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MIP-102
PATENTS

Patent Filing and Commercialization 2

"शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतंत्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।"

-इन्दिरा गांधी

" Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances"

- Indira Gandhi

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MIP-102
Patents

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2

PATENT FILING AND COMMERCIALISATION

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BLOCK 2 PATENT FILING AND COMMERCIALISATION

In the earlier block you were introduced to the Indian Patent Act and other important terms of patenting. In this block, you will be introduced with the procedure of filing a patent and its commercialisation.

This block consists of four units.

Unit 5 deals with the procedure for obtaining a patent in India, wherein the prescribed fee. Procedure for deposition of microorganism has been dealt elaborately.

Unit 6 discusses important issues like international patent search, documentation and analytics, which includes in it tools, practices, examples from different technology field like mechanism, electronic, biotech, software, pure science etc.

Unit 7 deals with patent specification and claims, with concrete examples.

Unit 8 attempts to discuss issues in commercialisation of patents which includes non-disclosure agreements, licensing assignments etc.

UNIT 5 PROCEDURE FOR OBTAINING A PATENT IN INDIA

Structure

5.1 INTRODUCTION

The creator of an intellectual property has many options to protect his creativity. The driving force behind the strategic decision to obtain a patent depends upon the commercial interest of the creator. Normally the creator is prompted to seek patents where he intends to secure protection for the new technology to establish a startup industry. There could be a possibility of manufacturing interest to strengthen the patent portfolio or licensing activity. Implementation of the decision to file patent application involves planning of a strategy to address the issue what to file and when?

There exit false notion in the minds of many inventors that applying for an Indian patent protects their invention throughout the world. In fact, a patent that is granted by Patent Office in India only provides protection within the territory of India. Therefore, if an inventor requires patent protection outside India as is usually desired by successful inventors, they must apply for patent protection outside the country.

Meaning of the term 'patent'.

The term 'Patent' has been defined under Section 2(1) (m) of the Patents Act,1970 which states that "patent" means a patent for any invention granted under the Act". Patents under this act are granted by the patent office after the examination of the patent application. Thus grant of a patent for an invention is compulsory requirement of the patent law.

5.2 OBJECTIVES

After reading this unit, you should be able:

- acquaint yourself with what a patent is;
- explain the procedure to obtain a patent;
- describe the different types of patent applications; and
- acquaint yourself with the forms and fee necessary in process for grant of patent.

5.3 STAGES INVOLVED IN GRANT OF A PATENT

The procedure related to securing a patent and the process relating to processing of the application is detailed in Chapter III and IV of the Patents Act, 1970 and in Chapter I and II of the Patents Rules, 2003. Stages involved in the process for obtaining a patent are as follows.

a) Filing of an application

b) Publication (including early publication)

c) Request for examination by the applicant or third party

d) Examination and issue of examination report to the Applicant

e) Meeting of objections and disposal of pre-grant opposition (if Any)

f) Grant of patent and issue of certificate of patent

g) Payment of renewal fee

5.4 TYPES OF PATENT APPLICATIONS

i) Ordinary applications – Are those applications where no priority is claimed

ii) *Convention applications* – Are those applications *where one or more priorities are claimed in respect of applications originating from the convention countries notified by the Central Government*

iii) *national phase applications* – Are those applications *application that entering national phase under Patent Cooperation Treaty (PCT)*

iv) PCT international applications – Are those applications *application which are filed under Patent Cooperation Treaty (PCT)*

v) *divisional application* – Are those applications *application which are divided out of the parent application containing one or more inventions*

vi) *patent of addition* – Are those applications *where invention pertains to improvement of the existing application or patent*

5.5 FORMAT FOR MAKING APPLICATION

Application for grant of patent is to be made on Form 1 as prescribed in the Second Schedule of the rules.

a) Particulars to be given for all types of application

   1) Name nationality, address of the applicant

   2) Name, nationality, address of the inventor (s)

   3) Title of the invention

   4) Address for correspondence of applicant /authorized patent agent in India

b) Additional particulars to be given depending on the type of application

   For convention application

   - Priority Particulars of the application filed in the convention country

   For national phase application

   - Particulars for filing Patent Cooperation Treaty (PCT) National phase Applications

   For divisional application

   - Particulars of original application- number and date of filing

   For patent of addition

   - Particulars of main application/ patent number and date of filing

c) In addition following declaration(s) should be given

   a) By inventors that they are true and first inventors of the invention or the applicants are their assignee/legal representative

b) By the applicants in the convention country that applicants are their assignee or legal representative *(For Convention application)*

c) By the Applicants that

- they are in possession of the invention,
- the application is accompanied by provisional /complete speciation
- Necessary permission from competent authority for use of biological from India would be submitted before the grant of patent (F*or inventions using biological material)*
- There is no lawful ground of objection to the grant of patent
- Applicant is the assignee or legal representative of true and first inventor in respect of the invention
- the application(s) filed in the convention country/ countries particulars of which are given in para -5 of Form1was the first application in respect of the invention *(For Convention application)*
- we claim the priority from the convention application(s) mentioned in para -5 of Form1 and no application in respect of the invention has been made in the convention country before that date *(For Convention application)*
- Application in India is based on International application filed under PCT (*For national phase application)*
- Application is divided out the original application particulars of which are given in para-7 of Form 1 and pray that this application is treated as deemed to be filed on (date of the original application) under Section 6 of the act (*For divisional application)*
- Said invention is an improvement in or modification of the invention particulars of which are given in para-8 of Form1 (*For patent of addition)*

d) *Each application should be accompanied by the following attachments*

a) Provisional specification /complete specification stating Number of Pages and Number of claims

b) Drawings (if any) stating number of drawing sheets

c) Priority documents

d) Translation of priority document/specification/International search report

e) Statement of undertaking on Form 3

f) Declaration of inventorship on Form 5

g) Sequence listing in electronic form

h) Abstract of the invention in 150 words

i) Power of authority (If inventor is not the applicant)

Separate applications should be made for each invention. The application should be signed by the applicant or the person authorized by him or the patent agent in whose favour Power of Attorney has been executed. Form 26 should be used for authorisation of a patent agent /or any person. Each application must be filed at the appropriate office along with the fee as prescribed in the first Schedule of the Rules. The application can also be submitted electronically through e-filing procedure available through the web portal of CGPDTM.

Self Assessment Question **(Spend 3 minutes)**

1) What are the necessary particulars which are to be given in an application for the grant of a patent?

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5.6 APPROPRIATE OFFICE

The appropriate office means the location of the patent office where the application should be filed. Applications filed in a wrong jurisdiction are ab initio void. The select of an appropriate office must be made carefully .It is based on the place of residence, domicile or business of the applicant or first mentioned applicant in the case of joint applicants or place from where the invention actually originated or place where the address for service in India, as given by the applicant is situated, if the applicant has no place of business or domicile in India. The appropriate office once decided can not be changed during the processing of the application.

A foreign applicant is entitled to file applications in patent office directly provided an address for service in India is given in the application. In this case, the application shall be filed in the office which covers the location of the address for service in India given by the applicant. An applicant is free to give the address of a patent agent as address for service in India. The territorial jurisdiction of each office is given below.

Patent Office	Territorial Jurisdiction
Mumbai	The states of Gujarat, Maharashtra, Madhya Pradesh, Goa, Chhattisgarh, the Union Territories of Daman and Diu and Dadra and Nagar Haveli.
Delhi	The states of Haryana, Himachal Pradesh, Jammu and Kashmir, Punjab, Rajasthan, Uttar Pradesh, Uttaranchal, National capital territory of Delhi and the Union Territory of Chandigarh.
Chennai	The states of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and the Union Territories of Pondicherry and Lakshdweep.
Kolkata	Rest of India.

5.7 PRESCRIBED FEE

Applicants are divided into two categories for the purpose of calculation of the fee. Amount of the fee that is payable depends on whether the applicant is a natural person or person other than a natural person. In the former case all individuals are covered. The later case is applicable to legal entities such as companies, R&D organizations, institutions, universities, societies etc. Fee charged in the later case is four time as compared to fee charged from the individuals .The quantum of fee also depend on number of priorities, number of pages ,and number claims. Details of the fee prescribed for filing an application is given below:

Fee	Natural Person	Other than Natural Person
For Application	Rs.1000/-	Rs. 4000/-
With multiple priorities	Multiple of Rs. 1000/- for every additional priority	Multiple of Rs. 4000/- for every additional priority
With specification exceeding 30 sheets	Rs. 100/- for every additional sheet	Rs. 400/-for every additional sheet
With claims exceeding 10	Rs. 200/- for every additional claim	Rs. 800/- for every additional sheet

5.8 PERSON ENTITLED TO FILE

5.8.1 True and First Inventor

The application for a patent must be filed by a person who is claiming to be the true and first inventor of the invention. The term "true and first inventor" has not been defined in the act, but it refers to a person who first made the invention and applied for a patent in the patent office. This indicates that two persons may independently make same invention at the same time but one who applies first for the grant of a patent will be considered as true and first inventor under the patent law. However, the first importer of an invention into India or a person who has received first communication of the invention from outside India is not considered as 'True and First Inventor' under Section 2(1) (y). This system is also referred to as 'first to file' where the applicant gets the date of application on 'first cum first serve' basis.

5.8.2 Assignee

Section 6(1) (b) indicates that right to apply is assignable. Since partnership firm or a company has no capacity to invent they cannot be treated as true and first inventor. They can be registered as a patentee either on assignment or jointly with true and first inventor. Assignee can be a natural person or registered company, research organization, educational institute, government undertaking or Government. The term assignee' as defined under Section 2(1) (ab) includes, assignee of the

assignee and legal representative of a deceased assignee The assignee is required to submit the proof of right to apply ether in the form of an endorsement on the application form or in the form of an assignment deed.

5.8.3 Legal Representative

The term 'legal representative' means a person who in law represents the estate of a deceased person. This means that right to apply is transferred to the legal representatives of the deceased persons on the death of the owner of this right.

5.8.4 Joint Applicants

An application for a patent can made by inventor ether alone or jointly with any other person. An inventor may join with any other person to make an application. The other person can be a co-inventor or assignee of the inventor or legal representative. According to Section 2(1) (s), the term 'person' includes Government.

5.8.5 Foreign Nationals

There are no restrictions on foreign nationals for making applications and obtaining a patent in India. But it is clear from rule 6 that a foreign applicant must furnish an address of service in India.

5.8.6 Application Made Through an Agency

An applicant may choose to authorize a registered patent agent or any other person to submit an application for patent on his behalf. .Such an authorization can be made on Form 26 or in the form of a power of attorney. The applicant is free to change such authorization any time during the processing of the application.

Self Assessment Question **(Spend 5 minutes)**

2) Who are persons entitled to file an application to obtain a patent?

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5.9 PROCEDURE OF FILING APPLICATION

There are two ways to file application for patent protection within India. The applicant may choose to file direct application in India or he may use the indirect route under Patent Cooperation Treaty (PCT) and file application in India after 31 months. The former category covers three type of application. (i) Ordinary application (Section 7). (ii) Convention application (Section 134) and (iii). PCT international application (Rule 20 (1). The later category refers to filing of national phase application using PCT route.

Form for filing the application

A simplified Form 1 is prescribed for filing application for patent under Section7 (ordinary application), 54 (patent of addition) , 135 (conventional application) and rule 20(1) (international application under PCT).

5.9.1 Ordinary Application

The first category relates to the applications where no priory date is claimed and the date of the application is the date on which the application is filed in the Patent office. Such applications are referred to as an ordinary application In the patent office. An ordinary application may be accompanied by a provisional or complete specification. If the application is accompanied by a provisional specification, a complete specification must be filed within twelve months from the date of filing of the application. In such cases a declaration as to Inventor ship on Form 5 should be submitted by the applicant at the time of filing complete specification or within one month from the date of filing complete specification. (S. 10(6) & Rule 13(6))

5.9.1.1 Documents Required for an Ordinary Application

1) Application, in Form 1 (in duplicate)
2) Provisional or complete specification in Form 2 (in duplicate)
3) Drawings (if any) in duplicate (Rule 13 & Rule 15)
4) Abstract of the invention in 150 words
5) Statement and undertaking relating to foreign filing in respect of the same invention in Form 3 (S. 8(1) & R. 12)
6) Power of attorney where application by a patent agent (Rule 135(1))
7) power of authority on form 26 where inventor authorize any person to make application on his behalf
8) Proof of right where application is made by the assignee. Proof of right to apply for grant of a patent can be included either in the body of the application (Endorsement in Form 1) or given separately as assignment deed. (S.7 (2) & R 10). If the application is made by the legal representative 'death certificate' of the deceased should be filed as proof of right. Proof of right may be submitted within three months of application

5.9.2 Convention Application

The second category covers those applications where the applicant claims the priory date and the date of the application is based on a similar application filed in one of the convention country notified under Section 134 of the act. In the patent office such applications are reoffered to as convention applications.

5.9.2.1 Special Provisions for Filing Convention Application

An application gets the priority date when following conditions are fulfilled

a) The applicant specify the date on which and the convention country where the application for protect was first made.

b) Application is filed in the patent office in India within twelve months from the date of first filing of a similar application in the convention country as notified by Central Government.

c) The applicant declares that no application in respect of the invention has been made in the convention country before that date by him or by any person from whom he derives the title.

d) Application is accompanied by a

i) Complete specification.

ii) Duly certified priority document (S.138 (1))

iii) English translation if priority document is not in English (S.138 (2))

5.9.2.2 Multiple Priorities

Convention application filed in India may claim multiple priorities based on more than one previous application. This refers to a situation where two or more applications are so related to each other to constitute one invention. For example if the convention application filed in India has described and claimed two elements (X and Y). X being disclosed in a UK application and Y in a Swiss application, both filed within 12 months, the priority dates of both the UK and Swiss applications may be claimed for the respective parts of the Indian application. Thus one application may be made covering both the application within twelve months from the date on which the earlier or earliest of those applications was made. Multiple fees is charged for claiming multiple priorities

Applicant of the convention application shall furnish when required by the Controller, copies of specification or documents (priority documents) certified by the official chief of the patent office of the convention country. If any such specification or document is in a foreign language, its translation into English shall be furnished.

5.9.2.3 Persons Entitled to File the Convention Application

A convention application may be made by any person who has made an application (basic application) for a patent for same invention in a convention country or the legal representative or assignee of that person.

5.9.2.4 Documents Required to File Convention Application

1) Application, in Form 1 (in duplicate)

2) Complete specification in Form 2 (in duplicate)

3) drawings (if any) in duplicate (Rule 13 & Rule 15)

4) Abstract of the invention in 150 words

5) Statement and undertaking relating to foreign filing in respect of the same invention in Form 3 (S. 8(1) & R. 12)

6) Proof of right where application is made by the assignee (S. 7 (2) & R 10)

7) Declaration as to Inventor ship (Form 5) (S. 10(6) & Rule 13(6))

8) Priority document(s) (S. 138)

9) Power of attorney where application is by a patent agent) (Rule 135(1)) or Power of authority in Form 26 where inventor any other person to file application on his behalf.

5.10 PCT-NATIONAL PHASE APPLICATION

An international application as specified in Section 2 (1)(ia)) filed under Patent Cooperation Treaty 2 (1)(oa)) can enter national phase in India within 31 months from the international filing date. The application which is filed before the Controller in the Indian patent office by claiming the priority and international filing date is called PCT-National Phase application.

Applicant can enter national phase by making a request on white paper. But Form 1A is preferred by the Indian Patent office during National Phase Entry. The title, description, drawings, abstract and claims filed with the application shall be taken as the complete specification for the purposes of filing in India (S.10 (4A)(i)). The filing date of such application is the international filing date accorded under the Patent Cooperation Treaty (S. 10(4A)).

It is not mandatory for the applicant to submit the documents while entering the national phase for filing the application in the member countries, as it is obligatory on the part of International bureau of the World Intellectual Property Organisation to send those documents to the designated offices. However for convenience and faster processing the applicant may submit the necessary documents. Office may ask for any other documents, which are necessary in addition to what was submitted along with the application.

5.11 PATENT OF ADDITION

This is a special type of a patent which is directly linked with main invention of another patent. It is basically restricted to an improvement or modification of the main invention. The application for patent of addition application can be filed only by the applicant or patentee of main invention.

An application for patent of addition can be filed for pending patent application or one existing Patent or two independent Patents.

Self Assessment Question **(Spend 2 minutes)**

3) Describe patent of addition?

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5.12 CONDITIONS FOR MAKING APPLICATION

When application for main Invention is pending

1) The application relating to main invention is being examined
2) Applicant for both of the applications is same
3) The application for grant of patent of addition is for improvement or modification on an invention described or disclosed in the complete specification filed for pending application for patent (main invention),
4) Specific request is made for grant of patent of addition in respect of application number of the main invention mentioned in the request.

When a patent for main Invention has been granted

1) The patent relating to main invention is in force
2) Applicant for the application and the patentee is same
3) The application for grant of patent of addition is for improvement or modification on an invention described or disclosed in the complete specification of the patent (main invention)
4) Specific request is made for grant of patent of addition in respect of patent number of the main invention mentioned in the request.

When two independent patents based on the main Invention have been granted

1) Both of the patents based on the main invention are in force
2) Patentee for the both of the patents is same
3) Where the patentee makes special request to the controller to pass an order to revoke the independent patent relating to an invention which is an improvement in or modification of the main invention disclosed in the existing patent of the patentee and grant to the patentee, a patent of addition for the former patent bearing the same date as the date of patent so revoked
4) The application for grant of patent of addition is for improvement or modification on an invention described or disclosed in the complete specification of the patent(main invention)
5) Specific request is made for grant of patent of addition in respect of patent number of the main invention mentioned in the request.

5.13 ATTRIBUTES OF PATENT OF ADDITION

1) The Complete Specification of the application for patent of addition shall include Specific reference
   - to the number of main patent or the application for the main patent as the case may be,
   - to a definite statement that the invention comprises an improvement in, or a modification of the invention claimed in the specification of the main patent granted or applied for.

- To Claims that are restricted to an improvement or modification of the main invention.

2) A patent of addition can not exit on its own.

3) The term of the patent of addition is coterminous with the terms of the main patent.

4) No separate renewal fee is payable for the patent of addition during the term of the main patent.

5) Patent of addition expires along with the main patent unless it is made independent according to the provisions in S.54.

5.14 DIVISIONAL APPLICATION

When the claims in one applications pertains to more than one invention, the applicant ether on his own request or to meet the official objection raised by office may divide the application and file separate applications for each of the inventions. The applications that are divided out of the parent application are called divisional application. The priority date for all the divisional application is same as that claimed by the parent application. Or in other words all the divisional application are ante dated to the date when the parent application is filed. The divisional application is not permitted to include any matter not in substance disclosed in the complete specification of the first application. The reference of parent application should be made in the body of the specification.

5.15 PROVISIONAL SPECIFICATION

A provisional specification is not rough draft or gist of the complete specification. The term 'provisional' does not imply temporary or ephemeral. The complete specification which is filed after the provisional specification does not in fact replace the later. Both are permanent and independent documents No amendments in the provisional specifications are permitted.

Contents of Provisional Specification

A provisional specification contains (i) title of the invention (ii) name address and nationality of each applicant (iii) a description of the nature of the invention proceeded by the preamble that 'the following speciation describes the nature of the invention'. The description should clearly state the object of the invention, principle underling the invention and a general statement relating to actual invention. The provisional specification must include as much information as the applicant has at the time of making the application. In any case the description must be adequate to identify the invention. Where it is not possible to describe invention without drawings suitable drawing must be submitted along with the provisional speciation. (iv) date and signature of each applicant or their authorized agent

5.16 COMPLETE SPECIFICATION

A complete specification contains (i) title of the invention (ii) name address and nationality of each applicant (iii) a description of the nature of the invention proceeded by the preamble that 'the following speciation particularly describes the nature of the invention and the manner in which it is to perform'. The

description should clearly state the object of the invention, principle underling the invention and a general statement relating to actual invention. The complete specification must include as much information as the applicant has at the time of making the application. The description must contain information relating to the nature of the invention and the manner in which it is to be performed in general terms and also describe the invention particularly by giving specific examples. The description must contain the best mode of perfuming the invention which is known to the applicant at the time of filing the application. In any case the description must be adequate to identify the invention. Where it is not possible to describe invention without drawings suitable drawing must be submitted along with the complete specification. If the suitable drawing has been already furnished with provisional specification it is not necessary to furnish set of the same drawing again. It is not enough to simply list various elements of the invention but the description must be provides for mode of the operation of the machine /device or functioning of its various parts. The complete specification must end with at least one statement of claim clearly defining the scope of the invention (iv) date and signature of each applicant or their authorised agent..

5.17 COGNATE INVENTIONS

Where two or more provisional applications constitute a single inventive concept they may be combined together under single complete specification. But such applications must be filed within the prescribed time of twelve months from the date of filing earliest provisional application.

5.18 DEPOSITION BIOLOGICAL MATERIAL

If the applicant mentions the use of a biological material in the invention and the material is such that it can not be sufficiently described in the specification he may choose to deposit such material in any of the depositories notified by the Central Government. Such deposit is bearing an accession number as treated as meeting the requirement of complete description of the invention in the specification. The type of material and the procedure for making deposits in the depositories under the Budapest Treaty are different for each material and it is governed by the terms and conditions of the depository where the material is deposited. List of the authorised depositories is given below. This material is not available to the public before the publication of the application. But the depository institutions are required to make this biological material available to public on request after the date of publication. Further the applicant is also required to fulfill the following conditions.

a) The biological material must be deposited at the time not later than the date of filing the patent application in India and a reference thereof shall be made in the specification within the prescribed period

b) All the available characteristics of the material required for it to be correctly identified or indicated must be specified in the specification including the name, address of the depository institution and the date and number of the deposit of the material at the institution;

c) The applicant is also required to disclose the source and geographical origin of the biological material described in the in the specification;

5.19 SUMMARY

- The procedure and process to obtain a patent is detailed in chapter III and IV of the Patent Act, 1970 and in Chapter I and II of the patent rules 2003.
- Application for grant of patent is to be made in Form 1 as prescribed in the second schedule of the rules.
- The persons who are entitled to file and application of patent are
  - i) True and first inventor.
  - ii) Assignee
  - iii) Legal representation
  - iv) Joint Applicants
  - v) Foreigners
  - vi) an application through an agency.
- There are six types of patent applications
  - a) Ordinary application
  - b) Convention application
  - c) National phase application
  - d) PCT international application
  - e) Divisional application
  - f) Patent of addition

5.20 TERMINAL QUESTIONS

1) What are the ways of filling an application to obtain a patent?
2) Write a note on PCT – National Phase Application?
3) Explain the attributes of patent of addition.

5.21 ANSWERS AND HINTS

Self Assessment Questions

1) i) name nationality, address of the applicant
   ii) Name, nationality, address of the inventor
   iii) Title of the invention
   iv) address for correspondence of applicant / authorized patent agent in India.
2) i) True and first inventor.
   ii) Assignee

iii) Legal representation

iv) Joint Applicants

v) Foreigners

vi) an application could also be made through an agency.

3) It is a special type of a patent which is directly linked with main invention of another patent. It is basically restricted to an improvement or modification of the main invention.

Terminal Questions

1) Refer to Section 5.7

2) Refer to Section 5.8

3) Refer to Section 5.11

UNIT 6 INTERNATIONAL PATENT SEARCH, DOCUMENTATION AND ANALYTICS

Structure

6.1 INTRODUCTION

The basic philosophy behind a patent system is to bring into public domain disclosures of new inventions at the earliest, and to provide incentives to an inventor in the form of legal rights in his invention to enable him or his assignee to prevent others from making, using, selling, or importing the invention in the protected territory for a limited period of time. Thus, while the inventors benefit from the legal rights in the inventions, the society benefits from the new knowledge disclosed in the patent documents which are normally published after 18 months

from date of filing of patent application. As a result, on one hand millions of dollars are saved by avoiding duplication of research efforts while on the other new knowledge is built benefiting from the disclosures made by others. Moreover, T the information required to be disclosed in a patent document possess many dimensions apart from its being techno-legal in nature and also having some kind of business orientation.

Further, the importance of patent information can be viewed from the fact supported by several studies indicating that more than 70-80% of the information disclosed in the patent documents is not published elsewhere. And above this fact that the volume of patent documents has grown to over 45 million documents. In order to meet the patentability requirement and to facilitate search for the prior art documents, patent databases information storage in various forms for major patent filing countries have been maintained for the period stretching as far as 1920 and even beyond. This voluminous documentation attracts, add more than 1.6 million documents published every year in various languages all over the world which include both unexamined and examined patent applications. According to the IP Statistics of WIPO, in 2009, 1,849,000 patent applications were filed worldwide. The top filers include Japan with 348,596 Patent applications followed by US 456,106, China- 314,604, Republic of Korea-, 163,523 and Germany-59,583 .Patent filings from developing countries is still insignificant but during the Post-WTO period, it has witnessed a remarkable increase. Similarly, during the last ten years, there has been a significant increase in the international patent filings under PCT both from the developed and developing countries.

Over the years, efforts have been made to standardize ways and means to store and access ever growing volume of patent information. Today, worldwide patent information from is available freely through on-line databases and also from national patent offices and to a limited extent from commercial entities. CDs, paper copies and value added information products and databases are also made available by commercial firms.

Universally, the Patent documents have a uniform structure and today various national databases and other organizations even provide facility to search through various parts of the patent document stored in the large databases running into millions of records. These databases contain both granted patents and patent applications. There are various ways to access and use patent information. In the following paragraphs, we will discuss in detail the structure of a patent document, various uses of technological information contained in patent documents, types of patent searches, tools and methods for carrying patent searches supported and illustrated by several examples.

6.2 OBJECTIVES

After reading this unit, you should be able to:

- describe about patent information and its various sources;
- explain the structure of a patent document;
- discuss about international patent classification;
- describe different types of patent searches;
- analyze how to conduct a patent search through various databases;
- explain about international search report; and
- describe patent analytics and its use.

Self Assessment Questions **(Spend 3 minutes)**

1) What type of information can be obtained from a patent document and a patent database?

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2) What are the different sources of patent information available?

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6.3 STRUCTURE OF PATENT DOCUMENT

The general structure of patent document comprises the following parts:

i) The title of the invention

ii) Abstract of the invention

iii) Field of the invention

iv) Background of the invention

v) Object of the invention

vi) Summary of the invention

vii) Description of the drawings and figures

viii) Detailed Description of the invention with examples.

ix) Advantages of the invention

x) Claims.

xi) Drawings/Sequence listing

Each patent document provides a very useful source of prior art information relating to a technological problem and specifies the ways and means to solve this problem. It also gives illustrative examples and the best mode of carrying out the invention and the advantages accruing from the inventive concept. The scope of the invention is defined by the claims in a patent which may relate to a product, process, method, application, new use, method of treatment, or a combination of one or more of these elements.

6.3.1 Bibliographic Information Contained in Patent Documents INID Codes

The front page of a patent document carries bibliographic information about a patent and is preceded by internationally accepted code for identification of Documents (INID Codes) so that it is possible to make out particular information about a field in a given patent document even if the language of the document cannot be understood. Important bibliographic fields include patent number, country codes, date pf grant, title, abstract, patent application number, date of filing, date of publication, inventors' name, name of the assignee, International patent classification, National Patent classification, attorneys' name, references cited, claims.

Some important INID codes used on the front page of patent document are given below. It may be noted that not all codes are used by all the patent offices on their printed patent documents. However, basic INID codes are available on all patent documents.

INID Codes

1) (10) Identification of the publication
   (11) Number of the publication
   (12) Kind of the publication
   (13) Kind of document code
2) (19) Country code, or other identification, of the country of publication
3) (20) Local filing details
   (21) Number given to the application
   (22) Date of making application
   (23) Other date(s) of filing, such as of complete application
   (24) Date from which industrial property rights may have effect
   (25) Language in which the published application was originally filed
   (26) Language in which the application is published
4) (30) Priority details
   (31) Number assigned to priority application
   (32) Date of filing of priority application
   (33) Country in which priority application was filed
   (34) Priority filings under regional or international arrangements. Country code for At least one Paris Convention member state where regional or international application was made, must be named
5) (40) Date of publication
   (41) Date of making available to the public by viewing, or copying on request, an unexamined specification which has not yet been granted
   (42) Date of making available to the public by viewing, or copying on request, an examined specification which has not yet been granted
   (44) Date of publication of an examined specification which has not yet been granted
   (45) Date of publication of a granted patent
   (46) Date of making available to the public the claim(s) only

(47) Date of making available to the public by viewing, or copying on request a patent document on which grant has taken place

(48) Date of issuance of a corrected patent document

6) (50) Technical information

(51) International Patent Classification

(52) Domestic or national Classification

(54) Title of the invention

(56) List of prior art documents, if separate from descriptive text

(57) Abstract or claim

(58) Field of search

7) (60) References to other legally or procedurally related related domestic document(s)

(61) no and filing date of earlier application/publication/utility model/ inventor's certificate or similar document to which the present patent document is an addition

(62) no of the earlier application from which present patent document is divided

(63) no of the earlier application from which present patent document is a continuation

(64) No of earlier publication which is re-issued

(65) Number of previously published patent document concerning the same application.

8) (70) Identification of parties concerned with the Patent or SPC

(71) Name of applicant

(72) Name of inventor

(73) Name of grantee/assignee

(74) Name of attorney/agent

(75) Name of inventor who is also applicant

(76) Name of inventor who is also applicant/ grantee

9) (80)-(90) Identification of data related to International Conventions other than Paris Conention and to legislation with respect to SPCs

(81) Designated State(s) according to the Patent Cooperation Treaty (PCT)

(83) Information relating to deposit of microorganisms under e.g. the Budapest Treaty

(84) Designated contracting states under regional patent conventions

(85) Date of commencement of the national phase pursuing to PCT

(86) Filing data of the international application (Number, Date of Filing, etc.)

(87) Publication data of the international application

(88) Date of deferred publication of the search report

(91) Date on which an international document filed under the PCT no longer has an effect in one or more elected states

(96) Regional filing data of original application

(97) Regional publication data original application

(***Source:*** Handbook of Industrial Property Information and Documentation, WIPO)

6.3.2 Kind Codes for Patent Documents

These codes include a letter, and in many cases a number, used to distinguish the kind of patent document e.g., publication of an application for a patent (unexamined patent application), examined patent, granted patent, reissued patents, plant patent, or design patent and also refer to the the level of publication (e.g., first, second, third, or subsequent publication or corrected publication). The kind codes differ slightly from country to country. The Kind codes assigned and used by WIPO, USPTO, EPO and India are provided below with their corresponding descriptions.

Code: A: First Publication Level

Code: B: Second Publication Level

Code: C: Third Publication Level

Code: L: Documents Relating to Patent Documents Other than Utility Model Applications or Registrations and Containing Bibliographic Information and Only the Text of an Abstract and/or Claim(s) and, Where Appropriate, a Drawing

Code: P: Special Series of Patent Documents—Plant Patent Documents

Code: T: Publication of Translations

Code: U: Utility Model Documents Having a Numbering Series Other Than the Documents Coded A, B or C—First Publication Level

Patent Kind Codes: Examples From Major Patent Offices:

S. No.	Patent Office	Kind Code	Description
1)	**EPO**	A	European patent application, published 18 months after filing with the EPO or 18 months after priority date
		A1	European patent application published with European search report
		A2	European patent application published without E uropean search report (search report not available at the publication date)
		A3	Separate publication of the European search report
		A8	Corrected title page of an A document, ie. A1 or A2 document
		A9	Complete reprint of an A document, ie. A1, A2 or A3 document
		B	European patent specification
		B1	European patent specification (granted patent)
		B2	New European patent specification (amended specification)

S. No.	Patent Office	Kind Code	Description
		B8	Corrected title page of a B document, ie. B1 or B2 document.
		B9	Complete reprint of a B document, ie. B1 or B2 document
2)	**India**	A	Complete Specification Laid open to Public inspection
3)	**USPTO**	A1	Patent Application Publication
		A2	Patent Application Publication (Republication)
		A9	Patent Application Publication (Corrected Publication)
		B1	Patent (No previously published pre-grant publication)
		B2	Patent (Having a previously published pre-grant publication and available March 2001)
		C1, C2, C3,	Reexamination Certificate
		E	Reissue
		H	Statutory Invention Registration (S.I.R.)
		P1	Plant Patent Application Publication (Pre-Grant)
		P2	Plant Patent (NO previous Pre-Grant Publication)
		P3	Plant Patent (previous Pre-Grant Publication)
		P4	Plant Patent Application republication (Pre-Grant)
		P9	Plant Patent Application Corrected Publication (Pre-Grant)
		S	Design Patent
4)	**WIPO/PCT**	A1	Publication of the International Application with ISR
		A2	Publication of the International Application without ISR.
		A3	Subsequent Publication of the ISR
		B1	Publication of amended claims
		B8	Second modification of the First page
		B9	Correction of a Complete Corrected Document
		C1	Modified First page
		C2	Complete Corrected Document

(***Source:*** WIPO, EPO, USPTO)

6.4 INTERNATIONAL PATENT CLASSIFICATION

The International Patent Classification (IPC) is a classification system developed and established under the Strasbourg Agreement (1971) and updated on a regular basis by a Committee of Experts. IPC is used universally by all patent offices in the world to classify the patent documents and assign the IPC codes during search and examination of patent applications. The IPC gets updated periodically. Currently, IPC Version 8 is available from the year 2006. The whole gamut of technology is divided into more than 70,000 fields or sub-groups. However, there are instances where mistakes occur when proper IPCs are not given by the classifiers and there may be difficulties in patent searching. However, for the standardization purposes EPO reclassifies the documents for internal searching to remove such ambiguities.

The IPC structure adopted is as follows:

- Section (8)
- Class (129)
- Subclass (639)
- Group (7,1316)
- Subgroup (61,460)

There are eight sections of IPC are as follows:

- **A**: Human Necessities
- **B**: Performing Operations, Transporting
- **C**: Chemistry, Metallurgy
- **D**: Textiles, Paper
- **E**: Fixed Constructions
- **F**: Mechanical Engineering, Lighting, Heating, Weapons
- **G**: Physics
- **H**: Electricity

An example of IPC explaining various symbols is given below:

Symbol A represents Section "Human Necessities";

Symbol A01 indicates class "agriculture; forestry; animal husbandry; hunting; trapping; fishing;

Symbol A01P indicates subclass "biocidal, pest repellant, pest attractant or plant growth regulatory activity of chemical compounds or preparations;

Symbol A01P 7/00 indicates Group "Arthropodicides";

Symbol A01P 7/02 indicates Subgroup "Acaricides"

For a broader understanding, the definition of IPC upto sub-class level is tabulated below:

IPC CLASSIFICATION

Section	Sub-section	Class	Code
SECTION A — HUMAN NECESSITIES	AGRICULTURE	AGRICULTURE; FORESTRY; ANIMAL HUSBANDRY; HUNTING; TRAPPING; FISHING	A01
	FOODSTUFFS; TOBACCO	BAKING; EQUIPMENT FOR MAKING OR PROCESSING DOUGHS; DOUGHS FOR BAKING	A21
		BUTCHERING; MEAT TREATMENT; PROCESSING POULTRY OR FISH	A22
		FOODS OR FOODSTUFFS; THEIR TREATMENT, NOT COVERED BY OTHER CLASSES	A23
		TOBACCO; CIGARS; CIGARETTES; SMOKERS' REQUISITES	A24
	PERSONAL OR DOMESTIC ARTICLES	WEARING APPAREL	A41
		HEADWEAR	A42
		FOOTWEAR	A43
		HABERDASHERY; JEWELLERY	A44
		HAND OR TRAVELLING ARTICLES	A45
		BRUSHWARE	A46
		FURNITURE, DOMESTIC ARTICLES OR APPLIANCES; COFFEE MILLS; SPICE MILLS; SUCTION CLEANERS IN GENERAL	A47
	HEALTH; AMUSEMENT	MEDICAL OR VETERINARY SCIENCE; HYGIENE	A61
		LIFE-SAVING; FIRE-FIGHTING	A62
		SPORTS; GAMES; AMUSEMENTS	A63
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION	A99
SECTION B — PERFORMING OPERATIONS; TRANSPORTING	SEPARATING; MIXING	PHYSICAL OR CHEMICAL PROCESSES OR APPARATUS IN GENERAL	B01
		CRUSHING, PULVERISING, OR DISINTEGRATING; PREPARATORY TREATMENT OF GRAIN FOR MILLING	B02
		SEPARATION OF SOLID MATERIALS USING LIQUIDS OR USING PNEUMATIC TABLES OR JIGS; MAGNETIC OR ELECTROSTATIC SEPARATION OF SOLID MATERIALS FROM SOLID MATERIALS OR FLUIDS; SEPARATION BY HIGH-VOLTAGE ELECTRIC FIELDS	B03
		CENTRIFUGAL APPARATUS OR MACHINES FOR CARRYING-OUT PHYSICAL OR CHEMICAL PROCESSES	B04
		SPRAYING OR ATOMISING IN GENERAL; APPLYING LIQUIDS OR OTHER FLUENT MATERIALS TO SURFACES, IN GENERAL	B05

Section	Sub-section	Class	Code
		GENERATING OR TRANSMITTING MECHANICAL VIBRATIONS IN GENERAL	B06
		SEPARATING SOLIDS FROM SOLIDS; SORTING	B07
		CLEANING	B08
		DISPOSAL OF SOLID WASTE; RECLAMATION OF CONTAMINATED SOIL	B09
	SHAPING	MECHANICAL METAL-WORKING WITHOUT ESSENTIALLY REMOVING MATERIAL; PUNCHING METAL	B21
		CASTING; POWDER METALLURGY	B22
		MACHINE TOOLS; METAL-WORKING NOT OTHERWISE PROVIDED FOR	B23
		GRINDING; POLISHING	B24
		HAND TOOLS; PORTABLE POWER-DRIVEN TOOLS; HANDLES FOR HAND IMPLEMENTS; WORKSHOP EQUIPMENT; MANIPULATORS	B25
		HAND CUTTING TOOLS; CUTTING; SEVERING	B26
		WORKING OR PRESERVING WOOD OR SIMILAR MATERIAL; NAILING OR STAPLING MACHINES IN GENERAL	B27
		WORKING CEMENT, CLAY, OR STONE	B28
		WORKING OF PLASTICS; WORKING OF SUBSTANCES IN A PLASTIC STATE IN GENERAL	B29
		PRESSES	B30
		MAKING PAPER ARTICLES; WORKING PAPER	B31
		LAYERED PRODUCTS	B32
	PRINTING	PRINTING; LINING MACHINES; TYPEWRITERS; STAMPS	B41
		BOOKBINDING; ALBUMS; FILES; SPECIAL PRINTED MATTER	B42
		WRITING OR DRAWING IMPLEMENTS; BUREAU ACCESSORIES	B43
		DECORATIVE ARTS	B44
	TRANSPORTING	VEHICLES IN GENERAL	B60
		RAILWAYS	B61
		LAND VEHICLES FOR TRAVELLING OTHERWISE THAN ON RAILS	B62
		SHIPS OR OTHER WATERBORNE VESSELS; RELATED EQUIPMENT	B63

Section	Sub-section	Class	Code
		AIRCRAFT; AVIATION; COSMONAUTICS	B64
		CONVEYING; PACKING; STORING; HANDLING THIN OR FILAMENTARY MATERIAL	B65
		HOISTING; LIFTING; HAULING	B66
		OPENING OR CLOSING BOTTLES, JARS OR SIMILAR CONTAINERS; LIQUID HANDLING	B67
		SADDLERY; UPHOLSTERY	B68
	MICRO-STRUCTURAL TECHNOLOGY; NANO-TECHNOLOGY	MICRO-STRUCTURAL TECHNOLOGY	B81
		NANO-TECHNOLOGY	B82
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION	B99
SECTION C — CHEMISTRY; METALLURGY	CHEMISTRY	INORGANIC CHEMISTRY	C01
		TREATMENT OF WATER, WASTE WATER, SEWAGE, OR SLUDGE	C02
		GLASS; MINERAL OR SLAG WOOL	C03
		CEMENTS; CONCRETE; ARTIFICIAL STONE; CERAMICS; REFRACTORIES	C04
		FERTILISERS; MANUFACTURE THEREOF	C05
		EXPLOSIVES; MATCHES	C06
		ORGANIC CHEMISTRY	C07
		ORGANIC MACROMOLECULAR COMPOUNDS; THEIR PREPARATION OR CHEMICAL WORKING-UP; COMPOSITIONS BASED THEREON	C08
		DYES; PAINTS; POLISHES; NATURAL RESINS; ADHESIVES; COMPOSITIONS NOT OTHERWISE PROVIDED FOR; APPLICATIONS OF MATERIALS NOT OTHERWISE PROVIDED FOR	C09
		PETROLEUM, GAS OR COKE INDUSTRIES; TECHNICAL GASES CONTAINING CARBON MONOXIDE; FUELS; LUBRICANTS; PEAT	C10
		ANIMAL OR VEGETABLE OILS, FATS, FATTY SUBSTANCES OR WAXES; FATTY ACIDS THEREFROM; DETERGENTS; CANDLES	C11
		BIOCHEMISTRY; BEER; SPIRITS; WINE; VINEGAR; MICROBIOLOGY; ENZYMOLOGY; MUTATION OR GENETIC ENGINEERING	C12
		SUGAR INDUSTRY	C13
		SKINS; HIDES; PELTS; LEATHER	C14
	METALLURGY	METALLURGY OF IRON	C21
		METALLURGY, FERROUS OR	

Section	Sub-section	Class	Code
		NON-FERROUS ALLOYS; TREATMENT OF ALLOYS OR NON-FERROUS METALS	C22
		COATING METALLIC MATERIAL; COATING MATERIAL WITH METALLIC MATERIAL ; CHEMICAL SURFACE TREATMENT; DIFFUSION TREATMENT OF METALLIC MATERIAL; COATING BY VACUUM EVAPORATION, BY SPUTTERING, BY ION IMPLANTATION OR BY CHEMICAL VAPOUR DEPOSITION, IN GENERAL ; INHIBITING CORROSION OF METALLIC MATERIAL OR INCRUSTATION IN GENERAL	C23
		ELECTROLYTIC OR ELECTRO-PHORETIC PROCESSES; APPARATUS THEREFOR	C25
		CRYSTAL GROWTH	C30
	COMBINATORIAL TECHNOLOGY	COMBINATORIAL TECHNOLOGY	C40
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION	C99
SECTION D — TEXTILES; PAPER	TEXTILES OR FLEXIBLE MATERIALS NOT OTHERWISE PROVIDED FOR	NATURAL OR ARTIFICIAL THREADS OR FIBRES; SPINNING	D01
		YARNS; MECHANICAL FINISHING OF YARNS OR ROPES; WARPING OR BEAMING	D02
		WEAVING	D03
		BRAIDING; LACE-MAKING; KNITTING; TRIMMINGS; NON-WOVEN FABRICS	D04
		SEWING; EMBROIDERING; TUFTING	D05
		TREATMENT OF TEXTILES OR THE LIKE; LAUNDERING; FLEXIBLE MATERIALS NOT OTHERWISE PROVIDED FOR	D06
		ROPES; CABLES OTHER THAN ELECTRIC	D07
	PAPER	PAPER-MAKING; PRODUCTION OF CELLULOSE	B21
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION	B99
SECTION E — FIXED CONSTRUC-TIONS	BUILDING	CONSTRUCTION OF ROADS, RAILWAYS, OR BRIDGES	E01
		HYDRAULIC ENGINEERING; FOUNDATIONS; SOIL-SHIFTING	E02
		WATER SUPPLY; SEWERAGE	E03

Section	Sub-section	Class	Code
		BUILDING	E04
		LOCKS; KEYS; WINDOW OR DOOR FITTINGS; SAFES	E05
		DOORS, WINDOWS, SHUTTERS, OR ROLLER BLINDS, IN GENERAL; LADDERS	E06
	EARTH OR ROCK DRILLING; MINING	EARTH OR ROCK DRILLING; MINING	E21
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION[8]	E99
SECTION F — MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING	ENGINES OR PUMPS	MACHINES OR ENGINES IN GENERAL; ENGINE PLANTS IN GENERAL; STEAM ENGINES	F01
		COMBUSTION ENGINES; HOT-GAS OR COMBUSTION-PRODUCT ENGINE PLANTS	F02
		MACHINES OR ENGINES FOR LIQUIDS; WIND, SPRING, OR WEIGHT MOTORS; PRODUCING MECHANICAL POWER OR A REACTIVE PROPULSIVE THRUST, NOT OTHERWISE PROVIDED FOR	F03
		POSITIVE-DISPLACEMENT MACHINES FOR LIQUIDS; PUMPS FOR LIQUIDS OR ELASTIC FLUIDS	F04
	ENGINEERING IN GENERAL	FLUID-PRESSURE ACTUATORS; HYDRAULICS OR PNEUMATICS IN GENERAL	F15
		ENGINEERING ELEMENTS OR UNITS; GENERAL MEASURES FOR PRODUCING AND MAINTAINING EFFECTIVE FUNCTIONING OF MACHINES OR INSTALLATIONS; THERMAL INSULATION IN GENERAL	F16
		STORING OR DISTRIBUTING GASES OR LIQUIDS	F17
	LIGHTING; HEATING	LIGHTING	F21
		STEAM GENERATION	F22
		COMBUSTION APPARATUS; COMBUSTION PROCESSES	F23
		HEATING; RANGES; VENTILATING	F24
		REFRIGERATION OR COOLING; COMBINED HEATING AND REFRIGERATION SYSTEMS; HEAT PUMP SYSTEMS; MANUFACTURE OR STORAGE OF ICE; LIQUEFACTION OR SOLIDIFICATION OF GASES	F25
		DRYING	F26
		FURNACES; KILNS; OVENS; RETORTS	F27
		HEAT EXCHANGE IN GENERAL	F28

Section	Sub-section	Class	Code
	WEAPON BLASTING	WEAPONS	F41
		AMMUNITION;BLASTING	F42
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION	F99
SECTION G — PHYSICS	INSTRUMENTS	MEASURING ; TESTING	G01
		OPTICS	G02
		PHOTOGRAPHY; CINEMATOGRAPHY; ANALOGOUS TECHNIQUES USING WAVES OTHER THAN OPTICAL WAVES; ELECTROGRAPHY; HOLOGRAPHY	G3
		HOROLOGY	G4
		CONTROLLING; REGULATING	G5
		COMPUTING; CALCULATING; COUNTING	G6
		CHECKING-DEVICES	G7
		SIGNALLING	G8
		EDUCATING; CRYPTOGRAPHY; DISPLAY; ADVERTISING; SEALS	G9
		MUSICAL INSTRUMENTS; ACOUSTICS	G10
		INFORMATION STORAGE	G11
		INSTRUMENT DETAILS	G12
	NUCLEONICS	NUCLEAR PHYSICS; NUCLEAR ENGINEERING	G21
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION	G99
SECTION H — ELECTRICITY	ELECTRICITY	BASIC ELECTRIC ELEMENTS	H1
		GENERATION, CONVERSION, OR DISTRIBUTION OF ELECTRIC POWER	H2
		BASIC ELECTRONIC CIRCUITRY	H03
		ELECTRIC COMMUNICATION TECHNIQUE	H04
		ELECTRIC TECHNIQUES NOT OTHERWISE PROVIDED FOR	H05
	OTHERS	SUBJECT MATTER NOT OTHERWISE PROVIDED FOR IN THIS SECTION	H99

Source: WIPO

For understanding IPC symbols upto sub-group level, you may refer to IPC version 8 at http://www.wipo.int/classifications/ipc/ipc8/?lang=en

6.5 TYPES OF SEARCHES

Patent searches are conducted for various purposes. The use of technological and bibliographic information contained in patent document is reflected in the various

types of searches conducted from the patent databases. Some of the applications of the patent searches are listed below:

- Assessing State of the Art
- Conducting Patentability Search
- Patent mapping for ascertaining value of IP
- Studying existing claims
- Conducting Freedom to Operate Analyses
- Anticipating other fields of use
- Cross-discipline review
- Design-around analysis
- Evaluating competitors' IP Space
- Looking at possible infringement issues
- Citation analysis: Finding key patents
    - Identifying patents frequently referenced in other patents
    - Shows who's actively patenting in an area
    - Citation tree
- Identifying companies developing similar products

As can be seen from the above applications, we find that patent searches provide a very useful tool for planning and doing R&D, finding technology space to work in newer areas, enforcing patent rights, carrying out due diligence and taking instant business and investment decisions using such information.

Explanations on use of patent search reports: Explained below are some of the uses of patent search reports for the better understanding of the students.

6.5.1 Patentability (Novelty, Inventiveness or Non-obviousness) Search

The patentability search is conducted by the National Patent Offices and organizations before a patent is granted. The objective of a patentability search report is to ensure that only novel, non-obvious and useful inventions are considered for the grant of the patent rights. There are instances where an invention is found novel but still it is not able to establish the inventive step in the invention due to the citations making an invention obvious.

6.5.2 State of Art Search

Generally speaking, state of the art search report gives a technological background about the existing solutions to the problems in a particular field. The state of art search report will also tell us about activity of various players in the field worldwide. The legal status of these patent applications when ascertained has given us an idea of the technologies which are available for free use and the ones which could be available for licensing.

6.5.3 Validity Search

The validity searches are conducted to ensure whether the claims in a patent are legally enforceable or not, in view of the prior art or are infringing somebody's patent.

6.5.4 Infringement Search

Infringement searches can be carried out at all stages of the inventive activity to safeguard inventor's patent rights and to enable taking remedial measures in case of infringement. This type of search can also be carried out for developing non-infringing products and processes.

6.5.5 Legal Status Search

This type of search is conducted to find out whether a particular patent is still in force or has been abandoned or allowed to lapse. This information is very useful while negotiating license agreements and exploiting the technological information where the patent rights do not exist.

6.5.6 Patent Family Search

Patent family search will give information about equivalent patent applications filed corresponding to a patent application showing thereby the geographical coverage of the invention.

6.5.7 Search by Inventor's Profile

This would help identifying prolific inventors in a particular field and also show as to how many patents are taken by an inventor in one or more fields. This can also decipher the movement of an inventor from one organization to another.

6.5.8 Search by Assignee's/Applicant's Profile

Search on assignees' profile would reflect the patent holding or portfolio of an assignee or applicant in a particular year or over a period of time and its distribution in the different fields.

6.6 SOURCES OF PATENT INFORMATION

1) **Databases**

   a) Patent databases

      i) Publicly available databases – USPTO, EPO (EP, Worldwide, IPDL/WIPO), JPO, Surf IP, Trilateral Databases, national databases etc.

      ii) Paid Access to Value Added databases – Derwent, Delphion, STN, Chemical Abstracts, Micropat, Questel and others.

   b) Non patent literature databases- Access to various journals through Science Direct, specific journals and abstracting services through on-line mode including Physical Abstracts, Chemical Abstracts, Biological Abstracts, CAB Food Science and Technology Abstracts, Medline, Web of Science, Journal of Patent Associated Literature (JOPAL, WIPO), IPDL/WIPO, Pubmed, Google etc.

   c) Exhibitions, Trade Fairs etc.

2) **Chemical Abstracts Accession Nos and Structure Search Facility** : CAS also provides facilities for retrieving information on various chemical substances by entering structure of substances as queries. Also millions of chemical compounds have been assigned CA codes and are helpful in accessing the information.

3) **Presses:** Various presses like Springerlink, Wiley-Interscience, Royal Society of Chemistry, Blackwell Synergy, ACS Publications etc provide free access to the abstracts of the research papers published.

6.7 HOW TO CONDUCT PATENT SEARCH

Searches are conducted using various Boolean operators, keywords, IPC, truncations, proximity operators, date fields, patent number and combinations of these tools as listed below:

i) Using Boolean operators: The Various Operators are

   a) AND

   b) OR

   c) ANDNOT

   d) XOR (at least one of the terms must be there in the field chosen, but not both).

   e) NEAR (that the two terms must occur near [within 5 words of] each other in the field chosen).

ii) Using proximity operators: This feature allows searching for terms that occur near one another

iii) Using truncation: Generally right truncations are used. Different truncation may have different meaning in different databases. The most commonly supported truncations include *, ?, # and $.

iv) Using keywords: Keywords have to be used to obtain the desired information. Keyword(s) should be selected carefully as the results obtained are wholly depending upon the keywords being provided. A combination of various keywords can be used using the Boolean operators, truncations, and parenthesis.

v) Using classification (IPC): Sometimes, a particular keyword can be found in many industries simultaneously leading to large number of hits relating to undesired documents. To avoid this, we can use a combination of keyword along with the IPC under which we need the required information.

vi) Citation and reference search: This can be used to search the patents cited during examination of a patent application, also all those patents mentioned as citation and references.

vii) Date search: This feature facilitates to specify from which date to which date we need the information.

viii) Number search: This search is done if the patent number/application number or any other related number of a patent document is known.

ix) Name search: Patent applications can also be searched by inventor's/ assignees'/attorney's/examiners' name as per the case requirements.

6.7.1 How to Conduct Patent Search in USPTO Database (www.uspto.gov)

Data Coverage:

Database	1976-2005	1790-1975
Utility* **	3,930,271- current	X1- X11,280; 1-3,930,270
Design	D242,583- current	D1- D242,880
Plant	PP3,987- current	PP1- P4,000
Reissue (RD,RE, RX)*	RE28,671- current	RX1-RX125;RE1-RE29,094
Defensive Pub. **	T100,001-T109201; T942,001-T999,003	T855,019-T941,025;
SIR	H1-current	-
AI* **	-	AI2-AI318

* RDs and REs are issued in the same numeric sequence; RXs are issued in a separate numeric sequence.

** T patents were not numbered in a continuous sequence; numbers were issued in batches based on OG volume.

*** X and AI patents have non-withdrawn gaps due to patents lost in the historic Patent Office fire.

Searchable Fields: The Searchable fields followed by their codes for advanced search are as follows:

- Abstract (ABST)
- Application Date (APD)
- Application Serial Number (APN)
- Application Type (APT)
- Assignee City (AC)
- Assignee Country (ACN)
- Assignee Name (AN)
- Assignee State (AS)
- Assistant Examiner (EXA)
- Attorney or Agent (LREP)
- Claims (ACLM)
- Description/Specification (SPEC)
- Foreign Priority (PRIR)
- Foreign References (FREF)
- Government Interest (GOVT)

- International Classification (ICL)
- Inventor City (IC)
- Inventor Country (ICN)
- Inventor Name (IN)
- Inventor State (IS)
- Issue Date (ISD)
- Other References (OREF)
- Parent Case Information (PARN)
- Patent Number (PN)
- PCT Information (PCT)
- Primary Examiner (EXP)
- Reissue Data (REIS)
- Title (TTL)
- Related US Application Data (RLAP)
- Current US Classification (CCL)
- Referenced By (REF)

***Source*:** USPTO

Types of Searches available:

- Quick Search
- Advanced Search
- Patent Number Search

a) **Quick Search**

The Quick Search Page allows searching the US Patent Full Text Database using two-term Quick search queries. There are seven steps to using the Quick Search Page:

1) Select a year or range of years to search from the **Select years to search** drop-down menu.

2) Enter a term in the text entry box labeled **Term 1**.

3) Select which field to apply to Term 1 by using the **Field 1** drop-down menu located to the right of the Term 1 box.

4) Select a **Quick Operator** (AND, OR, or ANDNOT) from the menu located between the two Term boxes.

5) Enter a term in the text entry box labeled **Term 2**.

6) Select which field to apply to Term 2 by using the **Field 2** drop-down menu located to the right of the Term 2 box.

7) Hit the **Search** button.

b) **Advanced Search**

The Advanced Search Page allows formulating a query which can be submitted to US Patent Full Text Database using command line search syntax. Before starting the search, one must look at the fields and the codes assigned to the fields. Each service provider may use different codes as assigned to the various fields. There are 3 steps to submit a query using the Advanced Search Page:

1) Select a year or range of years to search from the **Select years to search** drop-down menu.

2) Type the search statement into the Text Entry box marked **Query**.

3) Hit the **Search** button.

Example:

Search query "ttl/(Cycle or rickshaw)" gives 5508 hits which includes the patents having *cycle* or *rickshaw* in Title.

c) **Patent Number Search**

The Patent Number Search Page allows you to search for patents by their number. This page is designed to simplify one of the most common types of searching. To use the page:

1) Type the patent number or numbers into the box. If you include more than one number, they should be separated by a space. It is not necessary to include commas or to capitalize the prefix.

2) Hit the **Search** button.

Various Features Available in USPTO

a) ***Two-Term Quick Expressions Searches***

This can be done by using the Boolean Operators AND, OR, or ANDNOT.

Example 1: cycle AND rickshaw

While performing a quick search, if we enter *cycle* in the **Term 1** box, *rickshaw* in the **Term 2** box, and select AND from the **Operator** menu, we will retrieve a list of documents which contain **both** the word *cycle* and *rickshaw* anywhere in the document.

Example 2: cycle OR rickshaw

If we enter *cycle* in the **Term 1** box, *rickshaw* in the **Term 2** box, and select OR from the **Operator** menu, we will retrieve a list of documents which contain **either** the word *cycle* or the word *rickshaw* anywhere in the document.

Example 3: cycle ANDNOT rickshaw

If we enter *cycle* in the **Term 1** box, *rickshaw* in the **Term 2** box, and select ANDNOT in the **Operator** menu, we will retrieve a list of documents which contain the word *cycle* anywhere in the document but do **not** contain the word *rickshaw* anywhere in the document.

b) ***Field Searching***

The Advanced Search Page allows searching individual fields within patents. One can find a list of all indexed fields in the menu to the right of the **Term 1** and **Term 2** Text Entry boxes on Quick Search Page. Alternately in Advanced Searching, field code followed by the keyword in the form of syntax can be used. Field searching is used to narrow down the search to hits occurring within a single field.

c) ***Phrase Searching***

A group of words enclosed in quotation marks (") will be treated as a single search term. If we have to search for the phrase **electric kettle,** rather than entering **electric** or **kettle**, we would enter **"Electric Kettle"**.

d) ***Date Range Searching***

We can specify a range of dates we are interested in searching rather than having to specify a certain day or month to narrow the search. This feature is only available in date fields, such as Issue Date and Application Date. This is done by using the -> operator between two dates.

Example:

Term 1: ***12/1/1997->9/20/1998*** **Field 1:** ***Issue Date***

This query would return all patents in the database which were issued any day on or after Dec. 1, 1997, and before or on Sept. 20, 1998.

e) ***Right Truncation***

This allows to use a truncation wildcard ("$") on the right side of a search term, to retrieve words that begin with a certain string.

Example:

If we are interested in patents related to computers, we might truncate as follows: ***computer$*** which will return patents with *computer* or *computers* anywhere in the document.

f) ***Nested Quick Expressions***

The Advanced Search Page can be used to create and execute Quick searches with more than two search terms that use the Quick operators (***OR, AND, ANDNOT***). Along with these operators, parentheses can be used to further clarify the search statement. In the absence of parentheses, all operators associate from left to right. For example, if we want to search patents for cycle and not rickshaw in description, we can use the nester expression as **spec/ (cycle ANDNOT rickshaw)**.

Source: www.uspto.gov

How to search Indian database

Indian Granted Patents Search Engine:

The Current version of search engine is basically a structured search i.e. interface providing pre-defined Indexed fields for searching in the database.

The present version has been improved over previous so as to provide:

1) Increased no. of fields (No. of Parameters for search are now 14)
2) Combination of Search fields
3) Inclusion of operators
4) Distinct (non-repetitive) results
5) Detailed information of Patents (01/01/1995 onwards)

Data base also provide quick notes to new user

Quick Notes:

1) All Keywords are considered as case-insensitive by search engine.
2) Search result displays the Patents that are digitized and published u/s 43(2).

Data Coverage

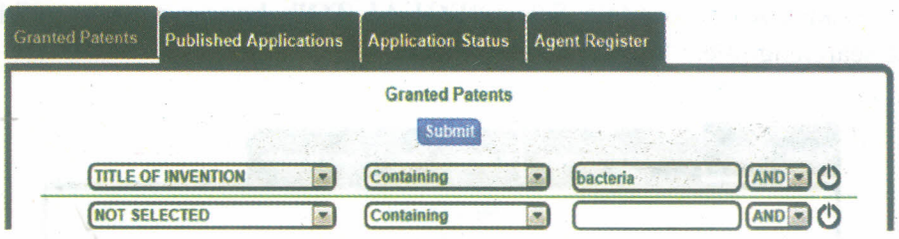
- Data of granted Patents is available since 1912.
- Full Details including Complete Specification, Original documents & Patent e-register are available for
- Patent Applications filed 01/01/1995 onwards

User inter-phase and help

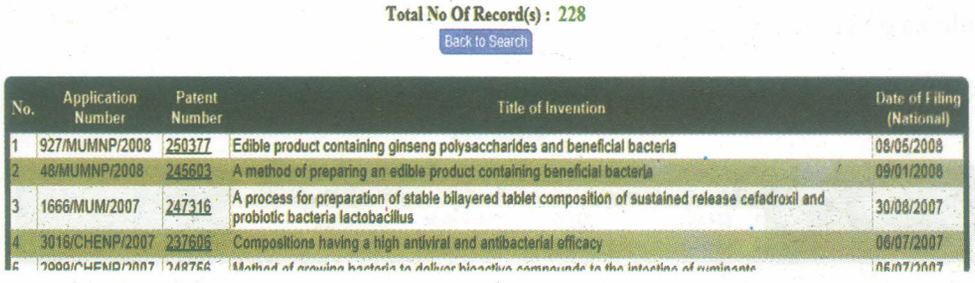
Title of Invention/Abstract:

1) **SEARCHING SINGLE KEYWORD**

Select "CONTAINING" if search is to be performed anywhere in the title/ abstract irrespective of proximity. For e.g. type "bacteria" for searching titles having "bacteria/bacterial/anti-bacterial"



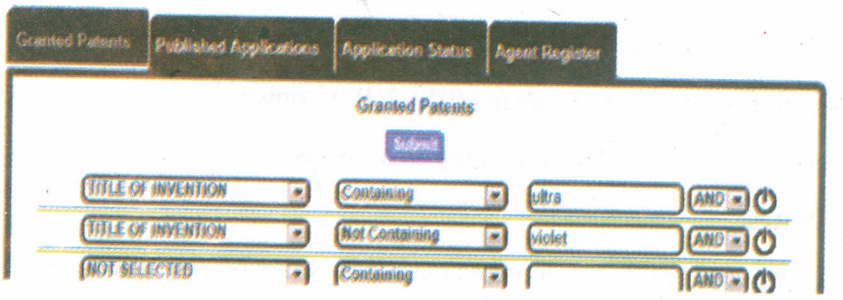
Search would be performed with as well as without truncation of Keyword. Result would appear as given below and it will include "bacteria", "bacterial", "anti-bacterial" etc.



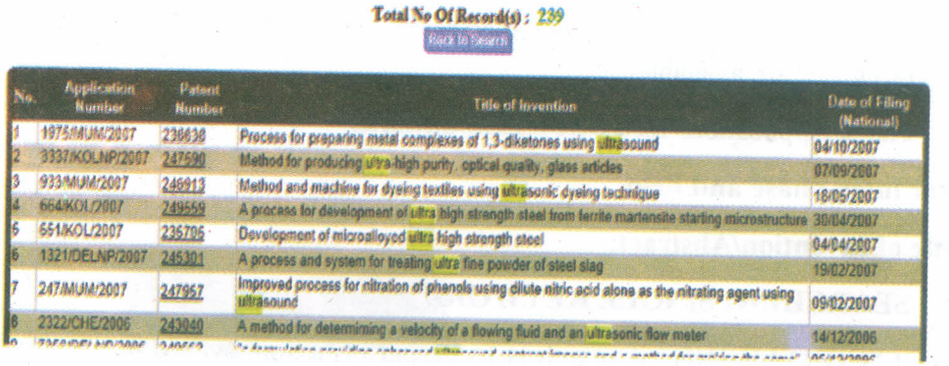
These Search Results can be sorted by clicking on the respective header in the result grid.

2) SEARCHING EXCLUDING SINGLE KEYWORD

To exclude a keyword anywhere in the title/abstract use **"Not Containing"**. For e.g. to search Applications having keyword: "Ultra" and not like "Ultraviolet" use: The screen will show as follows

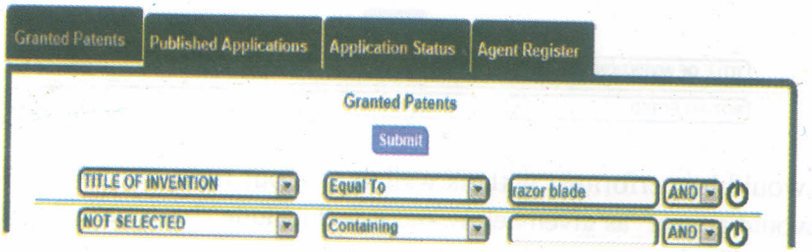


The search results would include "Ultra" but would exclude "Violet". It will highlight the search term.

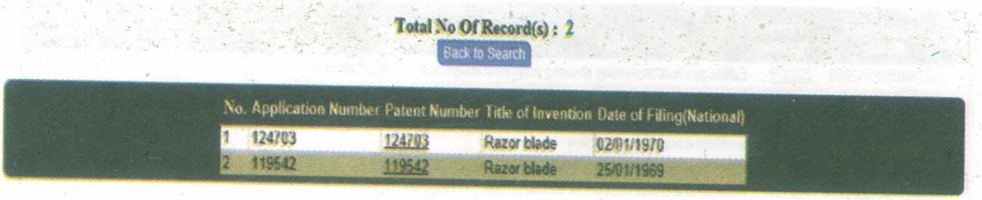


3) SEARCHING EXACT TITLE

For making search of a title Select **"EQUAL TO"** . For e.g. type "razor blade" for searching title : "razor blade" as shown below



Search result would show only those titles that are having "razor blade" as whole title as given below .

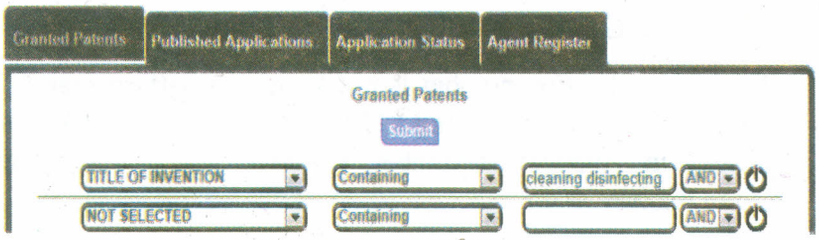


Full document can be viewed by clicking on the patent number.

4) SEARCHING MULTIPLE KEYWORDS

For making multiword search Select **"Containing"** and type all the keywords that are expected in title/abstract in the search box.

Example 1: To find all the applications having Keywords **"Cleaning" AND "Disinfecting"** use:

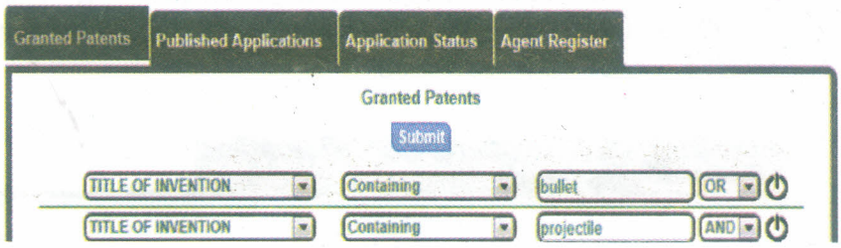


All the applications having both Keywords "Cleaning" and "Disinfecting" would be displayed with highlighting all words .

No.	Application Number	Patent Number	Title of Invention	Date of Filing (National)
1	2340/CHENP/2005	231322	A sprayable hard surface cleaning or disinfecting composition	21/09/2005
2	2349/CHENP/2005	226169	Hard surface cleaning and/or disinfecting compositions	21/09/2005
3	2618/CHENP/2004	230550	Hard surface cleaning and disinfecting compositions	22/11/2004
4	IN/PCT/2001/1728/CHE	221313	Low residue aqueous hard surface cleaning and disinfecting compositions	06/12/2001
5	833/DEL/2000	227365	"a low residue aqueous cleaning and disinfecting composition"	13/09/2000
6	1376/CAL/1996	205282	Blooming type, hard surface cleaning /disinfecting compositions	01/08/1996
7	65/CAL/1976	141823	Device for cleaning/disinfecting the nasal passages	09/01/1976
			Improvements in or relating to a device for washing cleaning and disinfecting floors.	

Note: To search "cleaning" and "disinfecting" irrespective of proximity/order within title/abstract, use the keywords separately by joining the terms with "AND" operator. Results would show both "Cleaning & Disinfecting" and "Disinfecting & Cleaning".

Example 2: To find all the applications having Keywords "Bullet" OR "Projectile" use:



All the applications either having Keyword "Bullet" or having "Projectile" would be

No.	Application Number	Patent Number	Title of Invention	Date of Filing (National)
1	1099/MUM/2005	245571	Hollow, least air resistance bullet	13/09/2005
2	IN/PCT/2002/1828/CHE	205930	Small-calibre deformation projectile and a method for the production of the same	07/11/2002
3	IN/PCT/2002/1634/CHE	212366	Reduced-contaminant deformable bullet, preferably for small arms	07/10/2002
4	IN/PCT/2002/00017/MUM	208845	Bag style container with bullet resistant deployable panels	07/01/2002
5	IN/PCT/2001/01229/KOL	206709	Projectile for delivery of a tranquiliser	23/11/2001
6	IN/PCT/2000/695/CHE	207711	A projectile for piercing armor and a method for piercing armor of a target	21/11/2000
7	IN/PCT/2000/00453/MUM	209961	Small arms projectile for a small arms weapon	29/09/2000
8	720/DEL/1995	190748	A process for the preparation of a light weight ceramic composite material for use in bullet proof panels/shelters"	20/04/1995
9	1274/DEL/1991	184926	"projectile for a rifled weapon"	24/12/1991

5) **Application number Search**

1) SEARCHING FOR EXACT NUMBER:

Select "**Equal to"** if exact number of application is known. For e.g. type

"345/DELNP/2009" in the search box after selecting "Application Number" & "Equal to" fields.

2) SEARCHING WITH APPLICATION NUMBER PATTERN:

If actual application number is not known, a pattern search can be performed for e.g. **searching "1234/DEL/20" using "Containing"** operator in "Application Number" would retrieve all the numbers like 1234/DELNP/2001,

1234/DELNP/2002,

1234/DELNP/2003,

1234/DELNP/2004,

1234/DELNP/2005,

1234/DELNP/2006 etc

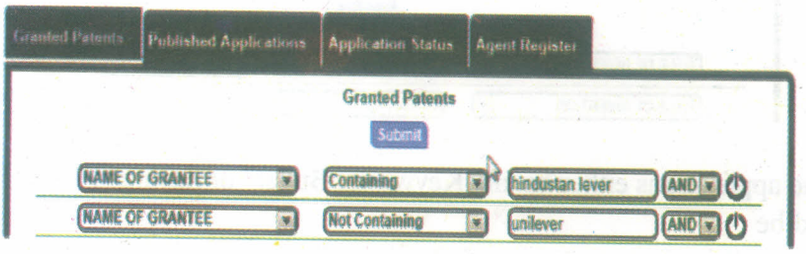
6) **Grantee/Inventor Name**

1) SEARCHING NAME PATTERN:

Applicant's name can be best searched using main string i.e. main name for e.g. "Microsoft" for Microsoft Corporation /Microsoft Corporation Limited/ Microsoft Corp. Ltd. /Micro Soft Corporation/ etc. using "Containing" operator AND refining the query for further results.

2) SEARCHING WITH NAME EXCLUSION:

If it is required to exclude some keywords from the Name of Applicant/ Inventor then "Not Containing" operator can effectively be used. For e.g. To search Applications filled by "Hindustan Lever Limited" but not by "Hindustan Unilever Limited", select "Containing" and enter "Hindustan lever" in 1st search box then select "Not Containing" and enter "Unilever" in 2nd search box:



Displayed results would show Applications filled by "Hindustan Lever Limited" excluding those having the name as "Hindustan Unilever Limited".

3) SEARCHING WITH EXACT NAME

If the exact name of the Applicant is known, use the **"Equal to"** operator to display the result.

7) **Applicant/Inventor Address:**

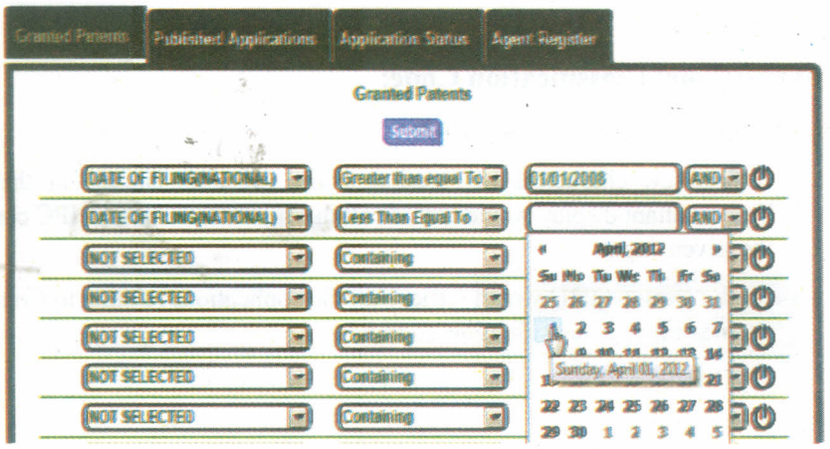
SEARCHING APPLICANT/INVENTOR'S ADDRESS:

Applicant's address can also be best searched using main string i.e. prime expected keyword occurring in the address for e.g. use **"Kanpur"** for applications having Applicant's address as "INDIAN INSTITUTE OF TECHNOLOGY KANPUR, KANPUR-208 016", using "**Containing**" operator. Refine the query appropriately for further results

8) **Date of Filing/Grant/Publication:**

1) SEARCHING BETWEEN THE DATES:

All the applications that have been filed or granted or published u/s 11A between a particular duration can be retrieved by entering dates in the fields of Date of Filing /Date of Grant /Publication Date, using **"Greater Than Equal to"** and **"Less Than Equal to"** operators.



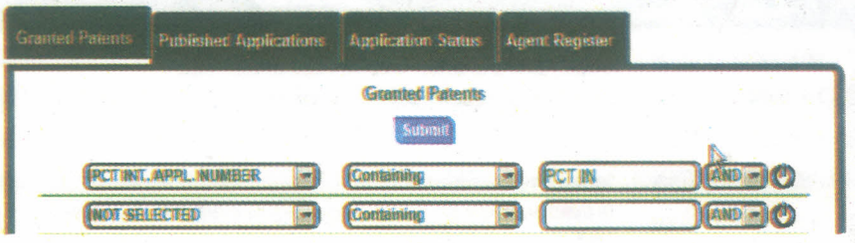
2) **SEARCHING WITH EXACT DATE:**

If exact date is known search can be performed using **"Equal to"** operator

9) **PCT International Application Number:**

1) SEARCHING WITH PATTERN:

Applications having PCT international numbers can easily be retrieved using Pattern search. For e.g. Keyword "PCT IN" is sufficient to retrieve all the applications originating from INDIA:



Results would include all the PCT applications originating from India that are granted:

No.	Application Number	Patent Number	Title of Invention	Date of Filing (National)
1	949/MUMNP/2006	251841	Extended release coated minitablets of venlafaxine hydrochloride	10/08/2006
2	2468/CHENP/2004	251698	A novel process for preparation of cefprozil intermediate	01/11/2004
3	1069/MUMNP/2007	251612	A process for the preparation of r-(-)-n, alpha-dimethylphenethylamine (levmetamfetamine) or s-(+) -n, alpha-dimethylphenethylamine (methamphetamine)	16/07/2007
4	16/MUMNP/2005	251454	Flavone derivatives as inhibitors of cyclin-dependent kinases	10/01/2005
5	374/DELNP/2004	251603	"a process for the preperation of platinum complex"	20/02/2004
6	1347/CHENP/2004	250550	Process for the production of an immunosuppressant	17/06/2004
7	504/DELNP/2004	250039	A novel synthetic plant growth regulator compound, methanone-(3,4,5-trimethoxy) phenyl 1-naphthyl 2-o-4-ethyl but-2-enoate	27/02/2004
8	1760/MUMNP/2007	249995	Improvement in synthesis of butylated hydroxyanisole from tertiary butyl hydroquinone	22/10/2007

Further if Keywords are modified to "PCT IN 2005" then results would be displayed for those applications which having filing year as 2005 like:

PCT/IN2005/000123,

PCT/IN2005/00037,

PCT/IN2005/000033

SEARCHING WITH EXACT NUMBER:

If exact Number is known search can be performed using "Equal to" operator

10) **International Classification Code:**

1) SEARCHING WITH PATTERN :

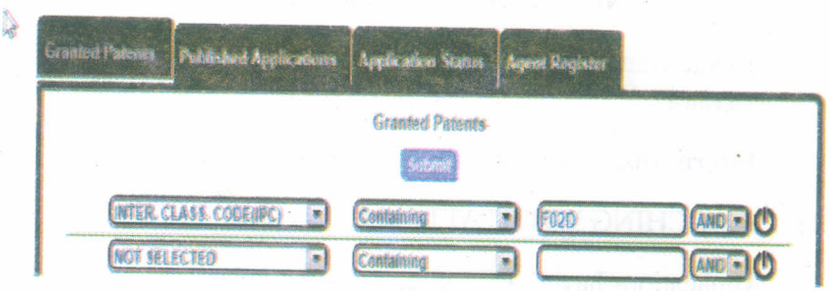
If first few characters i.e. section, class, group is entered in the search box; resultant display would include all the applications having IPC containing the given input.

For Example . F02D would retrieve all the applications relating to Combustion engines having classification code like:

F02D41/04,

F02D 41/06,

F02D23/02,



Following result will be

No.	Application Number	Patent Number	Title of Invention	Date of Filing (National)
1	941/KOL/2007	251816	A combustion mode switching control system for a diesel engine and a method of switching between a premixed compression ignition and a diesel combustion mode	29/05/2007
2	2173/MUM/2007	251691	Twin cylinder turbocharged inter cooled internal combustion engine	01/11/2007
3	931/KOL/2007	251472	An airflow determination system and a method for determining a mass airflow into a cylinder of an engine	28/05/2007
4	216/DEL/2005	251634	"anti rolling device for a vehicle"	03/02/2005
5	897/KOL/2007	251308	An internal combustion engine and a high pressure fuel pump assembly for the internal combustion engine	13/05/2007
6	3729/KOLNP/2006	251471	Control system for hydraulic construction machine	12/12/2006
7	1215/KOL/2007	250939	An engine control system and a method for controlling an internal combustion engine to transition between an activated and deactivated mode	31/08/2007
8	23/CHE/2005	250623	Attachment structure for an exhaust gas sensor for an internal combustion engine	13/01/2005

2) SEARCHING WITH EXACT NUMBER:

If exact IPC is known search can be performed using **"Equal to"** operator

(***Source*** : Indian Patent Office Website)

6.7.2 How to Search Patents in IPDL/WIPO Database

WIPO provides Structured Search which is a simple interface to the database for fielded term searches only. This is corresponding to the 'Advanced search' facility in EPO. There are 4 steps to using the structured search page:

1) Enter the search term or terms into the input box to the right of the field you are interested in searching.
2) Select an operator from menus to the left of the field or fields you are searching.
3) Select your preferred display formats under **Display Options**.
4) Hit the **Search** button.

Search Features available in WIPO

a) ***Field Searching*** (This feature is same as that in USPTO)

b) ***Phrase Searching*** (This feature is same as that in USPTO)

c) ***Proximity Searching***

The Structured search page allows searching for terms that occur near one another (currently, within 5 words).

Example:

If we enter *sewing* in the **English Abstract** box, needle* in the next box, changed the associated field to English Abstract, and selected NEAR from the next menu, we would receive back a list of all documents which contain the words *sewing* and *needles* in the English Abstract field, and in close proximity (5 words) to one another. Contrast this with selecting 'and', where the two terms are not required to be in proximity to one another.

d) ***Right Truncation*** (This feature is same as that in USPTO)

e) ***Simple Boolean Expressions***

The Boolean Operators supported by WIPO database are:

i) AND
ii) OR
iii) ANDNOT
iv) XOR (at least one of the terms must be there in the field chosen, but not both)
v) NEAR (that the two terms must occur near [within 5 words of] each other in the field chosen).

f) ***Adjustable Display Format***

The **Display Options** link at the bottom of the Structured Search page allows the user to select how the results of a search should appear.

- A drop down menu allows selecting how many results to show on one results page. One can always use the 'Next X' and 'Previous X' hits button to move through all the results.
- A checkbox labeled 'Show pages in separate window' allows having the individual documents from your result list displayed in a separate window from the list, allowing you to keep an overview while reading.
- A series of check boxes labeled with field names (Pub. Date, Int. Class, etc.) allows to select which items will be displayed on a search results page. Pub. No. and Title are included by default, but one can include as many of the available items as desired.

g) ***Search Statistics***

Detailed information about the results is available by clicking on the 'Search Summary' link at the top of each search results page. This will show how many times each of the terms occurred in how many documents, and the intermediate results of applying all of your specified boolean operators. Also, the total time required to conduct the search is listed. This information should assist in refining the search.

6.7.3 How to Search Patents in EPO

Data Coverage:

More than 3.5 Million documents in French contained in 3 collections of patents from 1978 until the present:

- FR A documents (Bibliographic data and original documents since 1978) and FR B documents (only original documents since 1995)
- EP A documents
- PCT (WO) A documents

All FR, EP and WO records are searched simultaneously. All the bibliographic data includes the title and abstract in French.

The following table gives an overview of the availability of the PCT minimum documentation in the worldwide database:

Country	Facsimiles from	Abstracts from	European Classification
CH	1888, from CH1 onwards	1970	1888
DE	1877, from DE1 onwards	1970	1877, from DE1 onwards
EP	1978, from EP1 onwards	1978	1978
FR	1900	1970	1902
GB	1859	1893	1859
US	1836, from US1 onwards	1970	1836, from US1 onwards
WO	1978	1978	1978

Types of Searches:

- Quick search
- Advanced search
- Patent number search
- Classification search

a) ***Quick Search***

In Quick Search there are three search option fields available:

1) Database to be searched : esp@cenet/worldwide/WIPO
2) Type of Search: simple words in the titles or abstracts/with the name of an individual or organization.
3) Search Term : Keyword

NOTE: Worldwide database covers published patent applications from over 80 different countries and regions, including INPADOC Data.

b) ***Advanced Search***

In advanced search there are two broad fields i.e. Database to be searched and Search Terms. In the 'Search terms' field we can search according to following fields:

a) Keyword(s) in title
b) Keyword(s) in title or abstract
c) Publication number
d) Application number
e) Priority number
f) Publication date
g) Applicant(s)
h) Inventor(s)
i) European Classification (ECLA)
j) International Patent Classification (IPC)

c) ***Patent Number Search***

In Patent number search there are two fields i.e. Database to be searched and the Patent number field. In the Patent Number field, we can enter either application, publication or priority number with or without country code prefix, or NPL (Non Patent Literature Document) reference number.

d) ***Classification Search***

In this type of Patent search we have 9 classes which can be selected upto sub-group level as per the requirement along with the keyword. The classes are as follows:

1) Human Necessities **(A)**
2) Performing Operations; Transporting **(B)**
3) Chemistry; Metallurgy **(C)**

4) Textiles; Paper **(D)**

5) Fixed Constructions **(E)**

6) Mechanical Engineering; Lighting; Heating; Weapons; Blasting Engines or Pumps **(F)**

7) Physics **(G)**

8) Electricity **(H)**

9) General Tagging of New Technological Developments [N0403] **(Y)**

The individual class has further been divided into subclasses.

Various Features Available in EPO

a) ***Boolean Operators*** (This feature is same as that in USPTO).

b) ***Truncations***

To extend the search, we can use truncation symbols (wildcards) to include, for example, the plural form of a word, or alternative spellings.

There are three different wildcard characters available in esp@cenet:

1) * - stands for a string of characters of any length (standard sign for truncation in internet) (For example: car* query will return patents with cars/carp/carps/care/caring/cart/carts/carpenter or any other word starting with 'car')

2) ? - stands for zero or one character (For example: car? Query will return patents with car or cars or care or cart or carp in the selected field).

3) # - stands for exactly one character (For example: car# query will return with cars or care or cart or carp in the selected field)

c) ***Nested Queries*** (This feature is similar to that in USPTO).

Limitations in esp@cenet

The major limitations in this database are as follows:

1. When combining search fields the default operator is AND and cannot be changed
2. It is not possible to search within date ranges
3. Characters such as apostrophe, slash and hyphen are not recognised.
4. No statistical analysis possible

Source: www.ec.espacenet.com

6.7.4 How to Search Patents in Delphion

Types of searches available in Delphion:

- Quick/Number Search
- Advanced Search
- Boolean Search
- Derwent Database Search

a) ***Quick/Number Search***

Like previously described database searches, Delphion provides for quick search using keywords or Patent/Application Number. Further we can select

the countries in which we need to search for the Patent/Application.

b) ***Advanced Search***

This feature provides numerous options and fields to select from. The options include countries to search in, Date Ranges, Language and field abbreviations. The various fields which can be searched include that of Text, Date & Code and US specific fields. These fields are further specified for subfields.

c) ***Boolean Search***

This feature provides advanced search with Boolean operators AND, OR, ANDNOT.

d) ***Derwent Database Search***

This search is done in the Database generated by Thompson. It utilizes Boolean Operators.

Various Features Available in Delphion

a) ***Boolean Operators*** (This Feature is similar as that in USPTO)

b) ***Date Range Searching*** (This Feature is similar as that in USPTO)

c) ***Searching for Exact Word (Stemming):*** Delphion provides option for searching the exact word when stemming tool is enabled.

Example:

Carbon syntax without stemming will lead to the results with carbon, carbons, carbonated, carbonation etc.

"Carbon" syntax with stemming will lead to results with Carbon only.

d) ***Wildcards***

Delphion supports the use of wildcards in the right-hand position, after a specific character string (known as *right-hand truncation*), in queries for all collections. This means that we can use both the **asterisk** and the **question mark** wildcards to the right-hand side of a search term. This allows retrieving words that begin with a specific character string but have one or more unknown characters at the end.

e) ***Nesting*** (This Feature is similar as that in USPTO)

f) ***Using the <in> Operator***

<in> is a proximity operator that helps select documents which contain the keywords in specified fields in the patent record. Proximity operators are always enclosed in angle brackets (less than and greater than symbols). They are not case sensitive so one may use upper or lower case. However the <in> operator does not work with date fields.

While using the <in> operator, one needs to specify the field to be searched. The accepted full field name or an accepted abbreviation for the field name can also be used.

Example:

Cycle <in> title

Cycle <in> TI

Cycle <in> ti

g) ***Thesaurus Operator***

The THESAURUS operator searches an index of terms and finds synonyms for the key term in your query. However, the thesaurus includes mostly common words and may not be helpful for technical or scientific terms.

Example:

<THESAURUS> sink <in> TI

The result set will include patents with the word *sink* and patents with synonyms for the word *sink* in the Title. Synonyms would include: sink, drowned, descend, drop etc.

h) ***<accrue> Operator***

The <accrue> operator selects documents containing at least one of the search terms specified (it is somewhat like OR in that manner). <accrue> however ranks documents according to the number of times the search elements appear in a given document — the more occurrences, the higher the score. The <accrue> operator *accrues*, or adds up, the number of occurrences of all of the terms combined for scoring. Because of this, <accrue> is not valid with just one search term.

Examples:

Pen <accrue> holder

Pen <accrue> holder <accrue> stand

<accrue> (pen, holder)

<accrue> (pen, holder, stand)

i) ***Complex Queries***

- In general a complex query may contain any of the following:
- Several Boolean operators
- A search applied against two or more collections
- Over 100 characters
- Utilization of more than one of the syntax modifiers listed after Boolean Operators such as: proximity, thesaurus, wildcard or weighting operators

Source: www.delphion.com

Other Search Engines:

Similar other value added services are also provided by QUESTEL, MICROPATENT, PatentCafe and others through their search engines. You may visit the sites www.questel.com, www.micropat.com, www.patentcafe.com for more information and limited free access options. It may be noted that different service providers may use different search language and may provide value addition in different forms for easy access, retrieval and presentation of basic patent and related industry information.

6.7.5 Searching Non Patent Literatures

ISI Web of Knowledge:

Social Sciences Citation Index — 1987-present

Science Citation Index Expanded — 1945-present

Physical, Chemical and Earth Sciences (PCES) — 1998-present

Engineering, Computing and Technology (ECT) — 1998-present

Agriculture, Biology & Environmental Sciences (ABES) — 1998-present

Life Sciences (LS) — 1998-present

Derwent Innovations Index (Engineering Section) — 1963-present

Derwent Innovations Index (Chemical Section) — 1963-present

Derwent Innovations Index (Electrical and Electronic Section) — 1963-present

Note: The individual websites of the Journals provide the data from Volume 1 of there corresponding Journals.

6.8 UNDERSTANDING AN INTERNATIONAL SEARCH REPORT

The results of an International Search are provided in International Search Report provided by one of the internationally recognized Searching Authority for conducting searches on international patent applications filed under PCT system. The purpose of ISR is to identify the relevant Prior Art and a preliminary opinion on patentability is also being provided along with the search report. The relevant contents of an ISR are as follows:

a) Relevant citations and documents as prior art

b) Classification of the subject matter

c) Fields of search

d) Citations of certain categories of particular relevance etc.

The Symbols used for Various Categories of Citations are as follows:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document refereeing to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art **"&"** document member of the same patent family

Sample ISR

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

INTERNATIONAL SEARCH REPORT

PCT/IB 03/06243

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C12N9/70 C12N1/21

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C07K C12N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
BIOSIS, WPI Data, EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ZHANG XUE-WU ET AL: "Recombinant streptokinase production by fed-batch cultivation of Escherichia coli" ENZYME AND MICROBIAL TECHNOLOGY, vol. 24, no. 10, 1 July 1999 (1999-07-01), pages 647-650, XP002291449 ISSN: 0141-0229 cited in the application the whole document	1,2,4-21
Y	section culture materials and cultivation	3
	--- -/--	

[X] Further documents are listed in the continuation of box C. [X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
6 August 2004	01/09/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Kools, P

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

PCT/IB 03/06243

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KENNETH TODAR : "Nutrition and Growth of Bacteria." INTERNET ARTICLE, 'Online! 2000, XP002291451 Retrieved from the Internet: <URL:http://lecturer.ukdw.ac.id/dhira/NutritionGrowth/introduction.html> 'retrieved on 2004-08-05! the whole document	3
Y	KENNETH TODAR : "Culture Media for the Growth of Bacteria" INTERNET ARTICLE, 'Online! 2000, XP002291452 Retrieved from the Internet: <URL:http://lecturer.ukdw.ac.id/dhira/NutritionGrowth/culturemedia.html> 'retrieved on 2004-08-05! the whole document	3
A	KO JAE HYEONG ET AL: "High-level expression and secretion of streptokinase in Escherichia coli" BIOTECHNOLOGY LETTERS, vol. 17, no. 10, 1995, pages 1019-1024, XP008033680 ISSN: 0141-5492 the whole document	1,2,4-21
A	EP 0 489 201 A (CIGB) 10 June 1992 (1992-06-10) cited in the application the whole document	1,2,4-21
A	PRATAP J ET AL: "EFFECT OF SIGNAL PEPTIDE CHANGES ON THE EXTRACELLULAR PROCESSING OFSTREPTOKINASE FROM ESCHERICHIA COLI: REQUIREMENT FOR SECONDARY STRUCTURE AT THE CLEAVAGE JUNCTION" MOLECULAR AND GENERAL GENETICS, SPRINGER VERLAG, BERLIN, DE, vol. 258, no. 4, May 1998 (1998-05), pages 326-333, XP001008832 ISSN: 0026-8925 abstract	1,2,4-21
A	LEE S H ET AL: "ENHANCED PRODUCTION AND SECRETION OF STREPTOKINASE INTO EXTRACELLULAR MEDIUM IN ESCHERICHIA COLI BY REMOVAL OF 13 N- TERMINAL AMINO ACIDS" BIOTECHNOLOGY LETTERS, KEW, SURREY, GB, vol. 19, no. 2, February 1997 (1997-02), pages 151-154, XP000863346 ISSN: 0141-5492 abstract	1,2,4-21
A	WO 91/11523 A (UPJOHN CO) 8 August 1991 (1991-08-08) page 3, line 20 - line 23	1
A	US 6 410 270 B1 (KREBBER ANKE ET AL) 25 June 2002 (2002-06-25) table 1	3
A	RINAS U ET AL: "Entry of Escherichia coli into stationary phase is indicated by endogenous and exogenous accumulation of nucleobases." APPLIED AND ENVIRONMENTAL MICROBIOLOGY. DEC 1995, vol. 61, no. 12, December 1995 (1995-12), pages 4147-4151, XP002291450 ISSN: 0099-2240 page 4148, column 2	3

INTERNATIONAL SEARCH REPORT

PCT/IB 03/06243

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0489201	A	10-06-1992	CU	22277 B1	06-09-1994
			AT	130369 T	15-12-1995
			AU	644657 B2	16-12-1993
			AU	7810191 A	28-11-1991
			DE	69023655 D1	21-12-1995
			DE	69023655 T2	02-05-1996
			DK	489201 T3	11-03-1996
			EP	0489201 A1	10-06-1992
			ES	2081909 T3	16-03-1996
			GR	3018368 T3	31-03-1996
			JP	3127298 B2	22-01-2001
			JP	4030794 A	03-02-1992
			US	5296366 A	22-03-1994
WO 9111523	A	08-08-1991	AT	116687 T	15-01-1995
			AU	4181593 A	30-09-1993
			AU	643752 B2	25-11-1993
			AU	7184091 A	21-08-1991
			CA	2070994 A1	01-08-1991
			DE	69106498 D1	16-02-1995
			DE	69106498 T2	24-05-1995
			DK	514405 T3	10-07-1995
			EP	0514405 A1	25-11-1992
			ES	2069277 T3	01-05-1995
			GR	3015629 T3	30-06-1995
			JP	5504063 T	01-07-1993
			WO	9111523 A1	08-08-1991
US 6410270	B1	25-06-2002	AT	213271 T	15-02-2002
			AU	716612 B2	02-03-2000
			AU	1032597 A	03-07-1997
			BR	9611937 A	02-03-1999
			CA	2240097 A1	19-06-1997
			CN	1219203 A ,B	09-06-1999
			CZ	9801652 A3	12-08-1998
			DE	59608743 D1	21-03-2002
			DK	866876 T3	27-05-2002
			WO	9721829 A1	19-06-1997
			EP	0866876 A1	30-09-1998
			ES	2171752 T3	16-09-2002
			HU	0000317 A2	28-06-2000
			JP	2000501936 T	22-02-2000
			NO	982672 A	10-06-1998
			PL	327188 A1	23-11-1998
			PT	866876 T	31-07-2002
			RU	2201455 C2	27-03-2003
			SI	866876 T1	31-08-2002
			SK	74098 A3	04-11-1998
			ZA	9610384 A	23-06-1997

Form PCT/ISA/210 (patent family annex) (January 2004)

6.9 PATENT ANALYTICS: A CASE STUDY

Patent analytics refers to analysis and mapping of patent information to produce various scenarios depending upon the requirement of the user. Today, efforts are also being made to use semantic technology alogwith other available tools for analysing information based on manipulation and searching of unstructured data also.

Some examples as given below will explain as to how a patent search can be used for macro-level planning of a country. The first example refers to a search conducted on **water purification technology** from the worldwide database which identifies **17272** patents based on the keyword search for the expression "water purification".

Based on the IPC Search, two main classes have been identified which are covered by IPC codes C02F, B01D and various subgroups under these codes. As can be seen 42.11% of patents pertain to 'Water purification by impurity/

heavy metal removal' followed by 'Purification of sea/ underground water' which is 33.85% and 'Industrial waste water purification' which is 18.5%. Then 5.55% of patents pertaining to 'Drinking water purification' ; relating to the purification of water by several other methods like Reverse Osmosis, treatment of watse water and also using latest technologies using fuel cell.

Table 6.1 : Search Using Keyword "Water Purification"

Database	No. of Hits	
	For all Years	Last 1 Year
Worldwide	17272	1414
USPTO Granted	5385	233
USPTO Published	2559	507
European Granted	879	61
European Published	1193	83
German Granted	55	2
German Published	67	7
Japanese	1355	54
PCT	2845	323
INPADOC	2934	144

Table 6.2 : Search Using Keyword "Water Purification" and Relevant IPCs

Database	IPC Code Chosen	No. of Hits
Worldwide	C02F* or B01D*	9127
USPTO Granted	C02F* or B01D*	3344
USPTO Published	C02F* or B01D*	1474
European Granted	C02F* or B01D*	561
European Published	C02F* or B01D*	822
German Granted	C02F* or B01D*	50
German Published	C02F* or B01D*	56
Japanese	C02F* or B01D*	1128
PCT	C02F* or B01D*	1603
INPADOC	C02F* or B01D*	2440

Table 6.3 : Search Using Concept Titles in Worldwide Databases

Concept Titles	No. of Hits
Industrial waste water purification	1012
Purification of sea/underground water	1850
Water purification by impurity/ heavy metal removal	2301
Drinking water purification	301

Table 6.4: B01D Further Classified upto Group Level

Subclass	Interpretation
B01D 1/00	Evaporating
B01D 3/00	Distillation or related exchange processes in which liquids are contacted with gaseous media, e.g. stripping
B01D 5/00	Condensation of vapours; Recovering volatile solvents by condensation
B01D 7/00	Sublimation
B01D 8/00	Cold traps; Cold baffles
B01D 9/00	Crystallisation
B01D 11/00	Solvent extraction
B01D 12/00	Displacing liquid, e.g. from wet solids or from dispersions of liquids or from solids in liquids, by means of another liquid
B01D 15/00	Separating processes involving the treatment of liquids with solid sorbents
B01D 17/00	Separation of liquids, not provided for elsewhere, e.g. by thermal diffusion
B01D 19/00	Degasification of liquids
B01D 21/00	Separation of suspended solid particles from liquids by sedimentation
B01D 24/00	Filters comprising loose filtering material, i.e. filtering material without any binder between the individual particles or fibres thereof
B01D 25/00	Filters formed by clamping together several filtering elements or parts of such elements
B01D 27/00	Cartridge filters of the throw-away type
B01D 29/00	Other filters with filtering elements stationary during filtration, e.g. pressure or suction filters, or filtering elements therefor
B01D 33/00	Filters with filtering elements which move during the filtering operation
B01D 35/00	Other filtering devices; Auxiliary devices for filtration; Filter housing constructions

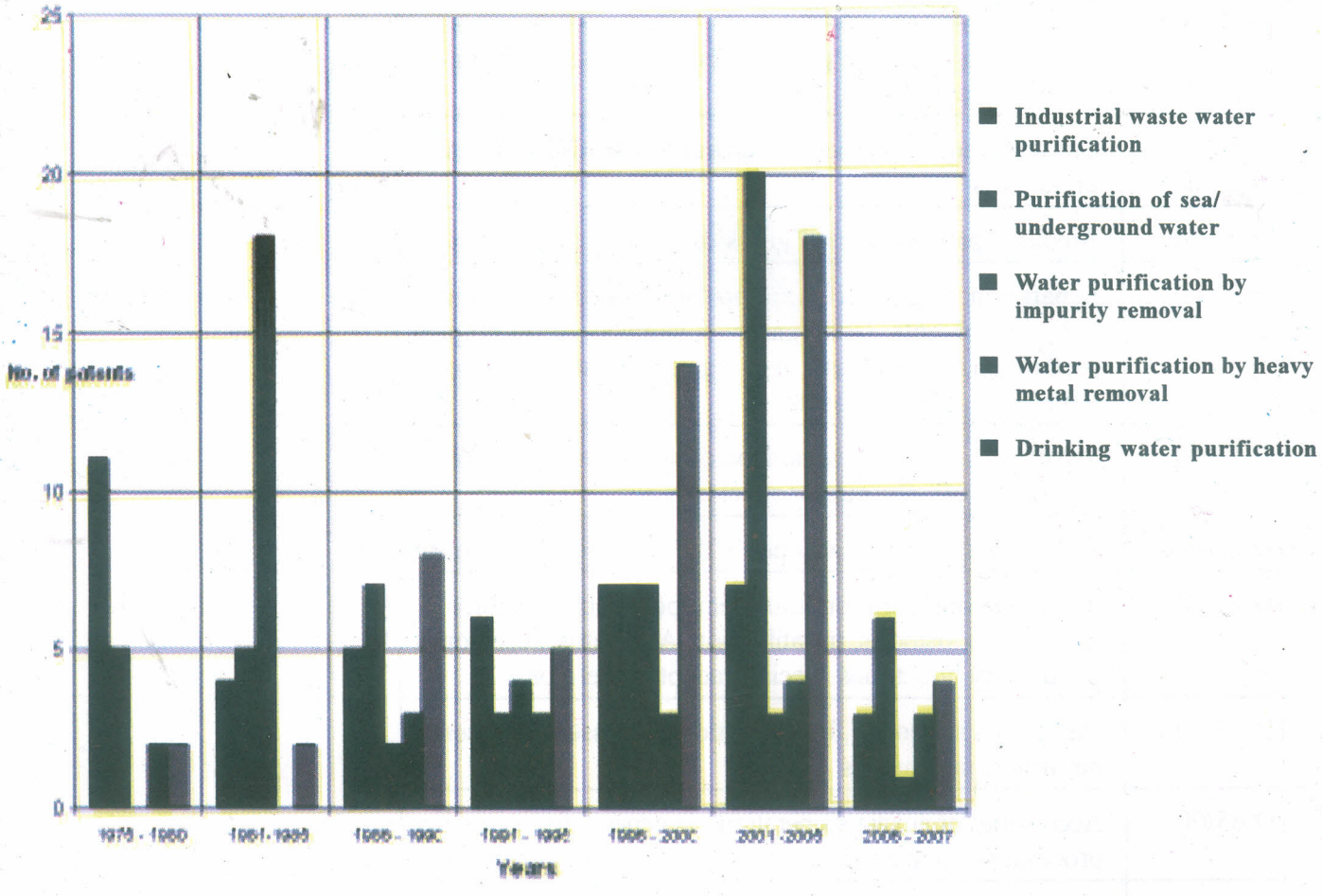
Subclass	Interpretation
B01D 36/00	Filter circuits or combinations of filters with other separating devices
B01D 37/00	Processes of filtration
B01D 39/00	Filtering material for liquid or gaseous fluids
B01D 41/00	Regeneration of the filtering material or filter elements outside the filter for liquid or gaseous fluids
B01D 43/00	Separating particles from liquids, or liquids from solids, otherwise than by sedimentation or filtration
B01D 45/00	Separating dispersed particles from gases or vapours by gravity, inertia, or centrifugal forces
B01D 46/00	Filters or filtering processes specially modified for separating dispersed particles from gases or vapours
B01D 47/00	Separating dispersed particles from gases, air or vapours by liquid as separating agent
B01D 49/00	Separating dispersed particles from gases, air or vapours by other methods
B01D 50/00	Combinations of devices for separating particles from gases or vapours
B01D 51/00	Auxiliary pretreatment of gases or vapours to be cleaned
B01D 53/00	Separation of gases or vapours; Recovering vapours of volatile solvents from gases; Chemical or biological purification of waste gases, e.g. engine exhaust gases, smoke, fumes, flue gases, aerosols
B01D 57/00	Separation, other than separation of solids, not fully covered by a single other group or subclass
B01D 59/00	Separation of different isotopes of the same chemical element
B01D 61/00	Processes of separation using semi-permeable membranes, e.g. dialysis, osmosis, ultrafiltration; Apparatus, accessories or auxiliary operations specially adapted therefor
B01D 63/00	Apparatus in general for separation processes using semi-permeable membranes
B01D 65/00	Accessories or auxiliary operations, in general, for separation processes or apparatus using semi-permeable membranes
B01D 67/00	Processes specially adapted for manufacturing semi-permeable membranes for separation processes or apparatus
B01D 69/00	Semi-permeable membranes for separation processes or apparatus characterised by their form, structure or properties; Manufacturing processes specially adapted therefor
B01D 71/00	Semi-permeable membranes for separation processes or apparatus characterised by the material; Manufacturing processes specially adapted therefor

C02F Further Classified upto Group Level

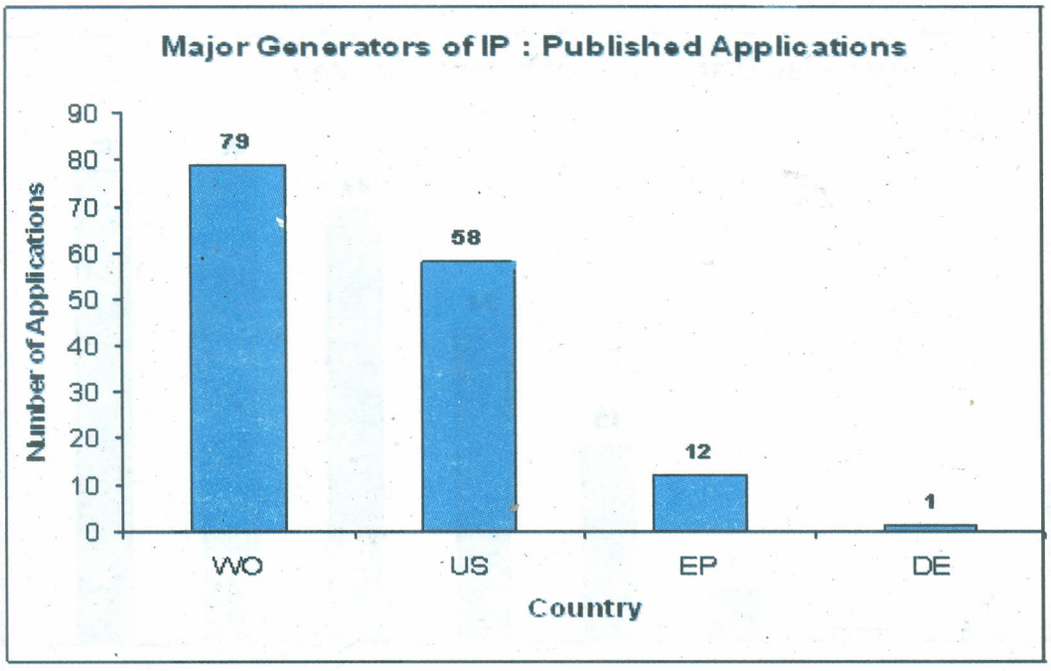
Subclass	Interpretation
C02F 1/00	Treatment of water, waste water, or sewage
C02F 3/00	Biological treatment of water, waste water, or sewage
C02F 5/00	Softening water; Preventing scale; Adding scale preventatives or scale removers to water, e.g. adding sequestering agents
C02F 7/00	Aeration of stretches of water
C02F 9/00	Multistep treatment of water, waste water or sewage
C02F 11/00	Treatment of sludge; Devices therefor

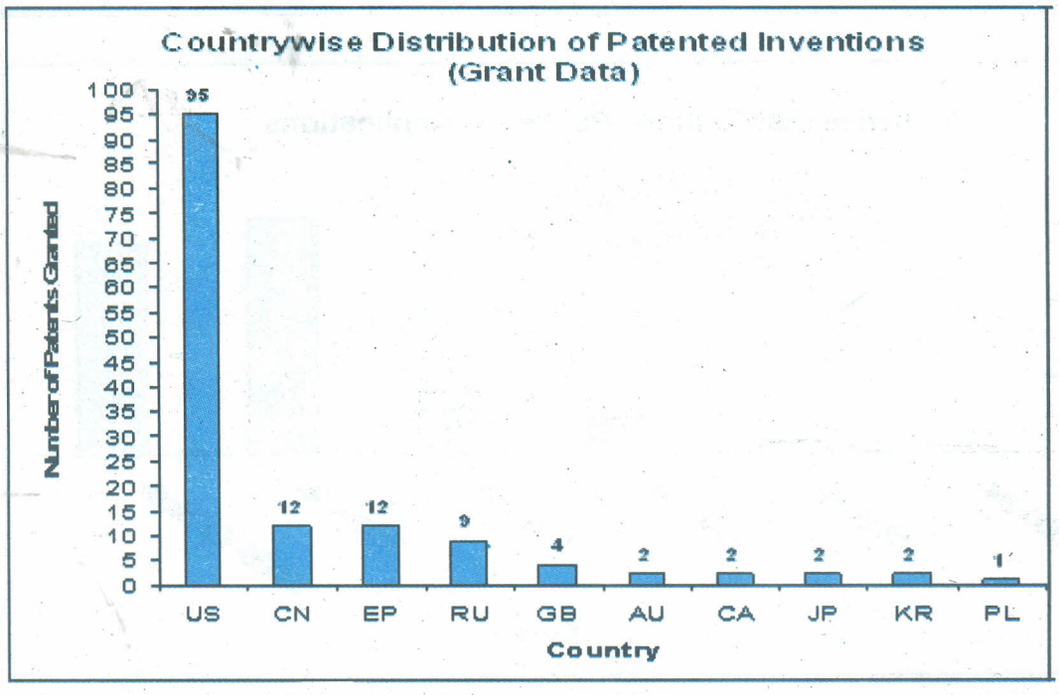
Year wise Patents Distribution on Technological Aspects on Water Purification

Year-wise Patents Distribution on Different Concepts of Water Purification

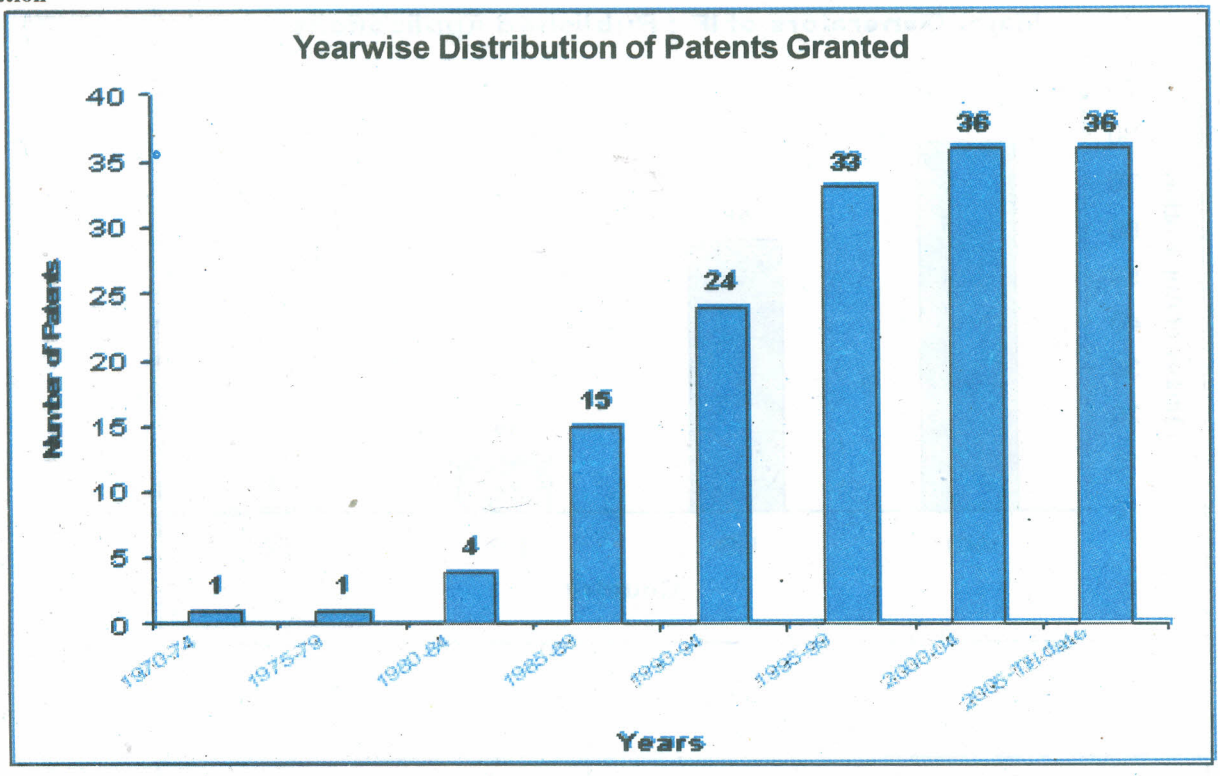


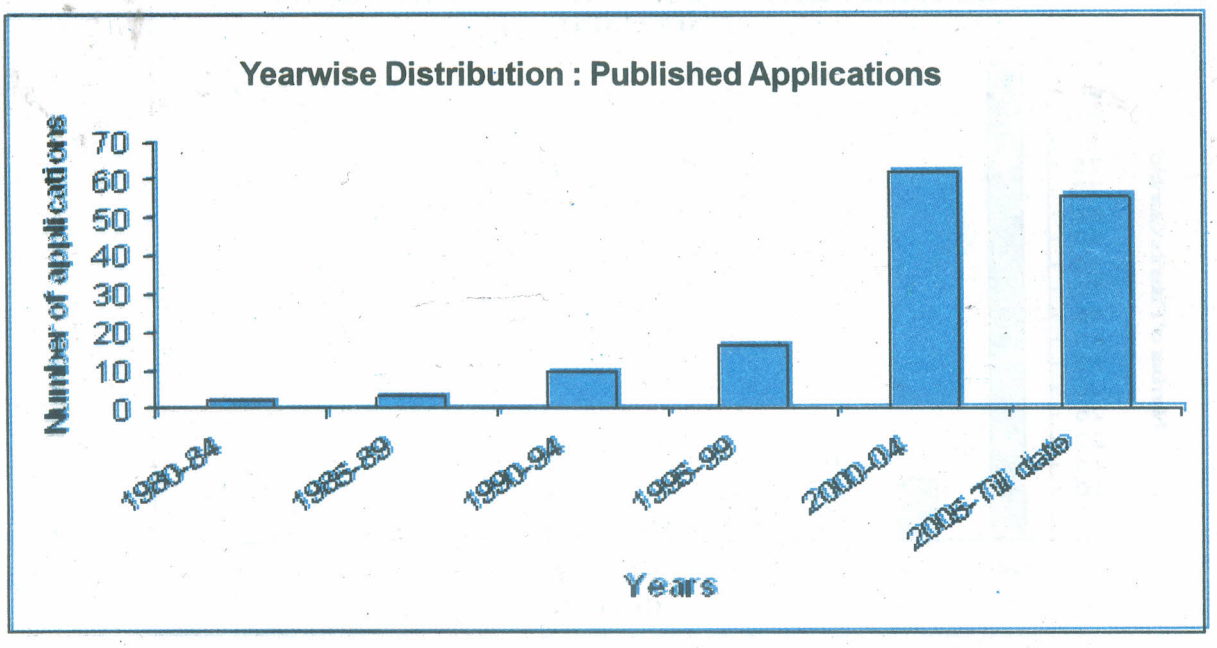
The further analysis of the above data can be done year wise, country wise, conceptwise and a combination of various features. The subsequent graphs given below show the gradual development of the technology to with the "Drinking water Purification". As can be interpreted from these Graphs, there has been a significant development in this area over a period of time. The major player include US, China, Europe, and Russia.





Country Code	Country	Country Code	Country
US	United States	AU	Australia
CN	China	CA	Canada
EP	Europe	JP	Japan
RU	Russia	KR	Republic of Korea
GB	United Kingdom	PL	Poland
DE	Germany		





6.10 SUMMARY

- The basic philosophy behind a patent system is to bring into public domain disclosure of new inventions at the earliest, and to provide incentives to an inventor in the form of legal rights in his invention to enable him or his assignee to prevent other s from making, using, selling, or importing the invention in the protected territory for a limited period of time. Universally, the patent documents have a uniform structure and today various parts of the patent document stored in the large databases running into millions of records.
- Each patent document provides a very useful source of prior art information relating to a technological problem and specifies the ways and means to solve these problems.

- The international patent classification IPC is a classification system developed and established under the Strasbourg agreement (1971) and undated on a regular basis by a committee of experts. IPC is used universally by all patent offices in the world to classify the patent documents and assign the IPC codes during search and examination of patent application.
- Patent searches are conducted for various purposes. The use of technological and bibliographic information contained in patent document is reflected in the various types of searches conducted from the patent databases. Patent searches provide a very useful tool for planning and doing R&D, finding technology space to work in newer areas, enforcement paten rights, carrying out due diligence and taking instant business and investment decision using such information.
- The result of an international search are provided in international search report provided by one of the international recognized searching authority for conducting searches on international patent application filed under PCT system. The purpose of ISR is to identify the relevant prior art and a preliminary opinion on patentability is also being provided along with the search report.
- Patent analytics refers to analysis and mapping of patent information to produce various scenarios depending upon the requirement of the user.

6.11 TERMINAL QUESTIONS

1) What are the main objectives of a Patent Search? How is it useful for development of a technology in a particular field?
2) How can a patent search be conducted?
3) Explain International Search Report.
4) What do you mean by patent analytics?

6.12 ANSWERS AND HINTS

1) Refer to Section 6.5.
2) Refer to Section 6.7.
3) Refer to Section 6.8.
4) Refer to Section 6.9.

6.13 REFERENCES AND SUGGESTED READINGS

1) Would intellectual property organization (WIPO) [http://www.wipo.int]
2) International Patent Classification (IPC)
   [http://www.wipo.int/classifications/ipc8/?lang=en]
3) WIPO Resources [http://www.wipo.int/ipdl/en/resources/linkd.jsp]
4) United States Patent Office (USPTO) [http://www.uspto.gov]
5) US Patent Classification
6) [http://www.uspto.gov/web/patents/classification/uspcindex/indextouspc.htm]
7) European Patent office (EPO) [http://ep.espacenet.com/]
8) Delphion Database [http://www.delphion.com]

UNIT 7 PATENT SPECIFICATION AND CLAIMS

Structure

7.1 INTRODUCTION

Patent Specification

Disclosure of an invention is made in a document universally termed as "patent specification" (hereafter referred to as "SPEC"). The expression "patent specification" should not be confused with specifications like ISI as applied on products. The preparation of SPEC involves a process often called as drafting of the specification and one of its important components called "claims" define the boundary of the claimed invention. Most of the patent battles are fought when patent rights of an entity, as defined by the claims, are infringed by others, or one or more claims of an invention are found to be already available in public domain and such claims are challenged by the interested parties. Therefore, drafting of claims of an invention is a very important task demanding multiple skills from the drafter of this document starting from understanding of the technical nature of the document, its comprehension, writing skills, assessments of the state of art, absorbing such details and defining the problem being solved by the invention and making an enabling disclosure meeting the patentability criteria. The document called SPEC is read by many stakeholders which include researchers, examiners, IP managers, economists, judges, business experts and all those who deal with inventions and innovative activities. Looking at multiplicity of stakeholders involved, SPEC is generally written in such a manner that it is easily understood by the all concerned. Therefore, experts sometimes comment that drafting appears to be more of an art rather than science. There are no fixed or rigid rules as to how one should write or describe an invention in the SPEC. Each individual can be his own lexicographer. But, the technical disclosure, supportive data in the form of examples, terminology, phrases and units used in the specification should be properly defined to enable others (often a person of average skill in the art) to understand and practice the invention. Patent laws of a number . of countries also require that the best mode of carrying out the invention must be disclosed in the specification. A patent specification is also a techno-legal document with commercial potential embedded in its possible exploitation for economic development. It should be remembered that a patent can be revoked if disclosure of the invention as made in the SPEC is not reproducible.

7.2 OBJECTIVES

At the end of this unit, you should be able to know:

- what is a patent specification - provisional and complete specification;
- what are the major categories of invention for patent protection;
- how to draft a patent specification; and
- description requirements under patent laws of different countries.

Self Assessment Question **(Spend 3 minutes)**

1) What the kind of disclosure is a patent specification and how it is different from ISI specification?

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7.3 PROVISIONAL AND COMPLETE SPECIFICATION

A provisional specification is often filed for securing the priority of the patent application. It contains only the nature of the invention with certain basic and conceptual information in the form of "proof of concept" about the invention. The provisional specification should, however, disclose the proper scope of the invention. In case of biotechnological invention, even at the provisional filing stage, the source and geographical origin of the biological material used and deposition details of the microorganisms duly deposited in an International Depository Authority must be provided. In case of engineering inventions, the specification should be supported with the necessary drawings. The complete specification need to be filed within a period of 12 months from the filing date of the provisional specification. It is also possible to file more than one provisional specification and file a single complete specification within 12 months taking priority from the first filed provisional application.

A complete specification contains detailed and substantial description with examples and illustrations based on experimental results showing all the essential and optional features of the invention and accompanied with a set of claims to define and determine the scope of the invention The complete patent specification should also describe the best mode of carrying out the invention, known to the inventor at the time of filing the application.

Universally, a complete patent specification comprises the following parts:

a) Title of the invention;

b) Applicant name;

c) Field of the invention;

d) Description of background and prior art;

e) Objectives of the invention;

f) Summary of the invention and Embodiments;

g) Brief description of the drawings;

h) Detailed description of the invention;

i) Examples

j) Advantages of the invention;

k) A set of claims;

l) Abstract;

m) Drawings.

Self Assessment Question **(Spend 3 minutes)**

2) What is meant by provisional and complete specification?

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7.4 CATEGORIES OF INVENTION

As per the definition of definition of patentable subject matter under TRIPS, patents include any invention, whether products or processes, in all field of technology provided they meet the patentability criteria. Some exceptions to patentability which the members may adopt relate to exclusion of diagnostic, therapeutic and surgical methods for the treatments of humans and animals; plants and animals other than micro-organisms and essentially biological processes for the production of plants and animals other than non-biological and micro-biological processes.

Some examples of different types of inventions falling under product and process category in various technological fields are given below. In certain cases, allowability of certain subject matter in a territory is governed by the domestic patent laws. It should, however, be remembered that an invention may be protected in those territories or countries where such protection is available even if the domestic laws may not allow such protection. For example, new medical use of a known compound may be patentable in many countries but not in India. Another example is in respect of subject matter pertaining to software and "business methods" which may be protected in USA but not in India.

Let us understand the some of the examples of product, processes and other categories of inventions as illustrated below:

- Products:
- Chemical compound[s]/intermediates and their derivatives, analogs, salts, esters, ethers, polymorphs, metabolites, pure form, particle size, isomers, mixtures of isomers, complexes, combinations and other derivatives of known substance(s);
- Composition containing the chemical compound[s]/their derivatives/ salts;
- Synergistic compositions/formulations;
- value added Traditional Knowledge based synergistic formulations with new activities or improved efficacy;
- new vaccine;
- new strain of microorganism;
- new plasmid/ vector/sequence/protein/construct;
- new variety of plant/asexually produced plant/seed/new plant per se;
- Genetically modified biotech products;
- other agri-biotech product;
- diagnostic kit/surgical device/surgical apparatus;

- apparatus/device;
- hardware/firmware/combination of hardware with software/software;
- Process/Method:
- Process for the preparation of chemical compounds/composition;
- methods of using the compounds or compositions [new use of the known compounds];
- agri-biotech processes;
- method for the surgical, curative, prophylactic or any other treatment of humans and animals;
- method for the treatment of plants;
- New Use
- new uses of known compound/known bacterial strains;
- Non statutory subject matter/requiring permission for patentability consideration
- Inventions relating to defense*;
- Inventions relating to atomic energy**;
- Inventions relating to dual use technologies.
- Inventions relating to Traditional Knowledge;
- Subject matter not permitted under law;
- Inventions contrary to law, public order and morality

* = permission required under section 35 of the Indian Patents (Amendment) Act, 2005, stating that if the invention belongs to one of the class notified by Central Govt. as relevant to defense purpose, the publication of information with respect to the invention is restricted or prohibited in India.

** = permission required under section 4 of the Indian Patents (Amendment) Act, 2005, stating that the invention related to atomic energy falling within sub-section (1) of section 20 of Atomic Energy Act, 1962 (33 of 19662) is not patentable in India.

Some of the categories of inventions depicted above are not-patentable in India. For example, new use of a known substance is not patentable. Similarly, in case of microorganisms, only modified ones can be considered as subject matter of patent in India. However, new micro-organisms isolated from the natural environment and meeting the other patentability criteria can be patented abroad. Another example is that of different forms of same substances, which if found meeting the patentability criteria can be patented abroad, even if not allowed in India.

Self Assessment Question **(Spend 3 minutes)**

3) In which category the following inventions belong to:

a) An universal primer for wild life identification;

b) A crane for lifting weights;

c) A gene responsible for Wart disease of potato;

d) Generating electricity from radioactive iodine;

e) An antibiotic composition.

7.5 PROCESS OF DRAFTING A PATENT SPECIFICATION

In order to draft a patent specification, the first step involves the identification of invention, its various features, advantages, including the novel and inventive aspects of the invention, apart from utility. Thus in order to identify the invention, it becomes necessary to discuss often several times with the inventor his research work in a brain storming mode for finding out how the invention was conceived; how it has been made, how it works or used. Before preparing a SPEC, one should conduct a patentability search to ensure that the subject matter as developed by the inventor possess elements meeting the novelty criteria, non-obvious requirements and are capable of industrial application/utility. In certain jurisdictions utility requirements are not merely indicative and need to be substantiated. Similarly, in certain technological field like biotechnology, examiners may ask different levels of utility requirements based on the nature of invention. In case, the search results are indicative of prior art which anticipate the invention, there would be no point in proceeding further in the matter. Also, if it is found that there is likelihood of certain embodiments becoming obvious, one can do necessary experimentation or can examine based on the prior art teachings whether it be possible to meet the non-obviousness or inventive step requirements or not. Sometimes, it would become necessary to do additional experimentation to generate data to overcome such issues. The patent practitioner should also gain a good understanding of the client's business objectives and may try to advise the inventor about the strength and weaknesses of the invention and the development inputs required. In case of engineering inventions, figures, flow charts and constructional features of the invention need to be properly explained and analyzed in relation to the closest prior art. During the process, all the prior art documents need to be collected which are material to the patentability of the invention and may be required to be submitted to the Patent Office either as a statutory requirement or otherwise during the prosecution. These steps would help in adopting a proper strategy in drafting the patent specification and formulating the claims. Next step would be to examine the supportive technical data generated by the inventor to assess sufficiency of technical disclosure to be made in the specification. The description of the invention should contain all the technical details of the invention in the form of examples and figures/flowcharts explaining the equivalents and preferred embodiments of the invention and then highlighting the advantages. There would be situation where comparative data would need to be given to highlight the advantage of the claimed invention over the prior art. Also, in case of drugs and pharmaceuticals, necessary in-vitro/in-vivo data may be required. Similarly, in case of bioinformatics based inventions, wet lab data may be required. Depending upon the technical field to which the invention relates, the drafter would ask related questions.

The description of the invention is followed by claims defining the scope and boundary of the invention distinguishing it from the prior art. The claims are often written in a clear and succinct manner and contain the all the essential characteristics or technical features as supported by the technical disclosure of the matter for which protection is sought. The claims further contain the specific utility of the invention. A patent specification must contain one or more claims The claims may relate to a **single inventive concept,** covering the product, a process for the preparation of the product and its industrial application. Depending upon the

jurisdiction and domestic practice, examiner may allow the product/process/ application claims in a single application or may ask the applicant to divide the applications for the non-elected subject matter.

Claim constitute a preamble part, a transitional phrase and the body of the claim. The preamble speaks about the general field of the invention. It generally does not limit the scope of the invention and no limitation need to be added to this part. This should, however, be brief.. Three transitional clauses are frequently used in the claims, viz. "comprising" (open ended phrase indicating the the claim is not limited to recited elements) and "consisting essentially of" (open ended only to some extent meaning some additional elements may be included in the claim but these would not affect the novelty and inventive features) and "consisting of" (specific – restricted to elements recited only). The use of transitional phrases is very important for the interpretation of the claims which would often be the subject of infringement or validity. The body of the claim is the main part; the critical elements are defined in the body. The structure of the body differs depending upon the nature of the invention. Based on the case laws, many types of claims have come into practice mostly is USA and these patterns and styles are used elsewhere in the world. For getting into details, one can refer to such decisions from the US Court of Appeals for Fedral Circuit. While issuing the office actions, these cases are cited by the examiners indicating howthe claims would be allowable or not. Claims are normally written in independent and dependent forms. Independent claims are normally directed towards broader scope and contain the minimum number of elements distinguishing the claimed invention from the closest prior art. Dependent claims are directed toward the other embodiments of the inventions and also optional features. Based on the nature of invention, a patent application may contain more than one independent claim and corresponding dependent claims. Then there are multiple dependent claims also. As per the US Patent Practice, there is greater use of independent and dependent claims and lesser use of multiple dependent claims. While, multiple dependencies are commonly use in Europe. In India, more common approach is to follow European practice. US Attorneys have their own styles in crafting claims and to provide for fall back situations in case such claims are challenged. In case of software patents, one may attempt a heuristic approach. Some attorneys, like to draft claims putting more stress on the support available in the specification. Whether one can attempt broad claims or narrow claims depend on the nature of technology and the existing state of the art. An invention may turn out to be one which may bring about paradigm shift in innovation processes and may be followed by a number of incremental inventions. Similarly, there would be technologies which would cut across many disciplines and may need the help of an expert drafter. One should understand that what is not claimed is disclaimed and available to public for free terms and phrases used in the claims must find clear support or antecedent basis in the description so that the meaning of the terms in the claims may be ascertainable by reference to the description.

Those who learn drafting should realize that it takes several years to develop expertise in writing and crafting the description and claims for an invention. It is thus advisable that in the formative years, a patent agent works under the supervision of an expert. Some examples depicting various forms of the claims are given below:

i) Independent claims – broad in nature and nearer to closest prior art

ii) Dependent claims – cover various embodiments and optional features of the invention

iii) Markush claims – for covering multiple functionally – equivalent chemical entities allowed in one or more parts of the compound

iv) Swiss type claims – covers second or subsequent new medical use of a known compound or composition (not allowed in India, per se);

v) Jepson claims – characterize the improvement in a process or product and are read in combination with the preamble;

vi) Benson claims – for covering software related invention (not allowed in India, per se)

vii) Product by process Claims: Sometimes, a product can be produced by the claimed process alone. In such cases, product by process claims are admissible.

viii) Omnibus Claims: In India, this type of claim is still in use. It reads like – A process for ..... substantially as herein described with reference to examples and figures, meaning it is an all embracing claim to take care of all the element as disclosed in the specification.

ix) Apart from independent claims, one or more claims may be presented in the dependent form, referring back to and further limiting another claim or claims. Dependent claim referring back to more than one other claim is considered a "multiple dependent claim". Such a claim shall be construed to incorporate all the limitations of each of the particular claims in relation to which it is being considered.

The Patent agent/attorneys of different countries have different ways of attempting the writing of a patent. Many attorneys in US, prefer to write the claims first and then build up the embodiments and supplement the write-up with other details. Thus, the invention driven approach provides the claims first and followed by the description of the invention along with relevant prior art. Commonly practiced in Europe, is the **problem solving approach** which aims at first discussing the background of the invention, establishing the problem in the existing art and then explaining how to solve this problem. In this case, claims are taken up for drafting at the last stage.

Based on the discussion in the preceding paragraphs, the structure of drafting the disclosure of an invention is as follows:

- Finding the invention by discussing with inventor at various stages;
- Reviewing the state of the art;
- Establishing the technical problem and the means to solve the problem;
- Preparing a matrix differentiating the invention with the closest prior art;
- Examining the differences with the closest prior art for non-obviousness rejections;
- Finding out advantages over the closest prior art;

- Adding embodiments to prevent the competitors to design around the invention;
- Explaining as to how the invention would not be obvious to a person skilled in the art;
- Inserting broadest parameters nearest to the closest prior art within which the invention can be performed;
- Essential features of the invention mentioned in the embodiments, which describe the broadest range of workable parameters and equivalents thereof;
- Satisfying Requirement of enablement must be satisfied, i.e., the invention must be repeatable by any person being ordinary skilled in the art;
- Finding out whether the inventor is in possession of an enabling disclosure;
- Developing the claims based on the support available in the document.

Self Assessment Question **(Spend 3 minutes)**

4) What are the steps of drafting a patent specification?

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7.6 DESCRIPTION REQUIREMENTS OF A PATENT SPECIFICATION IN DIFFERENT JURISDICTIONS

Care must be taken while drafting to take into account the legal provisions of the other countries such that the specification remains substantially same for international filing, only modifying the claims based on the allowability in respective countries.

7.6.1 Requirements Under the Indian Patents (Amendment) Act 2005

As per the provisions of Section 10 (1) of the Indian Patents Act, a specification, whether provisional or complete, shall describe the invention and shall begin with a title of not more than 15 words sufficiently indicating the subject-matter to which the invention relates. Sub-section (4) of Section 10 of the Act states inter alia that, every complete specification shall -

a) fully and particularly describe the invention and its operation or use and the method by which it is to be performed;

b) disclose the best method of performing the invention which is known to the applicant and for which he is entitled to claim protection; and

c) end with a claim or claims defining the scope of the invention for which protection is claimed.

d) Be accompanied by an abstract to provide technical information on the invention

Provided that

i) Controller may amend the abstract

ii) Where applicant mentions a biological material

A) the deposit of the biological material shall be made to an international depository authority under the Budapest Treaty not later than the date of filing the patent application in India and a reference thereof shall be made in the specification within the prescribed period;

B) all the available characteristics of the material required for its identification need to be included in the specification.

C) Access to material available only after date of application

D) disclose the source and geographical origin of the biological material used in the invention.

Sub-section (5) of Section 10 of the Act states that the claim or claims of a complete specification shall relate to a single inventive concept and shall be substantially based on the matter disclosed in the specification.

A complete specification filed after a provisional specification may include claims in respect of developments of the invention which was described in the provisional specification (S.10(7)). In case of an international application designating India, the title, description, drawings, abstract and claims filed with the application shall be taken as the complete specification for the purposes of this Act (S.10(4A)). Drawings where supplied are to be supplied as form a part of the specification. If the Controller considers that an application should be further supplemented by a model or sample of anything illustrating the invention or alleged to constitute an invention but such model or sample shall not be deemed to form part of the specification.

7.6.2 Claims Type

Process Claims: Process claims can be written in different styles. One way would be to incorporate only novel and inventive steps in the body of the claim and then elaborating other elements in the dependent claims. Another way to write these claims would be to detail all the process steps and introduce the novel and invention parameters in the first claim. Subsequent claims would recite the preferred and optional features.

Method Claims

These types of claims would include the functional language stating what the invention does and then reciting how it carries out by the claimed method.

Composition of Matter Claims

These types of claims would define the characteristics of the claimed product, in case of compound, the chemical structure, in case of general structure, representative compounds covered by the general structure. In case of a composition, it would specify the ratios of various components and in case of known components, the synergistic effect of the formulation.

Apparatus Claims

In case of apparatus claims, the most often used methodology is to recite means plus function claims or means claims maintaining the coherence with the recited elements in the claims, Clauses like "whereby" and "so that" are used for the purpose. It is also important to make generic claims reciting broad functions supplemented by embodiments highlighting possible equivalents structures. A broad claim may define the means and the dependent claim may define the structure for the said means claim. broadest structure

Software Claims

Such claims may be written based on the flow described in an algorithm reciting means plus function approach. Further these can be supplemented with hardware claims depending upon the nature of the invention. Most common approach is to use method and system type claims. What should be recited in the first claim would depend upon the nature of invention. Computer Source codes are normally not part of the claims and are protected under Copyright laws.

Improvement Claims: Sometimes there are minor improvements in a product or process and these can be claimed by reciting known elements in the preamble followed by characterizing the improvement.

7.6.3 Requirements Under European Patent Convention

Similar to the Indian patents Act, Article 83, 84, 69(1) and 79(1) and corresponding Rules provide that the patent specification of a European patent shall include the description, the claims and drawings, if any. EPC also provides that all essential features of the invention be provided in a sufficiently clear manner to be carried out by a person skilled in the art. The claims in a European application be clear, concise and succinct based on the support available in the specification. An EP application may carry one independent claim in each category like product and process and each supported by dependent and multiple dependent claims. The claims must not be unnecessarily repetitive. The claim structure could be two part, the first part namely prior art portion describing the subject matter of the invention and technical features defining it and characterizing portion defining the technical features. All the essential features of the invention must be defined in the first claim.

7.6.4 Requirements Under USPTO

As per the Patent Practice Manual of USPTO, the specification should have the following sections, (1) Title of the Invention; (2) Cross Reference to related applications (if any); (3) Statement of federally sponsored research/development (if any); (4) Reference to a "Sequence Listing," a table, or a computer program listing appendix submitted on a compact disc and an incorporation by reference of the material on the compact disc. (5) Background of the Invention; (6) Brief Summary of the Invention; (7) Brief description of the several views of the drawing (if any); (8) Detailed Description of the Invention; (9) A claim or claims; (10) Abstract of the technical disclosure and (11) Sequence listing (if any).

The specification must include a written description of the invention specifying the novelty and best mode of making and using it known to the inventor at the time of filing the patent applicant.

7.6.5 Requirements Under PCT

Under PCT, patent specification must contain similar basic requirements as in case of EP patent applications.. Under the provisions of Rule 11 of Patent Cooperation Treaty (PCT), the specification must contain description, claims, drawings, and the abstract. The description shall first state the title of the invention and specify the technical field to which the invention relates, indicate the background art by citing the reference as known to the applicant, which is useful for the understanding, searching and examination of the invention. The specification must disclose the invention, as claimed, in such terms that the technical problem & its solution achieved by the invention and state the advantages of the invention with reference to the background art. The brief description of the figures in the drawings, if any is also accompanied in the specification. The specification sets forth the best mode contemplated by the applicant for carrying out the invention claimed, this shall be done in terms of examples, where appropriate, and with reference to the drawings, if any. The specification further indicate explicitly, when it is not obvious from the description or nature of the invention, the way in which the invention is capable of exploitation in industry and the way in which it can be made and used.

As per rules of PCT regulations mentions the detailed requirement of the claims, drawings and abstract. Claims shall state the definition of the matter for which protection is sought shall be in terms of the technical features of the invention and a characterizing portion, preceded by the words "characterized in that," "characterized by," "wherein the improvement comprises," or any other words to the same effect, stating concisely the technical features which, in combination with the features stated under it is desired to protect. The drawings include Flow sheets and diagrams. The abstract shall consist of a summary of the disclosure as contained in the description, the claims, and drawings.

- the summary indicates the technical field to which the invention pertains and allows understanding of the technical problem, the gist of the solution of that problem through the invention, and the principal use or uses of the invention;
- the chemical formula where applicable that best characterizes the invention.

The abstract shall be as concise as the disclosure permits (preferably 50 to 150 words if it is in English or when translated into English). The abstract shall not contain statements on the alleged merits or value of the claimed invention or on its speculative application.

Self Assessment Question **(Spend 3 minutes)**

1) Is there a difference in the position of claims in US and India? If so, where the claims are put in the specification in both cases?

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7.7 EXAMPLES ILLUSTRATING VARIOUS COMPONENTS OF A PATENT SPECIFICATION

7.7.1 Title

Generally the title should be brief and should reflect the name of the invention viz. product, process/method/improved process of manufacturing, application / use and product and a process thereof and method of application/use. Mostly the title is based on the preamble of the first claim, there are instances wherein title itself may reveal the entire invention and in such cases due care should be taken to write the title. Some examples of titles from various field of technology are given below.

Example:

a) N-1-Alkyl-2, 5-di (tetraalkyl silyl) pyrrolidines

b) Process for preparing 2,4,4,6-tetrabromo-2,5-cycloyhexadienone

c) N-1-Alkyl-2,5-di (tetraalkyl silyl) pyrrolidines and a process for the preparation thereof

d) Multifunctional catalyst useful in the synthesis of chiral vicinal diol and a process for the preparation thereof, and a process for the preparation of chiral vicinal diols using the said multifunctional catalyst.

7.7.2 Field of the Invention

The field of the invention means the technical field to which the invention relates, it also includes the industrial area in which the present invention would be useful.

Examples:

- The present invention relates to a novel compound N-1-alkyl-2,5-di(tetraalkyl silyl) pyrrolidines. More particularly, the present invention relates to N-1-alkyl-2,5-di(tetraalkyl silyl) pyrrolidines useful for the synthesis of Epibatidine. Epibatidine is a potent non-opiod analgesic.
- The present invention relates to a process for the single pot preparation of 2,4,4,6-tetrabromo-2,5-cyclohexadienone.
- The present invention relates to a process for extraction of piperine from Piper species such as Piper nigrum, Piper retrofractum, Piper longum, Piper schmidtii. This method is particularly related to the extraction of piperine using aqueous hydrotrope solutions for the first time.

7.7.3 Background and Prior Art of the Invention

- The background description provides information about the existing knowledge in the field of the invention. All kind of references/disclosures e.g. patent, research publications, book chapters, etc. relevant to the invention shall be mentioned in this section and in the last, establishing a problem that is aimed to be solved by the present invention. The details of the existing art are given to establish a technical problem. The description must include information about the closest prior art and its drawbacks to highlight the need to solve

the technical problem. Thus, it may contain a series of developments in chronological order that have occurred towards the generation of the scope of the invention.

Example:

- 2,4,4,6-Tetrabromo-2,5-cyclohexadienone has wide applications in synthetic organic chemistry. It is used in preparation of linear poly(phenyleneoxides) (W. Ried et al. Angew. Chem., Int. Ed. Engl. 8, 379, 1969), direct monobromination of imidazoles and N-methylindoles (V. Calo et al. J. Chem. Soc., Perkin Trans.-1, 2567, 1972); in regioselective monobromination of aromatic amines to form 4-bromoanilines in high yields (V. Calo et al. J. Chem. Soc. C, 3652, 1971); Since 2,4,4,6- tetra bromo 2,5-cyclohexa dienone is a known compound in the literature, all relevant references dealing with its preparation shall be mentioned under this section of the specification. Reference is made to M. Tsubota et al. (Bull. Chem. Soc. Jpn. 45, 1252, 1972) wherein the bromination of 2,4,6-tribromophenol was carried out by employing liquid bromine. Yet another reference is made to ————

  In the last, drawbacks of the prior art are to be highlighted and is followed by the advantages of the present invention, which obviates the said drawbacks of the prior art. The drawbacks of this procedure are that it requires the handling of hazardous liquid bromine in the reaction. Additional steps are required to recover the methanol and the sodium acetate from the effluent for its safe discharge and to make the process more economically viable and thus the process is costly.

- Piperine (C.sub.17 H.sub.19 O.sub.3 N) is the major constituent of black pepper (Piper nigrum) and is used extensively as a spice, condiment, insecticide and for medicinal purposes. It has shown potent chemoprotective effect against procarcinogens (Reen and Rashmet, J. Ethnopharmacol., 1997, 58(3), 165-173). The extracts of Piper nigrum are found to have a hypercoagulative effect in vitro., they lessen the clotting time by accelerating the thrombin activation and lowering the heparin level in the clotting systems. (Hasselstorm et.a)., Food Res., 1954 19, 373). They are valued for their rubefacient properties and hence used as local application for sore throat, piles and some skin diseases (Wealth of India, Raw Materials, Vol. III, pg. 110). The concentration of piperine is about 6% to 9% in Piper nigrum, 4.0% in Piper longum fruits and 4.5% in Piper retrofractum.

7.7.4 Objectives of the Invention

The objectives of the invention provide the purpose and necessity for the invention. This section must give the specific objectives very carefully, so that the objects as stated are achieved by the support provided in the specification in the form of working examples. The objects must not define some aspects which are not accomplished or are mere suggestive in nature. The objects may cover the important results achieved by the invention.

Example:

- The main object of the invention is to provide an improved process for the single pot synthesis of 2,4,4,6-tetrabromo-2,5-cyclohexadienone which obviates the above drawbacks. Another object of the invention is to obtain 2,4,4,6-tetrabromo-2,5-cyclohexadienone by the direct bromination of phenol.

- The main object of the present invention is to provide a cost effective process for the extraction of piperine from Piper species in a substantially pure form using the phenomena of hydrotropy. The approach is to find a suitable hydrotrope for selective extraction of piperine from Piper species followed by dilution of the extract phase to precipitate piperine in pure form. Another object is to provide a two step process for the selective extraction of phytochemicals like piperine exploiting the ability of hydrotropes to dissolve the otherwise water insoluble organic compounds in aqueous solution.

7.7.5 Summary of the Invention

The summary of the invention (SOI) refers to the broadest claim normally the claim 1 and thereafter it may refer to the important embodiments of the claimed invention. The SOI describes invention in broad terms identical to or very similar to the language appearing in the broadest claims of invention claimed. The summary may provide support for the various dependent claims in the form of embodiments. These embodiments may go beyond the scope of claims to include obvious variations but should not be enlarged to the extent to attract prior art.

Example:

- Accordingly the present invention provides a process for the single pot preparation of 2,4,4,6-tetrabromo-2,5-cyclohexadienone by reacting phenol with a brominating agent comprising a mixture of alkali/alkaline earth metal bromide and alkali/alkaline earth metal bromate dissolved in deionized water, in the presence of an acid, separating, washing and drying the precipitate to obtain 2,4,4,6-tetrabromo-2,5-cyclohexadienone. In an embodiment of the invention, the organic acid is selected from the group comprising of oxalic acid and citric acid. In one embodiment of the invention, the acid comprises hydrochloric acid. In another embodiment of the invention, the phenol used is laboratory grade phenol.

- Accordingly the present invention provides a process for extraction of piperine of Formula 1 from the fruit of Piper species comprises, said process comprising the steps of: ##STR2## (i) contacting the fruit of piper species with aqueous hydrotrope solution at a temperature in the range of 0-100°C. and separating the solution from the solid residue by known methods, and (ii) recovering the piperine from the solution obtained at the end of step (i) by known methods. In an embodiment, piperine is recovered from the aqueous solution of hydrotrope obtained in step (i), after dilution with water so as to bring the concentration of hydrotrope sufficiently low to precipitate piperine from the solution in solid form and separating the precipitated piperine from the solution obtained, followed by washing with water or without dilution, by extraction with organic solvent selected from the group comprising aromatic hydrocarbons, aliphatic hydrocarbons, ethers, esters, ketones, amides, alcohols or mixtures thereof.

7.7.6 Brief Description of Drawings

Under this section of the specification a brief description of all the relevant drawing shall be made with reference to the invention disclosed in the description part. The description of the drawings must be given as per the provisions of patent regulations, which include the figures, flow diagrams, photographs, illustrations. The technical features in the drawings shall be numbered and referred to in the description. No descriptive matter need to be included in the drawings.

Example:

- In the drawings accompanying the specification, FIG I is a perspective view of the present device called "STERIFLOW", embodying the present invention. FIG II is a perspective view of the vertical section taken on the line 2—2 of FIG I. FIG III is a front view of the vertical section taken on the line 2—2 of FIG I, indicating the direction of the airflow streamlines that would affect particulate trajectories in the STERIFLOW.

7.7.7 Detailed Description of the Invention

The detailed description of the invention contains all the details pertaining to the invention, the process for constructing the invention, the broadest possible workable parameters for working of the invention, the examples providing experimental details using specific parameters in the workable range. The detailed description should describe each ingredient, its function, and other possible ingredients which can be substituted therefore.

Another function of this portion of the specification is to provide support for any unusual/ technical terms used in the claims. Also, certain words which may not have a generally recognized meaning should be defined.

Use of terminology: The patent agent normally uses terms, which are well known in the field; however, the inventor can use own terms, it is necessary to explain meanings of the terms as understood by the inventor for the purpose of the invention.

The patent agent must write the specification in such a manner that provide adequate support so that the invention disclosed is repeatable without undue experimentation by a person skilled in the art. It may be noted that if an invention is not repeatable, the patent can be revoked even after the grant.

Yet another function of this portion of the specification is to provide written description support for amendments that may be required later during prosecution.

Markush groups for disclosure of groups of compounds should be used where possible. If compounds, solvents, etc. are disclosed using generic language then various narrower sub-genera and species should be also disclosed. It may also be useful to include a description of the preferred embodiments with features of the invention. Thus, if it becomes necessary during prosecution to define the amounts of the various ingredients there will be proper support in the specification.

Under this section of the specification, a statement for the novelty and inventive steps involved in the invention along with scientific explanation may be included to facilitate focused examination of the disclosure. It is also advisable to include the sequential experimental steps involved in the process for the preparation of the compound/substance. Here, one can always broaden the scope of the embodiments, then what has been claimed. In order to write a proper description, attention should be paid to various aspects depending upon the field of the technologies as explained in the following paragraphs.

In case the invention relates to an improved apparatus/machine/device, provide detailed description defining the various components/parts constituting the apparatus/ machine/device. The improvement should be clearly distinguished from the acknowledged prior art.

Example:

- The present invention describes, 2,4,4,6-tetrabromo-2,5-cyclohexadienone, TBCO is obtained via the overall reaction depicted in equation below. ##STR1##. The present invention also describes a single pot preparation of 2,4,4,6-tetrabromo-2,5-cyclohexadienone by bromination of phenol employing a mixture of alkali/alkaline earth metal bromides and bromates and a mineral or organic acid. The process of the invention involves i) reaction of phenol with a mixture of alkali/alkaline earth metal bromide and alkali/alkaline earth metal bromate in deionized water by slow addition of 36% hydrochloric acid over a period of two hours. The inventive steps involved in the present invention are (i) alkali/alkaline earth metal bromides, alkali/alkaline earth metal bromates are used to generate reactive bromine species, which dispenses the need of liquid bromine, (ii) starting material for this synthesis is readily and cheaply available phenol, compared to 2,4,6-tribromophenol, (iii) reaction is carried out in purely aqueous medium, eliminating the need to use organic solvents which needs one more unit operation to recover organic solvent.

- The General Process of the Invention is Described as Follows: The dried fruits of Piper species such as Piper nigrum, Piper longum, Piper retrofractum, Piper schmidtii in pulverised form, preferably in the mesh size of 5 to 300 are brought in intimate contact with an aqueous solution of hydrotrope in the form of a slurry in a stirred vessel or in a column in which the coarse Piper species powder is packed and the solution passes over it. In the process of invention when the contacting is done in the stirred vessel the Piper species powder is added to the aqueous hydrotrope solution. After the aforementioned components are brought together, the mixture which is usually in the form of a slurry, is agitated for a period sufficient for the extraction of piperine to take place. A typical mixing time is in the range of 15 minutes to 24.00 hours depending upon the concentration of hydrotrope and the speed of agitation. The mixing is conducted at a selected temperature ranging from 0°C-100°C. preferably at room temperature of 30°C. and atmospheric pressure. The Plants of Piper species for the extraction of piperine is selected from the group comprising Piper nigrum, Piper longum, Piper retrofractum, and Piper schmidtii.

  A non-limiting clause is added before the examples, such as "The following examples are given by way of illustration of the present invention and therefore should not be construed to limit the scope of the present invention".

  Under this section of the specification a few typical practical examples based on the experiment carried out in the laboratory for the preparation of the compound/composition/substance etc should be given. These examples are required for covering the broad parameters employed and should specify the starting materials, reaction conditions employed, yield obtained and other relevant details. These examples should cover the broad spectrum of the variable parameters like temperature, pressure, time period, etc. In order to substantiate various permutations and combinations of the process reaction conditions, choice of reactants and the like, supportive examples falling within the scope of new process for the preparation of the compound. These examples should cover the broad spectrum of the variable parameters. Comparative examples should be given wherever required.

Each example based on the experiment given under this section must have a fixed value for all the parameters involved in the experiment i.e. there should not have any range of values for any parameters (temperature, pressure, time period, etc) involved in the given individual examples. The section may have as many examples as possible to illustrate the invention supporting the claims, each having the different critical values of all parameters/material used based on the workable experimental conditions.

Example:

- To a well stirred solution of 2.00 g (21 mmoles) of phenol, 5.97 g (58 mmoles) of sodium bromide and 4.38 g (29 mmoles) of sodium bromate in 60 ml deionized water, in a two neck 100 ml round bottom flask, was slowly added 8.7 mL (3.14 g; 86 mmoles) of 36% hydrochloric acid over 2 hr.
- Whole pepper 20 gms was pulverised to a coarse powder of mesh size# 6 and was added to 100 ml aqueous sodium butyl glycol sulfate of 2.5 gmol/ lit concentration and the suspension was stirred vigorously for 2 hours at 30°C. The solution was filtered and then diluted by addition of 310 ml water. The precipitated piperine was dried and analyzed for purity. The recovery of piperine was 58.8% (716 mg.) based on the amount of piperine present in the dried fruit with a purity of 98%.

7.7.8 Advantages of the Invention

The last part of the description ends with highlighting the advantages of the invention.

Example:

- The Main Advantages of this method are:
  1) It does not use directly liquid bromine for bromination of phenol.
  2) It does not require to start the reaction with tribromophenol.
  3) The brominating agents and other reactants are eco-friendly but not toxic and air pollutants.
  4) The brominating agents do not require special equipment and safety devices.
  5) Toxic side products like hydrobromic acid are not produced.
- The main advantages of the present invention are:
  1) A simple practically viable method has been provided for the extraction of piperine.
  2) The number of steps required for extraction has been reduced and simple operating conditions are provided which can reduce the cost of production.
  3) The hydrotrope solution can be recycled with or without the concentration step for further extraction which reduces the cost of chemicals.
  4) The process of the present invention is carried out preferentially at lower temperature which is an improvement over the prior art as it does not degrade piperine and other chemicals.

5) The first step of the process of the present invention is carried out without the use of any organic solvent, which retains the purity of piperine and is an improvement over the prior art.

7.7.9 Claims Construction

The principal claim must have the starting material and other reactants along with the essential features/properties/parameters, such as chemical formula/compositions/ molecular weight/ mol/wt% ratio, solvent, reaction conditions e.g. temperature, pressure, time period etc., critical physical and chemical characteristics/particle size of the material used, in the form of range to the extent of best possible workable range, so that it covers the scope of the invention. The preferred range of parameters/ reaction conditions and materials used are to be claimed in the subsequent claims, which are depending on the principal claim.

In the case of composition/formulation claim the percentage range of all the ingredients used must be claimed in such a way that the total percentage of the end product should not be more/less than 100% after the sum of all the consequent ingredients.

Example:

- **We claim:**
  - Independent claim:
    1) A process for the single pot preparation of 2, 4, 4, 6-tetrabromo-2, 5-cyclohexadienone comprising reacting phenol with a brominating agent comprising a mixture of alkali/alkaline earth metal bromide and alkali/alkaline earth metal bromate dissolved in deionized water, in the presence of an acid, separating, washing and drying the precipitate to obtain 2,4,4,6-tetrabromo-2,5-cyclohexadienone.
  - Dependent claims:
    2) A process as claimed in claim 1 wherein the acid is selected from the group comprising of oxalic acid and citric acid.
    3) A process as claimed in claim 1 wherein the acid comprises hydrochloric acid.
    4) A process as claimed in claim 1 wherein the phenol used is laboratory grade phenol.
    5) A process as claimed in claim 1 wherein the process comprises reacting 2 to 10 g (21 to 106 mmoles) of phenol with a mixture of 54 to 301 mmoles of alkali/alkaline earth metal bromide and 27 to 150 mmoles of alkali/alkaline earth metal bromate dissolved in 30 (w/w) equivalents of deionized water by slowly adding 3.5 to 16.0 g (96 to 438 mmoles) of 36% hydrochloric acid in 5 (w/w) equivalents of deionized water over two hours, allowing the reaction to continue, filtering the precipitate, washing and drying under vacuum to obtain 2,4,4,6 tetrabromo-2, 5-cyclohexadienone.
- We claim:
  - Independent claim:
    1) A process for extraction of piperine of formula shown below ##STR3## from the fruits of Piper species comprising the steps of: (i) contacting the fruit of Piper species with aqueous hydrotrope

solution at a temperature in the range of 0 - 100 degree C, wherein the hydrotrope is selected from a group consisting of alkali metal salts of alkyl benzene sulfonates, alkyl polyglycol sulfates or phosphates, substituted aromatic carboxylates, substituted phenates, substituted naphthonates, substituted naphthalene carboxylates and alkali metal saccharines; (ii) separating the solution from the solid residue; and (iii) recovering piperine from the solution by a method selected from a group consisting of dilution and solvent extraction.

- Dependent claims:
  2) A process as claimed in claim 1, wherein the fruit obtained from a plant of Piper species used in the step (i) is selected from Piper nigrum, Piper longrum, Piper retrofactum, Piper schmidtii.
  3) A process as claimed in claim 1, wherein the alkali metal salts of alkyl benzene sulfonates are selected from sodium, potassium, calcium, magnesium and ammonium salts of alkyl benzene sulfonates.
  4) A process as claimed in claim 1, wherein the alkyl benzene sulfonates are selected from the group comprising benzene sulfonate, toluene sulfonate, xylene sulfonate, ethyl benzene sulfonate, styrene sulfonate, pseudocumene sulfonate, mesitylene sulfonate, propyl benzene sulfonate and butyl benzene sulfonate.

- **We claim:**
  - Independent claim:
    1) A method of treating visceral leishmaniasis or kala-azar in mammals, said method comprising the step of administering to the mammals a pharmaceutical composition comprising an effective amount of a betel leaf extract, wherein the betel leaf extract is obtained by crushing the betel leaf or extracting the crushed leafs with water or organic solvents selected from the group consisting of alcohol, carbon tetrachloride, chloroform and acetone.
  - Dependent claims:
    2) The method according to claim 1, wherein the composition comprises betel leaf extract and a pharmaceutically acceptable additive.
    3) The method according to claim 2, wherein the additive is selected from the group consisting of proteins, carbohydrates, sugar, talc, magnesium state, cellulose, calcium carbonate, starch-gelatin paste, pharmaceutically acceptable carriers, excipient, diluent and solvent.
    4) The method according to claim 1, wherein the composition is administered orally or intramuscularly.
    5) The method according to claim 1, wherein the oral route is administered in the form of capsule, syrup, concentrate, powder or granules.
    6) The method according to claim 2, wherein the ratio of betel leaf extract to the additive is in the range between 1-10 to 10-1 by weight.

7.7.10 Abstract

The abstract must indicate the technical field to which the invention relates and must specify the technical problem and how the solution has been achieved through the invention. The abstract shall be as concise, preferably 50 to 150

words in English. The abstract shall be drafted in a manner so as to serve as a scanning tool for purposes of searching in the particular art.

As per the provisions of the Rule 8 of PCT regulations, the abstract shall consist of the following:

i) a summary of the disclosure as contained in the description, the claims, and any drawings; the summary shall indicate the technical field to which the invention pertains and shall be drafted in a way which allows the clear understanding of the technical problem, the gist of the solution of that problem through the invention, and the principal use or uses of the invention;

ii) the chemical structural formula which best characterizes the invention.

Example:

- **Abstract:**

A highly pure 2,4,4,6-tetrabromo-2,5-cyclohexadienone has been prepared in a single pot, eco-friendly procedure in yields of 91-94% from phenol. In this method, a mixture of alkali/alkaline earth metal bromide and alkali/alkaline earth metal bromate was employed as brominating agent in place of corrosive liquid bromine. The reaction between phenol and the brominating reagent was initiated by the action of a mineral acid or moderately strong organic acid. The crude product was further characterized by standard analytical and spectroscopic methods.

- **Abstract:**

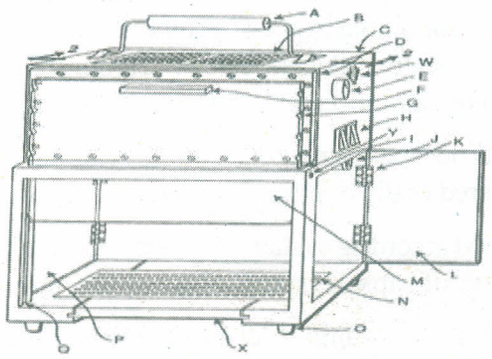
The present invention relates to a process for extraction of piperine of Formula I from the fruits of Piper species, comprising the steps of: ##STR1## contacting the fruit of piper species with aqueous hydrotrope solution at a temperature in the range of 0-100 degree C and separating the solution from the solid residue by known methods and recovering piperine from the solution by known methods.

7.7.11 Drawings

All the drawings comprise tables and figures must explain the embodiments of the invention. The figures must be provided in separate sheets along with the specification. The drawings help to better characterize the invention.

Example: US 6,623,538 - Sterile laminar airflow device

U.S. Patent Sep. 23 2003 Sheet 1 of 3 US 6,623,538 B2



7.7.12 Sequence Listing

All the sequences mentioned in the specification are to be submitted in PatentIn format.

PatentIn 3.5 facilitates the creation of sequence listings for inclusion in patent applications sequences. It accepts data about the sequences validates the data,

creates a sequence listing file and a mechanism for printing out and saving to removable medium for submission.

STEPS INVOLVED:

1) Open: http://www.uspto.gov/web/offices/pac/patin/patentin.htm

2) PatentIn 3.5 software is available for free download:

   Installation Instructions and Software Download

3) After downloading and installing – Launch PatentIn 3.5 by double clicking on the icon, Sequence screen will appear:-

   a) Select a sequence and its Type:- DNA, RNA, DNA/RNA and Protein type sequence

   b) Specify a name for your sequence an add it

      Example: Sequence ID NO. 1; DNA; Organism name: Abies alba

      ttttcttattgtttctcctactgcttatcataatgattgtcgtagtggcttcctcatcgt

   c) Validate the Sequences

SEQUENCE LISTING FILE:

PatentIn 3.5 will generate a notepad of sequence listing with the extension "ST25.txt".

If sequence generation succeeded and drop boxes "View listing" and "error log when done" to be selected, the generated sequence listing will be shown automatically on the View Results Window.

7.8 ESSENTIAL FEATURES OF DESCRIPTION OF AN INVENTION

Invention relating to a new compound

For an invention relating to a new compound, the chemical name and structural formula of the said compound needs to be mentioned. All the symbol and specific terms used are required to be defined. The process of preparation in a detailed step wise manner including the starting material used along with all the necessary parameters and reaction conditions are other essential parts of the description. All the reactants and their functions must be illustrated in the description part of the specification. The broadest parameters within which the invention will work even at reduced efficiency should be stated along with the preferred parameters for obtaining optimum performance of the invention must be mentioned. The commercial importance or uses of the new compound should also be mentioned in the examples. Under the provisions of Section 3(d) of the Patents (Amendment) Act, 2005, the salts, esters, ethers, polymorphs, metabolites, pure form, particle size, isomers, mixtures of isomers, complexes, combinations and other derivatives of a compound shall be considered to be the same compound, unless they differ significantly in properties with regard to efficacy.

In case of chemical inventions, the structure of the chemical entity or general structure of the claimed compounds is essential to be provided.

In case of drugs/pharmaceutical inventions, the status of chirality, structure with defined stereochemistry and Status/Stage of bio-evaluation (Preliminary/follow-up/pre clinical/pharmacology/toxicology) is required to be provided.

- As per the manual of Indian patent practice & procedure, the definitions of different forms of a compound, as covered under Section 3(d) of the patent Act isomers having the same empirical formula but having structural differences may be considered novel and may not be obvious as they are structurally different. In case of a new polymorph, only process patent may be allowed provided it is prepared by novel process involving inventive step. In case of homologues, metabolites and prodrugs, allowability of claims depend on case to case basis.

  An invention relating to a novel carrier for drugs, which might be further used with many other drugs for which the inventor has not carried out experimentation, the specification however can contain few names of those drugs, which would probably work in combination with the invented carrier. It must be also mentioned what are the optional ingredients that can be used and also their proportions required in the experiments.

Example:

- US5,654,439 - N-1-Alkyl-2,5-di (tetraalkyl silyl) pyrrolidines
- US 7,129,251 - Nitrosated and nitrosylated H.sub.2 receptor antagonist compounds, compositions and methods of use

Invention relating to a new composition:

For an invention relating to a new composition, the ingredients and their proportion ranges, including the preferred ranges viz, wt% or % volume etc. in the new composition are to be mentioned. The specification must provide comparative data to establish the synergistic characteristics of the composition in view of the ingredients separately. The specification further provides the process of preparation of the composition in a step wise manner, specifying the critical steps and the commercial use of the composition. A substantial description of the invention must be supported by the examples based on experimental results, mentioning the reaction conditions, yields and other relevant details covering the broad scope of parameters.

Example:

- US 6548586 - Composition useful for making in situ silicon carbide whiskers and fibres.
- US7,338,674 - Anti-arthritic herbal composition and method thereof
- US 7,297,659 - Synergistic fermented plant growth promoting, bio-control composition

Invention relating to Biotechnology:

For an invention relating to biotechnology, detailed description regarding the characteristics of the used microorganism or strain or culture, required for its definite identification, must be provide in the specification along with its appropriate deposition details in any of the 37 International Depository Authority (IDA). The

deposition details include the accession number of the strain, date of deposition, name of the IDA and details of the conditions necessary for the cultivation of the microorganisms, for its storage and for testing its viability and also, where a mixture of microorganisms is deposited, descriptions of the components of the mixture and at least one of the methods permitting the checking of their presence;. It is necessary to deposit the used microorganism in the IDA before filing the patent application. While deposition, IDA should be informed in writing that, the deposition is made for the purpose of patent protection and therefore, the IDA will make such information available to public only after the patent application is published.

Information regarding microorganisms:

a) species identification;

b) morphological details such as shape, size, stain ability, motility;

c) colony characteristics, for example, color, shape, size, swarming and any distinguishing features in appearance, such as, shininess;

d) metabolic characteristics including substrate requirements, products or byproducts, isozyme characteristics and growth conditions;

e) genetic characteristics such as specific genes or mutations or variants of these (these may be characterized at either the nucleic acid or protein level);

f) plasmids and phages (if any) in the microorganism together with relevant genetic characterization.

g) Types of Host cell and expression systems;

h) recovery and purification of recombinant proteins

Information for Vectors, DNA, proteins and monoclonal antibodies:

a) Amino acid composition, sequences and derivatives;

b) Physical and chemical properties;

c) information regarding impurities;

d) Reactivity with antibodies/antigens;

e) Post translational modifications of proteins;

f) Epitope determination of monoclonal antibodies;

g) Isotypes and catalytic & neutralizing activities;

h) Diagnostic and therapeutic uses of monoclonal antibodies etc.

i) selectable markers;

j) details of inserted structural gene;

k) promoter, initiators, terminators used;

l) sequences of critical region of vector;

m) all nucleotide, cDNA, RNA and protein sequences in particular format;

n) diagnostic uses of the genes and proteins;

One example of original cloning of gene accompanying by other methods of performing the invention is desired to be described in the specification. All the enzymes, plasmids, buffers, primers and labels used in the invention might be critical, thus mentioning them along with suitable equivalents may be of importance. If the invention relates to a new molecule, DNA or protein, the specification must depict which of the portion of the said molecule remains unchanged and which portions are changeable.

If a chemical such as peptide is having known structure, it is essential to mention the general formula and changeable subtituent groups. Sometimes the structure of the product, such as an antibody or protein is not known to the inventor, it is important to recite the identifying characteristics. General characteristics of biotechnology inventions include the biological properties, in vitro properties, physical properties such as stability, solubility, molecular weight, crystallinity and NMR spectra. The product of unknown structure can also be claimed in a "product by process" style. (E.g. A glycoprotein produced by a process comprising the steps of:.....)

BDA Requirements:

[a] Provide source and geographical origin of biological resource, its identification, characteristics and deposition details; biological resources means plants, animals and microorganisms or parts thereof, their genetic material and by products (excluding value added products) with actual or potential use or value, but does not include human genetic material;

Sequence listing:

For all sequences of DNA, RNA or protein or any other sequence mentioned in the specification must be provided in the PatentIn format. It accepts data about the sequences validates the data, creates a sequence listing file and a mechanism for printing out and saving to removable medium for submission.

Expasy is one of the most commonly used servers for searching of sequences; others include NCBI-Blast, Entrez, EMBOSS, Rfam library, KEGG, EBI, DDBJ, PDB and ClustalW.

Example:

- US 6841358 - Recombinant proteins of filamentous haemagglutinin of Bordetella, particularly Bordetella pertusis, method for producing same, and uses thereof for producing foreign proteins of vaccinating active principles
- US 6,365,601 - Process for extraction of piperine from piper species
- US 7,132,258 - Nucleic acid encoding vitamin D receptor related polypeptide.
- US 7,132,522 - Regulatory sequences and expression cassettes for yeasts, especially for kluyveromyces

Invention relating to a device/apparatus/machine:

For an invention relating to device/ apparatus/machine, the interconnectivity of the parts is required to be mentioned. The specification further provides the characteristic features of the device, which is different from the functioning of separate parts along with the process for the preparation of the device. It is also required to mention about the usefulness and method for using the said device. It is essential to highlight the essential parts/steps/characteristics of the invention

without which the invention will not work and which are not present in the hitherto known art. In case of inventions relating to apparatus/ device, the parts or combination of parts imparting a new function must be specified.

The information about the working conditions and life cycle of the developed device are also important to mention in the patent specification. In case the invention relates to an improved apparatus/machine/device, the detailed description defining the various components/parts constituting the apparatus/machine/device must be provided. The improvement should be clearly distinguished from the acknowledged prior art.

The specialty of the engineering invention is that, the combination or assembly renders a new technical effect although all the individual components are known. For example, a circuit made of ICs and resistors, transistors.

Example:

- US 6,623,538 - Sterile laminar airflow device
- US 6,935,144 - Device for leather processing
- US 6,407,797 - Polymer coated long duration optical memory device and a method for the development thereof

Invention relating to a new process for preparation of compound or composition:

For an invention relating to a new process for the preparation of a known compound, substance or composition, detailed description of the relevant prior art and its drawbacks should be mentioned. The specification must further mention the detailed sequential steps involved in the new process. There must be novelty and inventiveness in the process distinguished from the prior art. Description must also contain the structural formula of the compound used and must define all the symbols and terminology used in the specification. The usefulness of the compound used and advantages of the new process compared to the existing ones need to be specified. The specification describes examples of the essential and preferred steps and parameters like reaction conditions, reactants, temperature, pressure, solvent employed etc. in which the invention would work and also mentions the preferred ranges of parameters for optimum results of the invention. The specification should preferably provide a flow chart of the invention process.

Example:

- US 6780810 - A process for the preparation of chiral vicinal-diols using multifunctional catalyst
- US 5,145,955 - Process for the preparation and composition of a fraction containing picroside I and kutkoside.

7.9 FILING OF A PATENT APPLICATION AT PATENT OFFICE

The documents required for filing a patent application in India are:

- Application form with original signatures of all the inventors [in duplicate]
- Provisional/complete specification; [in duplicate]
- Drawings (if any); [in duplicate]

- Information for foreign filing details; [in duplicate]
- Declaration of inventor ship from all the inventors; [in duplicate]
- Requisite Fees.

7.10 SUMMARY

- Patent specification describes all the essential features of an invention. Drafting the patent specification demands multiple skills of the drafter including understanding the technical nature of the document, writing skills, assessments of the state of art, absorbing of details and defining the problem being solved by the invention. The patent specification must meet the requirements of novelty, inventiveness and industrial applicability. There are parts of the specification having specific significance.
- There is an option of securing priority by filing a provisional specification, which is to be completed within a period of 12 months.
- Claims form the most important part of a patent specification, which define the scope of the invention. There are different types of claims; however the allowbility of different types of claims varies according to different jurisdictions.
- The focus of a patent specification is to establish a problem based on disclosure of the prior art and how the present invention solves the said problem. The application further highlights the substantial new advantage over the prior art in terms of cost and ease of working.
- The process of drafting a patent specification involves various steps focusing on the differences with the closest prior art, advantages over the closest prior art, how to stop the competitors to design around the invention, the broadest parameters nearest to the closest prior art under which the invention can be performed.
- Inventions pertaining to different categories are allowable for patent protection subject to the respective patent law provisions of the country where the protection is sought.
- Specific requirements exist for claiming the invention pertaining to different technological fields such as chemical and biotechnological or engineering, which are essential for the grant of the patent.
- The claims of a complete specification shall relate to a single inventive concept and shall be substantially based on the matter disclosed in the specification.
- The Doctrine of Equivalents is a legal concept which allows a patent owner to claim infringement, even if the claims of said patent are not literally infringed, due to the very similar nature of the infringing behavior and is considered as equivalent to the claimed invention. The goal of the doctrine takes a more holistic approach and provides patent owners with fair protection for their patents.

7.11 TERMINAL QUESTIONS

1) What is a patent specification, what are the different parts of it?
2) What are the differences between a provisional and complete specification?
3) Explain the process of drafting a patent specification.

7.12 ANSWERS AND HINTS

Self Assessment Questions

1) Refer to Section 7.1
2) Refer to Section 7.2
3) Refer to Section 7.3
4) Refer to Section 7.4

Terminal Questions

1) Reference to Section 7.1
2) Reference to Section 7.2
3) Reference to Section 7.4

7.13 REFERENCES AND SUGGESTED READINGS

1) World Intellectual Property Organization (WIPO) [http://www.wipo.int]
2) WIPO Resources [http://www.wipo.int/ipdl/en/resources/links.jsp]
3) United States Patent Office (USPTO) [http:/www.uspto.gov]
4) European Patent Convention regulations [http://www.epo.org]
5) Journal JOM, 42 (5) (1990), p.59
6) Types of claims - http://www.uspto.gov/web/offices/pac/dapp/pdf/bwsex.pdf
7) http://www.uspto.gov/web/offices/pac/mpep/documents/0800_803_02.htm

UNIT 8 COMMERCIALISATION OF PATENTS

Structure

8.1 INTRODUCTION

One of the key issues in the licensing, commercialisation of patents, is the need for the scientist to make sustained efforts to market his patents. When should the scientist begin his marketing efforts? It is generally felt that the marketing efforts should begin at the earliest, even at the concept stage, particularly when there is no danger of the idea being exploited by other parties.

This is illustrated by a few examples. For instance a scientist in CSIO has an idea to develop an electronic jamming system, which would block the use of mobile phones, say in a radius of 4 kilometers. (Such a system, which was imported, was recently used when President Musharaf and Prime Minister Man Mohan Singh watched the one day cricket match between India and Pakistan at the Feroz Shah Kotla Stadium in Delhi). The idea is not unique. There may be some aspects of the know-how that could result in patents Therefore, if the scientist wishes to develop an indigenous product; he should start marketing the idea at the idea stage itself, to seek financial and technical support, particularly for testing and certification of the product. The idea can be marketed to various agencies such as the Army authorities, Police Department, Intelligence Bureau (IB) etc. These agencies would also provide the scientist with the proposed specifications for the product, and any additional features that they might like to be incorporated in the product, which could then be patented.

Another example is the development of a Six-High rolling mill, which would cost around Rs. 1600 million. In this case also there is no adverse consequences of leakage of the idea due to the inherent high cost of development. In fact, it is not only advantageous but also essential to have an industry partner even **before** the start of the R&D work for such large R&D projects, which would result in a number of patents.

On the other hand, there are many ideas, which should not be discussed or disclosed to interested parties, before filing of the patent application. Otherwise there is a danger that the industry would utilize the idea, as their own, and develop the same into a commercial product. Take for example, the case where a scientist in the National Physical Laboratory (NPL) has developed the basic concept of having a mirror like coating on a plastic film. A plastic mirror film would be a major break through in mirror technology, in fact it would be a disruptive technology, as the product would be cheaper, unbreakable and more convenient for use on steel almirahs, rearview mirrors in auto's etc. In this case there is a real danger that the idea could be stolen if it is disclosed to others.

Or take another example like the development of a balloon type atlas globe using rubber or plastic, which may cost around, say Rs. 10 as compared to the existing globes available in the market. Therefore, the marketing efforts should only begin after the patent or the PCT application has been filed. Most ideas fall in the latter category. It is generally safer to begin the marketing efforts after filing of the patent

It may also be noted that often the marketing efforts for licensing of the patent, which is the first step towards its commercialisation, may have to continue for a long period of time, often it takes as long as 5-7 years before the license agreement is signed with an interested party. In patent and technology licensing, one is never sure, at what stage of development of the technology, it would be licensed. It may be licensed at the stage of filing the patent, or at the laboratory development stage or at the pilot plant development stage, etc.

One must also appreciate that licensing of a patent to a party is not sufficient or a guarantee that it would be commercialised, for commercialisation to succeed the know-how/ technology embedded in the patent has also to be transferred. Technology transfer is an activity, which requires considerable expertise. On the one hand, it requires domain expertise pertaining to the concerned industrial sector viz chemical, electronics, computer software, metallurgy, building materials,

drug and pharmaceutical products, etc; and on the other hand of the technology transfers process itself.

This is the reason that most reputed R&D Institutions and Universities have a separate Technology Transfer Division. Often, the technology transfer and Intellectual Property Divisions are grouped together in most of the major R&D organizations such as ISRO, CSIR, and BARC. In fact, ISRO has set up a separate technology transfer company, viz: ANTRIX in Bangalore and the Defense Research Development organization (DRDO) has a separate Technology Transfer Group known as C-Tech. In the case of CSIR, all their individual laboratories/Institutes such as the National Chemical Laboratory, Indian Institute of Chemical Technology, etc have been delegated powers to transfer technologies directly to industry or to enter into joint technology development and commercialisation agreements with the industry or other R&D Institutions - Indian or foreign for all their patents. They have therefore set up separate Business Development Groups in each of the CSIR laboratories.

Other countries, particularly China & Japan and now Russia, have also setup specialized stand alone Technology transfer companies which cater to the patent commercialisation and technology transfer needs of various R&D Institutions/ Universities, either on a regional basis or on a sector (industrial) specific basis.

In India, the National Research Development Corporation is the premier patent licensing, commercialisation and technology transfer company, which has been set up under Section 25 of the Companies act (i.e. a non dividend paying company, though it makes profits) – for it is expected to invest back the profits it makes on the development and commercialisation of new patents and technologies, and also to promote the commercialisation of new inventions of **individual inventors**. It should, however, be noted that patent licensing and technology transfer, as a business, is not likely to be profitable, though NRDC is an exception, for it makes profits. Most of the other international technology transfer originations are supported by their respective Governments – generally to the extent of 50% of their annual financial budgets. This is perhaps, the reason why there are hardly any private patent licensing and technology transfer companies in the developing countries. In fact, in India there are none.

Even in the developed countries, there are very few stand alone patent licensing and technology transfer organizations. In U.K., the British Technology Group (BTG), which was earlier known as the NRDC of U.K, was privatized in1993, and has since been consistently making losses over the years - its loss in 2003-2004 was over $27 million. However, on the positive side, it may be noted that BTG has been able to secure considerable private investments on the basis of its patent portfolio.

8.2 OBJECTIVES

After reading this unit, you should be able to:

- describe the strategic R&D institutions in India and their objectives;
- explain the key factors that make marketing of patent technologies different from marketing products;
- discuss the different patent/technologies and the different methods used in patent/technology valuation;

- explain the factors that affect the marketing sale ability and pricing of a patent/technology;
- identify the different potential licensees;
- explain the different factors to be considered in formulating a strategy; and
- explain the distinct features necessary for the expert of technologies.

The primary objective of patenting is of course to protect ones inventions. One must however understand that the real commercial or strategic objective of patenting varies from one organization to another organization and from one individual to another individual. Let us examine this aspect in detail as it has implications in the ultimate objective of commercialisation of the patent.

8.3 OBJECTIVES OF COMMERCIALISATION OF PATENTS

a) Objectives of strategic R&D organization and societal organizations

There are many strategic R&D Institutions in India, such as over 40 laboratories of the Defence Research and Development Organization and the R&D centers of the Indian Space Research Organization (ISRO), whose main interest in taking patents for their inventions is first of all to protect the national strategic interests, particularly for dual use technologies, which can be commercialised and used both by the defence and civilian industry sectors. They do not want a situation, where some other country has patented the technology and therefore they cannot utilize it. The strategic R&D Institutions of every country want to retain the option to commercialise the technology in future. Furthermore they do not want other countries to utilize or commercialise the technology. In defence parlance, these are known as "Defensive Patents".

The societal organizations such as the NGO's, the R&D Institutions of the Indian Council of Agricultural Research (ICAR), International Foundations such as the Bill Gates Foundation etc, often patent an invention so that no one else can patent it. But they do not have any desire to in any way derive commercial benefit from it. The patent is available to anyone who wants to use it or commercialise it, for social benefit - like the " Open Source Code" available on the internet.

b) Objective of Industry

The objectives of industry for patenting vary from one industry to another. Large multi nationals also use the strategy of filing "defence patents" to protect the commercial viability of their present investment, which often exceed millions of dollars in investment. They do not wish to commercialise their patent in the near future, because, either they do not have the money for the investment of commercialisation of the new patent, or that they feel that they should derive the maximum benefit from the investment that they have already made in the mark 1 version of the technology. Thereby, they want to prevent competitors form leap forging to the mark 2 version of the technology.

However the primary objective of the multinational industry organization is to use and commercialise the patent themselves, at least in the countries where they have manufacturing plants or business interests at an appropriate time.

The SME's on the other hand may desire to license the patent rights to other organizations particularly in other countries, and sometimes even within India, but on the basis of territorial exclusive rights, such as the states of Tamil Nadu and Karnataka. This stems from the limitation as they do not have the financial or the man power resources to either manufacture the patented product in large volumes or sell the patented product in other regions or other countries. For them the best option is to license the product and the know-how to other clients on a selective territorial basis.

c) Objective of R&D Institutions/Universities

The primary objective of scientists in R&D institutions and universities is patenting their inventions is to license the patent rights to industry and earn lump sum premiums and royalties, for they cannot commercialise it themselves. Though sometimes the university is instrumental in setting up a commercial venture in association with an industry as a joint venture, where the university gives the patent right holder the option to join that venture and in return being compensated, individually, by getting an appropriate percentage of the equity in that new venture. The Silicon Valley is an example of this type of arrangement, which has changed the world. In India, IIT Chennai and IIT Delhi have also achieved significant success by this type of arrangement. The R&D institutes/universities have decided what type of strategy they would like to deploy for a particular patent. The options are:

- License on non-exclusive basis to anyone.
- License on exclusive basis to one company without any restrictions.
- License on limited basis on exclusive basis, depending upon-Geographical territory (region country, continent)
    - Time exclusivity- total exclusivity to the first licensee for 5 years from the date of commercialisation.
    - Application exclusivity – it shall be used only for a particular application. For example a high energy magnet will be used only for removing the minor accidental dents in a car, but not in "auto door closure", or in an apparatus for removing foreign particles in the human eye.
    - Dual license- two licensees. One an Indian company, the other a multinational company, having some exclusive territories and some co exploitation territories.

d) Track Record in commercialisation of patents

Though the published literature in this regard is rather poor, mainly because the number of patents that are commercialised is below a dismal 4% in the USA- the most patent savvy country in the world, and only 0.5% in India, one has to understand that by patenting his invention, he is not guaranteed that his invention will be commercialised, is not true, it is an exception. And patenting is expensive. An Indian patent will cost Rs. 30,000 but taking patent in 10 major developed countries would cost over 4 millions (the initial fees) which cannot be affordable by many. That is the dilemma. But all said and done there are R&D institutes who are licensed/commercialised. Almost 30% of their patents. Unfortunately in India, there is only the National Research Development Corporation (NRDC).

A series of circumstances combined to focus attention on patenting issues surrounding the use of the base human genome in 1998, due to the fact that the advent of the new technologies permitted significant reductions in gene sequencing time and costs. This led to a rival relationship between the public and private genome research industries. The scientists also realized that the potential issuance of numerous patents on individual segments of the base genome would delay down stream genome medical research. Further, monopoly-licensing practices could even block access to some critical information.

8.4 PATENT COMMERCIALISATION VS PRODUCT MARKETING

What are the key factors that make marketing of patents/technologies different from that of marketing of products.

8.4.1 Disclosure of Know-How

Firstly, when one markets a product, he is not bothered about the need to maintain secrecy, in explaining the features or advantages of his product over other competing products. The salesman can practically demonstrate the operation and uses of the product, particularly for durable or consumable products such as sewing machines, TV's, Mixers, mobile phones, etc.

However, when one markets a patent or technology, one has to be extremely careful to ensure that during the process of marketing the technology, the Know how is not inadvertently disclosed to the prospective buyer. This aspect has to be kept in mind because the marketing of technology involves the marketing of protected and often unprotected knowledge of the scientist/innovator. Various legal methods have been developed, such as signing of Non-disclosure (confidentiality) agreements, Material Transfer Agreements, Deposition of strains/ micro – organisms, catalysts or enzymes in recognized international depositories to protect bio – technology patents and processes,. however, in practice none of these methods are foolproof. This is perhaps the reason why almost 50-60% of the patented technologies are acquired illegally by industry without any payment to the R&D institution or the inventor, particularly by unscrupulous parties and exploited for commercial gains.

Self Assessment Question **(Spend 3 minutes)**

1) Mention the unique key factor of marketing of patenting that differs it from marketing of products.

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8.4.2 Time to Market

Secondly, the process of marketing a patent or technology is rather complex, involving a number of steps, which require persistence efforts by the scientist for a long period of time, often extending to 2-3 years, before a deal is finally struck. This also means that many meetings and prolonged discussions are required by the scientist with the prospective licensee to convince him of the usefulness of the patent or technology even before entering into the actual negotiations for pricing of the technology. Many scientists get frustrated with the delays in finalization of license agreements for the existing patents, and they decide to move on to newer areas of research, which are not only more exciting and challenging but also more satisfying in respect of the creative needs of scientists.

8.4.3 Background of The Potential Customers (Licensees)

Thirdly, while selling a product, the seller is not concerned about the background or competence of the client, if he is assured of the receipt of the payment for the sale. However, in the case of patent licensing or technology transfer, the credentials of the client (not only his technical and financial competence but also his trust worthiness) is important, because patent licensing or technology transfer is not a one time activity, it involves building up a longstanding relationship based on exploiting the strengths and weaknesses of both the parties, for mutual benefit.

It should also not be forgotten that the licensee/client has to pay royalties on the sales of the patented product when it is sold commercially, for a number of years, generally for the validity period of the License which may extend to 20 years or for the remaining life of the patent ,which would essentially be less than 20 years. Therefore, the track record of the patent licensee in making the due royalty payments for other patents that he has required is also important. The patent technology licensing process, thus often involves selection of a competent licensee, who has not only the technical, financial and marketing capability to successfully commercialise the technology, but one who is trustworthy, who will pay the royalty dues.

Further, remember that if the first licensee fails in making a commercial success of the patented technology, further licensing of the patent to other parties would become extremely difficult, if not impossible.

8.4.4 Role of End Users and Intermediaries

Fourthly, the end user of the product, resulting from the patent/ technology may be other than the manufacturer (the licensee) who commercialises the technology. For example, for a new frost-free, non-CFC refrigerator, the user is the household customer, but the licensee is a refrigerator manufacturer. For patent commercialisation to succeed in the market place both the manufacturer and the end user have to be convinced about the advantages of the new patent/ technology. Sometimes the chain from the licensee, to the end user may be long, involving several intermediaries, such as whole sellers, marketing companies, dealers, shopkeepers, etc. For process-based technologies, the role of detailed design and engineering consultants is also crucial for the successful commercialisation by up scaling the pilot plant to a commercial scale and implementation of the technology in the manufacturing plant.

8.5 PATENT/TECHNOLOGY VALUATIONS AND PRICING

Before we take up the subject of patent/technology pricing, let us examine as to how we can determine the intrinsic value of a patent/technology. While the value of a patent/technology depends on the various inexact factors enumerated above, we cannot ignore the need for having a sound basis, to determine the value of a patent/technology. There are two reasons why this needs to be done.

* Firstly, to broadly benchmark the starting point as to what should be the patent licensing fees in terms of the upfront lump sum premium and the type of royalties that would be paid by the licensee and for what period of time..

* Secondly, for adding to the value of a company when it is up for sale, or merger, or when the company decides to go in for an Initial Public Offering (IPR) in the stock market. In the pharmaceutical, ICT and Chemical sectors, the patent portfolio of the company, is the key to its evaluation in the market place for mergers, takeovers, IPO's and for strategic partnerships. In the USA and some other countries, the intrinsic value of the patent is also used for claiming tax benefits (if it is not commercialisable by the patent holder) by the patent holder when he gifts the patent to a University or any other authorized body, who have interest in the patent to make further developments, which would result in the commercialisation of the patent and any improvements made thereof.

8.5.1 Methods for Patent/Technology Valuation

a) **Cost Based Valuation**

This method depends upon documenting (often not done in R & D Institutions) the actual costs incurred in carrying out the R & D work (manpower, raw materials used, utility, dedicated pilot plant costs, etc.) and more importantly the IPR costs incurred in protecting the invention (most of the R & D Institutions neglect this cost factor which can be substantial for protecting the IPR even in say 6-8 countries – it could be around Rs. 30 lakhs)

One also has to estimate the replacement cost for the patent/ technology, if a party wants to develop the same on his own. How much would it cost? How long would it take to develop? Could they avoid patent infringement issues by developing a new process say for the manufacture of a known chemical entity?

b) **Comparable Market Value**

This is the estimate obtained by reference to actual licensing terms for comparable technologies in recent times, specific to the particular industrial sector. Often, such information is not available, though the DSIR has a register of the terms and conditions of foreign technology licensed by Indian Industry which could serve as a reference. This also depends greatly in specific industry norms, which may vary from country to country The media, the press and now the internet is a powerful source to get information on the cost of licensing similar patents.

c) **Income Method**

This method depends on determining the expected profits (or additional profits) that a licensee is expected to make by acquiring the license for the

patent/ technology. How much is the value added to the raw materials: 10% to 80%. In the case of say the know how to manufacture Fly Ash Bricks, if the value added to the raw materials is only 10%, the intrinsic value of the technology would perhaps be only 1 to 2% of the turnover, but say in the case of the patent for an artificial heart valve,since the value added is 500% of the raw materials, the intrinsic worth of the patent would be very high – almost 30 to 40 % of the turnover that the licensee plans to manufacture the product.

d) **Client Based Market Valuation:**

This method depends on calculating the worth of a patent/technology based on the anticipated turnover of the prospective licensees. Again this depends greatly on specific industry sectors. There is a thumb rule, that it should be 30 to 40 % for patented computer software programs, 20% of the turnover for pharmaceutical products, 10% for new chemical entities (other than pharmacy products), 5% for other products related to the auto sector, metallurgical industries, utility products etc.

e) **Patent Related Valuation Index Based On Patent Evaluation Grading For: Specific evaluation of IPR rights, Transfer and distribution potential, Evaluation of business potential.**

This method is rather complicated, and is used by eminent patent attorneys. For more information on this method, you can visit the Japanese Patent Office Site.

It must, however, be clearly understood that patent/technology valuation methods enumerated above are only useful as a guiding tool, ultimately the pricing of a patent/technology is client specific and is dependant on a number of other factors which are explained in the next section.

Self Assessment Question **(Spend 3 minutes)**

2) Mention the different methods which is used in patent / technology valuation.

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8.6 PATENT/TECHNOLOGY MARKETING - KEY FACTORS

There are many factors that affect the marketing, salability and pricing of a patent/ technology. Some of these are-:

8.6.1 Nature of Technology

The different nature of technology:

a) **Incremental innovation based Technology:** Examples are Teflon coated electric iron press, the suitcase trolley where the length of the handle is adjustable. Both the electric press and the suitcase were in commercial use the world over, the innovator only added a feature, which gave the product an added advantage, but it was an incremental innovation. Therefore, the value of the technology would be marginal only.

b) **Simple technologies:** Examples are; a new type of toy, wireless mouse for PC, various new gadgets - like an alarm device to prevent the theft of a vehicle, a tire puncture indication device, etc. These products may be new but are not essential for the user - he can do without them – therefore again the value of the technology is only marginal, as in the case of incremental innovations.

c) **Complex technologies:** Examples are; a six high rolling mill, a new chemical entity which has medicinal use, a high energy LED lamp which can replace a fluorescent tube light, a new plastic film lithium battery which can be mounted as a solar battery on the top of a car (for solar powered vehicles), plasma TV's etc. The inherent basic feature of such technologies, is that not only is the product new but the process of manufacture is extremely complex, involving a number of custom made manufacturing equipment, specific to the product. The technology would also have taken a number of years to develop. The cost of development would also have been enormous. Sometimes, these technologies are also referred to as disruptive technologies, because over a short period of time they may totally replace the existing technologies and make the old products, like the ballpoint pen has made the ink filled pens virtually obsolete. Similarly, the plain paper copier has totally replaced the cyclostyling machine, just as the mobile phone is expected to totally replace the landlines in the next 4-5 years.

It is important to understand that one has to study the technology in depth, its applications, its advantages, its useful lifecycle, the finances required for commercialising the technology, the likelihood of getting soft loans/grants for commercialisation of the technology, the competing products, etc. to get an idea as to how much would be the marketability of a particular patent/ technology (even in the case of a particular prospective Licensee).

Self Assessment Question **(Spend 3 minutes)**

3) Mention the different nature of technology with examples?

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8.6.2 State of Development of the Technology

This is an important factor, as it depends not only on the type of the technology but also to the relevant industrial technology sector. For instance in the computer software technology sector, the development is fast - 9 to 18 months - the

application and marketability of the technology may be industrially profitable, perhaps for the next 4-5 years, after that the technology may become obsolete.

If you consider the pharmaceutical or chemical sector, it may take 2-3 years to develop the technology and another 3 to 4 years for it to be field tested, involving animal/human clinical trials, certification/approval of regulatory authorities before it can be actually commercialised. Besides huge finances are required for this process, generally, Rs.1-2 cores in India (internationally it is documented by the Multinationals that a new drug development costs over US$ 10 million). The price of a technology, therefore, depends on what is its stage of development, at the time it is being negotiated for licensing. This aspect is again sector specific.

While the pharmaceutical sector has the largest number of intermediate stages of development, the computer software, telecommunication and Internet related sectors generally have the least number of stages. What is more, while large companies prefer to acquire the technology in the initial stages of development, the smaller companies prefer to acquire a technology after it is fully developed, as they do not have the risk taking capacity (for the technology may fail) or they lack the technical or financial capability to take a Lab Scale Know-how and develop it to a commercial scale by themselves.

The broad stages of development of a technology are summarized below. For this purpose the technologies have been classified into two broad categories vis-à-vis:

a) **Prototype related technologies :** The stages of development are;

   i) One prototype has been developed.

   ii) Prototype has been tested.

   iii) Several prototypes have been developed and tested.

   iv) Production model has been developed, field tested, and test marketing has also been carried out.

The prototype related technologies relate to new consumer products, gadgets, utility items, personnel health care gadgets, instruments, testing kits, electronic and telecommunication products, etc. These need to be produced in sufficient quantities for user trials involving test marketing.

b) **Process related technologies**

On the other hand Process based technologies involve several stages of development. First of all, the development of the product itself in minute quantities in the laboratory, testing it for efficacy and purity, carrying out toxicity studies, animal trials, human clinical trials, etc. And, then, up scaling the manufacturing process from lab scale to bench scale, to semi commercial scale and eventually to commercial scale. At each stage there are risk factors, (generally it is felt that at each stage the up scaling factor should be limited to 20- 30 times only).

The selling potential of the technology therefore depends on the stage of development at the time it is being evaluated or licensed. Even after a technology has been successfully developed and commercialised, the price of the technology depends on at what point is the technology in the life cycle of the product - has it reached its maturity, or it is in the declining stage, etc.)

or a commercial loans from banks, or from venture capitalists as equity for the further development of the patent/ technology for commercialisation There are almost 40 major funding schemes of the Central government of India alone for new Patents/technology commercialisation, such as the Technology Development Board (TDB), the programme aimed at Technological self-reliance's (PATSER) of the DSIR, the Home Grown Technology Development Programme of TIFAC, the Tepp programme for individual inventors of TIFAC, etc. The likely hood of obtaining such financial assistance enhances the value & pricing of a patent/ technology . This aspect is later dealt in detail with in another Unit.

d) **Scientist Related Factors**

These factors relate to the reputation and experience of not only the patent holder or the technology development supplier, be it a R&D Institute, a University or an industry, but also on the reputation and successful track record of the scientists involved in the R&D work, their industry experience, their past successes/and failures.

A more important aspect, particularly for the prospective licensees, is the likely hood of the scientist holding the patent rights, in continuing his carrier in the R&D Institution, his views on mobility (to work anywhere in India, perhaps with the prospective Licensee himself), his ambitions for seeking and acquiring foreign assignments on deputation or otherwise as a result of his patent, his desire in seeing that his patent is commercialised. The Licensee wants to at least ensure the availably of the concerned scientists for at least the duration of his commercial project to succeed, it may be 6 months in the case of software projects or as long as 5-10 years in the case of Pharma based products.

e) **Logistics of Technology Transfer**

The industry requires technology transfer services in a timely manner and at an affordable cost. This depends on the location logistics, and the provision of post technology transfer services, for process optimization, de-bottlenecking and supervision of testing and commissioning of the plant.

The availability of proper logistics of the technology transfer process to an industry partner enhances the salability of the patent/technology to that client.

8.7 IDENTIFYING POTENTIAL LICENSEES

The essential pre-requisites for patent/technology licensing are firstly to identify potential licensees, and then to infuse in them, an interest in acquiring thepatent/ technology. This is easier said than done. Let us first examine the question, as to who could be the potential licensees:

- The parties who control the supply of the major raw materials used in the patented technology/process.
- The industries that are manufacturing similar products. For example, a company manufacturing kitchen utensils would be interested in acquiring a non-stick technology for their pans, saucers, etc. They would, however, like to compare the Teflon coated technology with the metal powder coated technology. Both the technologies are in the market place, and what is surprising is that with

incremental innovations the two technologies continue to co-exist in the market place.

- Industries who would like to widen their product range, for instance a dessert cooler manufacturer would be interested in a non-CFC based air conditioner manufacturing technology.
- Importers of similar or competing products.
- New high tech companies who have the highly qualified engineers and technicians required to master the technology without which the product cannot be manufactured, for example high quality night vision goggles, plasma TVs etc.
- Companies who have the required manufacturing infrastructure facilities such as specialized plant & machinery, or statutory clearances or licenses for producing certain type of products, which require safety or pollution, related clearances; for example high temperature resistance explosives [used in mines located in areas where there are underground fires]. These companies would have the advantage of making nominal investment in commercialising the new technology as compared to other parties
- Industries where the new product fits in with their vertical integration / expansion program. For example an existing manufacturer of blood bags would be interested in acquiring the technology for manufacture of large diameter surgical needles used in the blood bags [which at present are being imported as a bought out item by the blood bag manufacturers].

The question is how to firstly generate a database of potential licensees for the licensing of the patent, this can now be easily done through the information available on the Internet; and then create an interest in such potential licensees in the newpatent/ technology? The first thing that has to be done is to inform them through direct mail or through various other publicity measures about the availability of the license for the patent or the development of the new technology, highlighting the advantages and how they could benefit from it. This can be done through the traditional direct mail route, through display of the new product itself / or showcasing posters giving the details of the technology in trade fairs / exhibitions, or by advertising in newspapers etc. The most effective method of marketing of technology is, however, through networking with the technology experts in the specific sector or through specialized technology transfer companies like the National Research Development Corporation, British Technology Group, etc. In today's world of cable TV, it is also possible to get a lot of free publicity, provided the new technology is of benefit to the common man. Recently, there was the case of the development of an alarm clock, by a Non Resident Indian girl in the USA, that walks away and hide and rings again after a few minutes, forcing you to get up which was widely highlighted in not only the Indian media but also in the international press.

Once the interest is created in potential licensees, the real business of licensing/ the technology begins. You have to formulate a strategy for licensing of thepatent/ technology. It depends on, first of all on the identity and financial standing of the parties who have shown interest. .Are there any major MNC's or large companies in the list? How many parties have shown interest in the technology, one or three or a large number?

Self Assessment Question **(Spend 3 minutes)**

4) Who could be a potential licensee.

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8.8 FORMULATING A PATENT LICENSING STRATEGY

Once a few parties have shown interest in the technology it is the time to finalize a strategy for technology marketing. What are the basic factors to be considered in formulating the strategy?

8.8.1 Determination of Market Potential

A buyer of a technology is interested in knowing the market potential of the new product. He wants to know about all the different possible applications. Will the new product be able to compete with the existing products in terms of quality and prices? Are there any entry market barriers, for instance to introduce a new coco-cola type drink the licensee may be required to invest millions of Rupees in advertising alone for the product to succeed. All these questions can be answered by conducting a market survey. Generally such market surveys are conducted by specialized agencies having experience in the respective industrial sector. While desk based market surveys cost around Rs. 20,000 to 50,000, primary market surveys can cost upwards of Rs.2,50,000. And international market surveys can cost over Rs. 1 million. Fortunately with the advent of the Internet, market surveys can now be done at a reasonable cost and in a short time.

8.8.2 Negotiation Strategies

The decision about final pricing of a patent/ technology eventually depends a lot on the negotiation skills of the Licensor in matching the interests of the R&D institution and the prospective Licensee.

There are some generic factors on which negotiations between the Patent/ Technology Supplier and the patent/Technology Receiver depend. These are:

a) **Exclusivity**

First of all, one must decide whether the patent/technology has to be licensed on a non-exclusive basis or on an exclusive basis; this in turn depends on the nature of the technology but also on the market response.

There are certain types of technologies, which can be licensed on a non-exclusive basis to multiple parties without any objection from the licensees because such technologies do not create competition amongst the licensees. For example technologies relating to waste treatment, pollution control, improving safety of plant and machinery or of operating personnel etc.

There are other technologies which are dependent on raw materials which are either available only at a few select locations – for example agro / food raw materials which are perishable, or raw materials which are bulky, difficult or costly to transport such as various metal ores. In such cases though multiple licensing does create competition, the licensees do not object to multiple licensing provided the scientist does not license the technology to any parties near to their location. In some cases the raw materials are available only in limited quantities such as sandalwood or various medicinal herbs. In such cases also interested licensees do not insist on an exclusive license because the size of the processing plant is limited to the quantity of raw materials that are available, and consequently the competition is also limited.

The strategy as to how many parties, a particular technology should be licensed, also depends on the market response. For instance if only one party has responded, the options for the scientist are limited .He is forced to negotiate with one party, who obviously will demand exclusive rights and also dictate the terms of technology transfer. On the other hand if a number of parties have responded, the scientist can dictate his terms. In real situations, however, particularly in the developing countries, it is always the case of very few parties responding. It also depends on the size of companies from whom intention of interest has been received. For example if a MNC has shown interest, it is obvious that they will insist on exclusive rights to the technology., as large companies wish to exploit the technology in the global market place.

The question of exclusivity and non-exclusivity has to be understood clearly. The scientist prefers to license his technology on a non-exclusive basis, to keep his options open, for licensing of the technology later to other parties [major parties]. It is well known that after a technology has been successfully commercialised by the first licensee who may have been a SME, there is scope for licensing the technology to much larger parties, albeit at much higher lump sum premium and royalty rates. On the other hand the licensee always wants exclusive rights to the patent/technology without any conditions what so ever.

What are the different types of exclusivity in licensing?

- **Territory exclusivity:** It can be State wise {say Maharashtra}, it can be country wise, it can be region wise, The territory can be defined separately, firstly to cover manufacturing operations and secondly for the sales of the product. The two territories for sales and manufacturing can be different.

- **Period exclusivity:** This type of exclusive rights are given for a specific period of time, say for a maximum period of 5 years from the date of signing of the license agreement or three years from the start of commercials production, whichever is later.

- **Application Exclusivity:** There are many technologies, which may have more than one application, such as a new type of bearing, which can be used in autos as well as in railways, a new type of loudspeaker, which can be used in TVs or in cinema theaters. The most important and valuable multiuse technologies are in the medical and pharma field, where the medicine is found to be effective in the treatment of more than one disease {example: gene targeted systems] Another classical example is Teflon which is used in making high temperature resistance cables, non stick pans and now Teflon coated leather products. In such cases the exclusivity for a particular licensee can be further curtailed to cover only the application in which that particular

licensee is interested, leaving the option of licensing the technology for other uses to other parties who may be involved in a totally different industrial sector.

- **Co-exclusive Territories:** The concept of having certain territories as co-exclusive for some of the licensees, particularly when the objective is to license only two parties, is gaining popularity. How does this concept work? Take the case of the development of an "Anti-diabetic preparation from Fenugreek " by Prof. Moitra of Delhi University. It was decided to license the patented Know-how to two parties, firstly to an Indian party and secondly to a major international MNC. The perceived advantages of this strategy was that, firstly, the MNC would finance and conduct clinical trials in USA and obtain FDA approval [which is critical for the successful marketing of any medical product internationally]. At the same time, the Indian party would manufacture the product as an herbal preparation, and start marketing immediately the product in India as an herbal product, thereby gathering further clinical data, which would be useful to both the parties.

- The most important criterion however, was the need to license the know-how to an Indian party who would sell the product within India at a reasonable price Otherwise there would be questions in Parliament as to how a Government University / R&D Institution gave away the exclusive rights to a new technology to an MNC who could later sell the product in India at 100 times the price During the negotiations there was resistance from both parties to agree to the terms of licensing, [that is the lump sum premium which was around US$ 400,000]. Both parties wanted the license on a totally exclusive basis. After prolonged discussions and negotiations the know-how was licensed by NRDC on an exclusive basis for the whole of India to the Indian party and on an exclusive basis to the US party for all the countries of the Americas and the erstwhile non-communist countries of Europe. All other countries were to be treated as Co-exclusive territories where both the parties could sell the product.

b) **Multiple Licensing**

The most basic concept of multiple licensing must be understood. The Government, the Public Sector Units are the largest buyers of products in almost all the countries of the world. These organizations purchase their products on the basis of a transparent tendering system, sometimes limited to a few parties for high tech products, but even for these products which may be of a strategic nature or for use of the defense forces (examples are fax interceptors, NBC masks, mobile phone jamming systems, batteries for submarines, laser ranger finder detectors, night vision goggles of the highest quality etc.), the government agencies such as the Ministry of Defense, the Ordinance factories, the railways, the Public Sector Organizations have to, by their own rules and regulations to procure the new products through a system of tendering. They need at least three quotations to finalize a contract. If there is only one licensee for a new product, these agencies seldom have a mechanism to decide the price of the product. The decisions, therefore, get delayed for years, ultimately when the products are introduced in the private sector and are successful, only then the Government agencies try to use the new products.

This system of procurement by the Government agencies requires that a new product be licensed for manufacture to at least three licensees. Otherwise, the

licensees will not be able to get contracts from government agencies. And, let us not forget that the Government is the largest buyer for products for which there is a large market in the Government agencies and the Public Sector. The Licensees also realize that it is in their interest that the technology is licensed to 4-5 parties on a non-exclusive basis (and not to them alone an exclusive basis).

There are many examples of such technologies, for which there is a substantial if not a major market in the Government/Public Sector Agencies. For instance the DRDO Gwalior laboratory developed glycol-based coolants for use in radiators in automobiles, tanks, and railway engines. It was licensed to a major Indian company, which could not get orders because of lack of three quotations. However, when the patented know how was licensed to 5 more parties, they and the other licensees received substantial orders from the defense agencies, the railways, and the Public Sector organizations such as BSF, ITPB, BPL etc. Thus, all the licensees, including the first licensee benefited from multiple licensing of the technology, after the first licensee, who had insisted an exclusive right at the time of signing the license agreement, voluntarily agreed to withdraw the exclusivity arrangement due to commercial consideration.

This happens not only in the developing countries but also in the developed countries, like USA. In fact, in USA, the Ministry of Defense stipulates in its R&D development contracts for new products that the collaborating agency shall ensure that the new technology will be licensed to at least one other company so that the Ministry of Defense has at least two possible suppliers for the new product, which has been developed at their cost.

Multiple licensing, therefore, is not always harmful to the interest of a Licensee. An intelligent scientist often sites this logic when he is negotiating a technology transfer agreement with a major client to counter his insistence for acquiring the technology on an exclusive basis.

This can be illustrated with an example.

- The Licensor has to ascertain first that the licensee he is a genuine client, whose intention is to commercialise the technology and not to block it. A client tries to block a new technology when he already has a similar technology (but which is older and less cost effective) and his intention may be to only protect the huge investment he has already made in the earlier technology. He wants to acquire the new technology only to avoid new competitors. The ploy that such clients, particularly MNC's use, in such circumstances, is to agree to a large lump sum and royalty payments for acquiring the total exclusive rights to the technology/IPR, often running into millions of dollars. But, the catch is that the first installment of the lump sum premium is pegged at a very low value, often (10% of the total lump sum premium); the payment of the remaining part of the lump sum premium is linked to further stages of development, field trials, statutory approvals etc. that the client has no intention to pursue. Thus, he gets away with blocking the technology for a miniscule amount, thereby duping the Licensor. There are various measures that can be taken to avoid this type of blocking a technology by incorporating proper safeguard clauses in the agreement for ending the exclusivity if the Licensee does not make the specified stage was progress in the implementation of the technology.

- The client understands that the know-how / IPR has been developed only at the lab scale. He, therefore, does not want a licensing agreement but a joint technology development agreement. But such agreements are much

more complex, because even the ownership of the existing or new IPRs have to be shared and the third party licensing (particularly to foreign clients) may have to be negotiated jointly. The technology fees in such cases may have to be left open ended to be decided later, based on certain norms, or on joint negotiations.

c) **Outright sale of an IPR**

There are a number of patents, particularly those that require enormous amounts of efforts in terms of further development, finances, and time, which should be put on-line-sale. There are a number of Internet sites that offer this service, off course on very stringent terms.

d) **Practicality of Legal action**

The price of a technology also depends on whether the Licensor can take legal action against the Licensee, if the Licensee fails to pay his legitimate dues, such as subsequent installments of Lump sum premium or royalties; or against any other party who copies the technology or an innocent party who infringes the patent. Some times the courts are extremely reluctant to decide IPR infringement cases. It may take over 10 years to get a decision in an IPR infringement or non-royalty payment case and by that time the Licensee can make his profits and shift to some other business. It may be noted that while in some sectors such as New Chemical Entities it may be easy to prove infringement, in most cases it is quite difficult to prove infringement.

8.8.3 Pricing and Payment Options - General Principles Case Studies etc.

A major part of decision regarding technology pricing is determined by the intrinsic value of the patent/technology as determined by the methods elaborated earlier in Section 5.1 and the strategies used for licensing and technology transfer.

- Outright Sale of the Patent/ Technology to a client on absolute exclusive basis, like selling a house
- Exclusive nature of License: Exclusivity could be of various types;
  - Territory exclusivity for manufacture (particular state or region, or country);
  - Sales territory exclusivity;
  - Exclusivity for a number of years, say the first 5 years;
  - Application exclusivity (e.g. Battery to be used only in automobiles);
  - A combination of exclusivity, combined with minimum royalty clause.

The technology transfer strategy first needs to be finalized in order to estimate the upper limit of the pricing of a technology for a particular licensee. **Most patent/ technology licensing strategies are based on charging a royalty in addition to the lump sum premium.** This can be done in various ways; each has its own advantages and disadvantages. Some of the royalty options are listed below:

a) **Royalty on sales**

This is the most-preferred method for R&D Institutions, as it can be exact, with

no hassles of checking the accounting ledgers etc. Generally, it is charged as a percentage (0.5% to 20%) of the ex-factory invoice value of the product, manufactured and sold by a licensee. Royalty may be paid quarterly, half yearly or annually, based on the audited financial statement of accounts, verified and signed by the chartered accountant of the licensee.

b) **Royalty on profits**

On the other hand many licensees insist on paying royalty as a percentage of the profits that he is likely to make in the manufacture and sale of the product. The difficulty in this form of royalty payment is the manner of calculation of the profits made by the licensee, even, if it is based on the income tax return for a one product manufacturing company. However, most large companies manufacture several products, i.e. products other than the one for which they have taken the patent/ Know-how license. What is more, often the company's balance sheet does not provide information, separately on the profits made by the company separately in respect of each product. It therefore becomes difficult to work out the correct value of the royalty payable.

However, a licensor i.e. the R&D INSTITUTE is sometimes forced to agree to a percentage royalty on profits arrangement, particularly if he does not have any other potential buyers for the technology. In such cases, the percentage of royalty on profits is much higher, around 20 to 50% of the profits.

c) **Minimum Fixed Royalty**

Under the minimum fixed royalty arrangement, the licensee pays a fixed amount annually, say $ 50,000 per year for a period up to the validity of the IPR, irrespective of the quantum of his sales, in addition he still has to pay a percentage royalty on sales if the total quantum exceeds the minimum royalty payment specified in the agreement. Generally, this type of arrangement is coupled with an exclusive territory clause (the licensee has the exclusive rights from the licensor for manufacture of the licensed product (not sale) in a specific territory, say the state of Maharashtra. (Law in many states does not allow exclusive territory for sales). If the licensee does not utilize the technology, he still has to pay the minimum royalty; otherwise he looses his exclusive rights. This is, thus a fee that the licensee has to pay to keep his options open for utilizing the technology in future. Sometimes, a large company utilizes the acquisition of the rights to an IPR only for the purpose of barring others from utilizing the technology, which is superior to their existing products, because the licensee has invested huge amounts in the manufacture of the existing products and he does not want to make further investments in new technology. But at the same time he does not want his competitors to adopt the new, superior technology. A well-informed licenser would recognize the possibility of a Licensee acquiring the patent rights only for the purpose of blocking and therefore, insist on a minimum fixed royalty clause, even on "Royalty on Sales" agreements. This arrangement can also be coupled with a clause, which specifies a specific time period for the working of the patent, and if the Licensee did not do that, his exclusivity would be terminated.

d) **Variable Royalties**

Royalties can be changed on a variable basis depending on the quantum of anticipated turnover from year to year. Thus the royalty may be 1% for the first year, which could increase, to 5% by the fourth year. The rationale behind this arrangement is that the licensee may not make much headway in the first 2-3

years, as he has to not only invest in the production facility, but also to create a marketing network, His profits, therefore, in the initial years would be marginal; and if he is further burdened with high royalty payments the very success of the enterprise may be put in jeopardy. He, therefore reasons that, I will pay you higher royalty when I can.

On the other hand, some licensees may argue, the other way round. That after the first 2-3 years, the royalty percentage should be reduced, as their turnover would increase substantially. This would motivate them to not only increase production, but to match competitor's prices and capture a larger share of the market; which in turn would also benefit the Licensor, as he would receive much larger royalty amounts.

e) **Perceptions on payment of royalty by licensees**

In India, the perceptions on payment of royalty vary considerably from large companies, to SME'S. to new enterprises. The large companies are reluctant to pay any royalty, they prefer to pay the technology fees as a lump sum: for reasons that are peculiar – they may not be able to fudge or manipulate their balance sheet, they may be planning a large scale operation, they are a multi product company, or the licensed product may be used as a new material or component or a sub assembly for their existing products, etc.

On the other hand the SME'S and particularly the new entrepreneurs prefer royalties to lump sum premium – their reasoning being that they do not have sufficient financial resources initially to pay a large lump sum premium, for they have to invest in the production facilities, sales network etc. In the back of their minds is also the possibility that they can avoid/or reduce royalty payments by manipulating their balance sheets (or by setting up production facilities at other locations - than the one specified in the license agreement – in the names of their relatives).

f) **Factors effecting estimation of fair royalty amount**

While some of these factors have been outlined above, the most important factor that determines the quantum (percentage or otherwise) of the royalty on sales is the value addition that a technology provides to the licensed invention. If it is only 10% as in the case of fly ash bricks, or 5-10 times as in the case of a new pharma product the percentage of royalty would very considerably, often from 0.5% to 20%.

One must also understand in this regard, the concept of the technology content in a product. For instance a computer software CD has almost 95% knowledge (IPR) content, (the base cost of the CD is only Rs. 60), but with the software it sells for Rs. 20,000 but in a fly ash brick the cost of the raw materials and processing is itself 90%. While there are no hard and fast rules to determine the knowledge content in a new product, there are certain industry norms that are applicable to specific sectors. We shall discuss this aspect further with case studies.

CASE STUDY NO 1

The Indian Plywood Research Institute has developed a rice husk particleboard, an environmental friendly technology, utilizing a waste product. The new product has many advantages, it is cost effective as compared to wood based particle boards, it is termite and moisture resistant, it can be manufactured with various

types of surface laminates – vis-à-vis bamboo mat, jute cloth, plastic veneer, or even a colored plain rice husk board which looks like granite in different colors, gray, red, purple, and more important in multi colors. The technology was licensed to five Indian companies for a lump sum premium of Rs. 5 lakhs plus 3.5% royalty on sales on non exclusive basis for 10 years, Three plants were in production when an interest was expressed by an Indonesian company for acquiring the technology/IPR rights on an exclusive basis for manufacture and sale in Indonesia

- What should be the lump sum premium?
- What should be the royalty percentage on sales
- Should the IPRI insist on a minimum fixed royalty, clause in addition to percentage based royalty on sales.

Probable Negotiating Options

Lump sum	$10,000	$ 50, 000	$ 200,000
Royalty on Sales	3.5 %	5%	7.5%
Period of Royalty	10 Years	Life of Patents in Indonesia	15 Years

Minimum Royalty – US $ 10,000 per annum.

This is a real case. There are no exact answers, but you can compare your answer to the one that was negotiated and actually finalized.

Answer to Case Study No 1

Agreed Major Terms of Licensing

- Lump sum premium : $ 100,000 for first plant

  $ 80,000 for second plant

  $ 60,000 for third plant

  Exclusive license for manufacture in Indonesia The Licensee can sell the products on non-exclusive basis all over the world except in India.

- Royalty for 10 years : 3.5% on ex-factory sales value However, Since Indian licensees have already been permitted to sell the product internationally without any restriction, they will be allowed to sell their product in Indonesia, but no new licensee would be allowed to manufacturer or sell the product in Indonesia.

- Minimum fixed Royalty : $ 10,000 per annum, even if the Licensee does not manufacture the product. Non-payment would result in cancellation of the exclusivity clause.

- Period of Payment of Royalty : 10 years or the validity of the life of the patent in Indonesia, which ever is longer.

CASE STUDY NO 2

Process for anti-diabetic preparation from active ingredient from Fenu Greek (Methi):

The product and the process were unique and therefore patents were filed and granted in India and US. PCT application was also filed during the validity period for obtaining priority for filing patents in other countries by the Licensor as the invention was expected to have high value. After, discussions and negotiations with both Indian and foreign Pharma companies, it was decided by the Licensor to license the IPR to two major companies; the first being a large Indian company and the other a multinational company. The strategy was adopted to protect the interests of the people at large in India, who want medicines at low cost, and on the other hand to piggy ride on the shoulders of a multinational licensee who would invest over US $ 10 million in further development, clinical trials and obtaining FDA-USA approval. The question was as to what should be the exclusive territories of the two licensees.

a) The multinational company would have rights to manufacture and sale of the product on exclusive basis in the countries of the North and South American continents and in the erstwhile non-communist countries of Europe, Japan and Australia.

b) The Indian company would have the exclusive rights to manufacture and sale of the product on exclusive basis in India, the SAARC countries and China.

c) All other territories would be treated as co-exclusive for both the licensees to sell their products, i.e. the countries in Africa, the Middle East, etc depending on their marketing strengths, political afflictions and business contacts. The basic reasoning was to respect the strengths and weaknesses of each party so as to derive the maximum benefits arising from sharing of the data on the results of the further developments, field trials and marketing initiatives.

d) There was also an unwritten arrangement, to share the data and the results of further R&D for the benefit of all the concerned parties, that is the two licensees & the Licensor

Technology Fees Agreed

Foreign Licensee

Lump sum premium	:	US $ 400,000
Royalty	:	3% on sales
Period of Licenses	:	15 years or the life of the patent (s)

Indian Licensee

Lump sum premium:	Rs 25 lakhs
Royalty:	3% on sales for 15 years

Period of license: 15 years or the life of the patent(s)

It is pertinent to note that the royalty rates rarely differ form one licensee to another – Indian or Foreign. In fact differing royalty rates amongst licensees are against the law pertaining to licensing or acquisition of technologies in many Countries.

CASE STUDY NO 3

Import of Technology for a Lithium Polymer Battery

The technology was developed by a famous multinational company in the USA & the know-how and the process for manufacture of the raw material used in the product were covered by over 45 patents in almost 100 countries. The Licensor had product patents on the materials of the cathode, the anode, process patents for manufacturing of the same, design registration for the shape of the battery, trade mark registration, and to top it all, they had various trade secrets covered under Trade Secrets Act. The Licensor had extensively protected their technology by filing PCT application, patents etc. In fact they had spent over US $ 1.5 million alone on the IPR protection. The technology was unique for the battery was a plastic film, that could be mounted on the roof of a car (Solar Car) or even on the roof / or walls of a house. The technology was licensed to 17 parties, the world over on a non-exclusive basis on the following terms.

Lump sum Premium	:	US $ 2.5 million to be paid in stages, but the first installment was pegged at US $ 1.5 million.
Royalty	:	5% on sales but this would be reduced if the quantum of sales exceeded certain quantities.
Nature of License:		Non-Exclusive
Period of License	:	As per the validity of the over 45 patents; but also to be mutually extended to cover any new patents filed later, which would be valid for a much longer time.

8.9 LICENSING OF PATENTED KNOW HOW TO CLIENTS IN DEVELOPED COUNTRIES

One has to understand that export of technologies from a developing country like India (or China) has two distinct features – on the one hand they develop high-tech know-how in the frontier areas of science such as medicines, biotechnology and Information & Communication Technologies which are required in the developed countries; on the other hand they have developed a large number of appropriate and proven technologies which can be exported to other developing and under-developed countries.

Therefore, the strategy for export of technologies depends on the export target country. If it is a developed country, it should meet the following criteria:

- Know-how should be patented at least in the target export country
- Know-how should be in the high-tech area

- The Licensee / Inventor should be willing to license the know-how on exclusive basis at least on territory or time exclusive basis

For Export of technology to a developing country, the technology should be proven, appropriate, low-cost and most important of all, the clients from developing country require a turn-key solution (They want the project to be set-up on a turn-key basis), i.e. apart from providing the know-how / technology, they also require the machinery to manufacture the product and supervision of erection, testing and commissioning services for the plant. It has to be clearly understood that the methodology of export of technology to develop and developing countries is totally different. Almost, all the major technology export contracts to developing countries involve turnkey services.

Custom duty Tariffs are down and will be further reduced as per the WTO negotiations, but the basic concepts of competition – freight charges based on volume / weight, pollution and other local laws will decide if it is profitable to import a product or produce it in a particular country. Technology exports are also highly dependant on the customs tariffs on CKD / SKD component. Fine-tuning of these tariffs is required by the developing countries to enhance their exports of technology and technology-intensive products.

Ultimately, for a country it is the quality of research, generation of innovative ideas and capability of the R&D setup to convert these ideas into industrial products that will determine the competitive position of that country (or that of company)

One-Word of Caution – Negotiations for export of a know-how / technology are complex, highly legal and time consuming.

For instance, NRDC wanted to license the know-how for preparation of a medicine based on the active ingredient isolated by a scientist for the treatment of diabetes. NRDC used the internet, press and various other medias to highlight the technology, but there were few takers. Ultimately, it was the son an NRI in USA, of the scientist who agreed to take up the know how and carry out the clinical trials in USA to get FDA approval. The lab-scale know-how was licensed to his company at a nominal up front payment of US$ 20,000 but it was agreed that the total lump sum amount would be over US$ 400, 000 once the clinical trials were successful.

Export of technologies from India to other developing countries have also had some success, be it the mini-cement plants, rice husk particle boards, etc. A number of appropriate Indian technologies have been adopted by African countries such as the leaf cup making machine, chlorine tablet making plant, rope making machine, cottage soap making machines, etc.

8.9.1 Governmental Control of Licensing Policies

There are two types of controls exercised by Governments all over the world both in the developed and developing countries. While the Governments of the developed countries such as USA, France, Canada etc. exercise control on the export of know how / Technologies relating to defense, strategic sector (space and micro electronics) and duel use technologies through export control regulations; the developed countries exercise control on import of technologies by various parties in their country. In the latter case of the import by developing countries their import regulations specify the permitted terms for import of the technology such as royalty shall not exceed 5% and the royalty payment period should not exceed, say 10 years.

In fact, India had a similar policy till 1993, where by every industry wishing to buy technology form abroad was obligated to obtain the prior approval of the Indian Government (The Directorate General of Technical Development – DGTD) before signing of the licensing agreement. However, later not only DGTD was abolished but also almost all other restrictions on the import of technology were removed, except for informing the Government of the License Agreement.

In accordance with the WTO agreement and globalization of the world economy, many other countries such as China, Malaysia, Thailand, Indonesia etc have or are in the process of removing restrictions on the import of technology and foreign investment.

However it is in the interest of a technology seller to educate himself about the laws of the particular country where he intends to sell the technology to avoid legal problems and avoid payment problems relating to royalty etc (in foreign exchange).

8.9.2 Methodology for Export of Technologies

The entire process of exporting technologies- identifying potential licensees/clients, negotiating contracts, technology transfer, post technology transfer services- is different for the developed and developing countries.

For developed countries as has already been mentioned earlier, IPR protection is the key issue, if you have not filed patents in the country where you wish to export, or at least a PCT application, hardly any client in a developed country would be interested in acquiring your technology. On the other hand clients in developing countries seek relatively lower end technologies, often termed as appropriate technologies, but they desire more comprehensive technology transfer services, often for setting up the manufacturing plant on a turnkey basis. Clients in the developing countries desire latest cutting edge technologies often at the patent filing/grant stage, which are yet to be successfully commercialised.

In the case of developed countries, the process of technology export often starts with the negotiation and signing of confidentiality Agreement/Non –Non Disclosure agreement, followed by a Material/Prototype Transfer agreement. Only after the client has evaluated the know how, based on his own tests and more importantly on the patent documentation, he would come forth to offer his terms for taking up the license. Often, they would insist on worldwide exclusivity to the rights of the know how. The developed country client may not put due emphasis on the demonstration of the know how and post demonstration services, as he has the necessary technical and financial capabilities.

There are many MNC's who are willing to take the rights to license and use the know how, and further develop the same to suit their requirements. It is, therefore, far easier to market the know how (if it is high tech and patented) to clients in the developed countries through direct e-mail or through various Internet sites.

In the case of export of know how to clients in developing countries, the scenario is quiet different. These clients generally do not have the technical or financial capabilities to acquire and commercialise a lab scale know how. They want proven technologies, which have already been successful. Therefore, first of all they would like to see an operating plant where the technology has been successful. Moreover they require turnkey services including: know how, supply of plant and machinery, supervision of erection, testing and commissioning of plant, training of

their key operating personnel in the operating plant in India and later in their own plant, de-bottlenecking, long term contract for supply of key raw material/spare parts etc. The marketing of technologies to clients in developing countries can therefore best be done through representatives/agents in these countries.

For the reasons explained above, it is very difficult for R & D institutes and universities to export their technologies to the developing countries. They have to use their successful licensees in India and authorize them to export the technology on a plant-to-plant technology basis. The other alternative is to use technology transfer organizations such as NRDC or engineering consultants or turnkey contractors who would be willing to give the necessary plant performance guarantees.

However, unlike China, India is not a major exporter of technology. This is likely to change in the near future as the Collaboration among R&D institutes, Universities and Industry is enhanced. The need of the hour is to identify and authorize appropriate Financial Institutions such as IDBI, SIDBI etc. to provide risk finances for facilitating export of technologies.

8.9.3 Government Support for Licensing and Export of Technologies to other Countries

There are many nations particularly those of the European Union, China, Japan, etc who actively assist and support the efforts of their industrial and R&D organizations to export technologies to other countries

One of the primary objectives of such support is to increase their overall exports. It is a well-known fact that the export of technology has a multiplier effect in the export plant and machinery, sub assemblies, components and services.

In India the Export Credit and Guarantee Cooperation (ECGC) provides support in the form of guarantees for receipt of payments, insurance against political or other risks and also provides loans for setting up turnkey plants abroad at nominal rates.

8.10 SUMMARY

- Patent licensing and commercialisation is an activity, which requires domain expertise pertaining to the concerned industrial sector and of the licensing and technology transfer process itself.
- Marketing of patent is different from marketing of products. The background of the client is extremely important in the licensing and commercialisation of patent.
- It takes much more time and effort and finally there are legitimate concerns regarding the technical information (regarding the patented know-how/ technology) to potential licensees before the license agreement is signed between the patent owner and the licensee.
- The key factors that govern patent commercialisation include the nature and stage of the Development of the Technology, Testing / Certification of the end products, stage of Development of the by-products / waste utilization.
- The essential requisite for patent licensing and its eventual commercialisation is fastly to identify potential but credible licensees who have the technical

financial and market resources to make the infuse in them, an interest in licensing of the patent, negotiating and finalizing a license agreement not only for licensing the patent, but also for providing the know how / technology, demonstration of the know-how, and providing a host of post licensing support activities.

- Patent commercialisation is a complete process. It involves a number of activities before and after signing of the patent license agreement.

8.11 TERMINAL QUESTIONS

1) Today a person needs, either a matchstick or a cigarette lighter to light the cigarette. An individual inventor comes up with the idea of providing a match like insert at the tip of the cigarette so that the cigarette packing case serves the purpose of lighting his cigarette. This could eliminate the matchbox / lighter that smokers use. He files a patent for his idea in India (provisional patent) and tries to sell his patent through the Internet.

   a) A multinational company shows interest, how should he proceed?

   b) Considering that,

      i) Cigarette Manufacturing is a highly automated industry, any change in the manufacturing process may cost millions of Rupees; and

      ii) The ingredients used in self-lighting the cigarette may be more harmful than the cigarette itself. This requires testing and could take years of clinical and field trials, statutory approvals (FDA) etc.;

2) If he is offered US$ 50,000 for his Patent by a MNC for outright purchase of his Patent, should he accept the offer? If not what should be his counter offer?

3) Organic flocculates are in great demand in the sugar and other food processing industries. A public funded R&D institute has developed a process for producing flocculate from tamarind seeds, presently a waste material. India is the largest producer of tamarind in the world. The Lab has filed a patent only in a limited number of countries (those producing tamarind like Sri Lanka, Indonesia, Malaysia & Kenya). After considerable marketing effort, they have got a small Indian company interested in the technology. What should be the Lump sum / royalty terms & other terms (exclusivity, time span etc) that they should offer to the client?

Available options are:

Pricing Head Options

	I	II	III
Lump sum	Rs 10,000-50,000	Rs 50,000-200,000	Rs.200,000-500,000
Royalties	1-2%	2-5%	5-10%

3) A research institute has developed the know-how to prevent collisions & accidents in the railways. It is based on an old concept used in guided missiles, which detects if an oncoming missile is going to hit the airplane. The

R&D team has used the basic concept of thermal detection, whether it is an oncoming train, or an animal or even a vehicle crossing the tracks at an unmanned crossing, to give an alarm to the train driver through a wireless based system. One prototype of the system has been developed and tested for its efficacy but only on a straight track. The Railways are interested to acquire the know-how and IPR. How would you price it? The available options are:

Pricing Head	Options		
	Option I	Option II	Option III
Lump sum Premium	Nil	Rs 2-5 Lakhs	Rs 10-20 Lakhs1
Royalty on sales	8-10%	3-5%	1-3%
Exclusivity	Exclusive for Indian Railways	Non Exclusive	Limited period Exclusivity

8.12 ANSWERS AND HINTS

Self Assessment Questions

1) The key factor that make marketing of patenting different from marketing of products are:
   a) Disclosure of know how
   b) Time to market
   c) Background of the potential customers.
   d) Role of end users and intermediaries.

2) a) Cost Based Valuation
   b) Comparable Market Value
   c) Income Method
   d) Client Based market valuation
   e) Patent related valuation index based on patent evaluation grading.

3) a) Incremental innovation based technology.
   b) Simple technology
   c) Complex technology

4) Refer Section 8.6

Terminal Questions

1) a)
   - First file a PCT Application and then negotiate.
   - Settle for a one time Lump sum payment for his Patent filed in India.
   - Approach Indian or International R&D Institutions to take up his idea to prototype stage on sponsorship basis.

b) The inventor should try for lump sum of around $100,000 plus 5 percent royalty on sales. However, if he is offered even $ 25,000 he should accept but insist on the 5% royalty because he does not have the financial or technical resources to take the technology to the next level, which requires huge investments.

2) Lump sum premium of Rs. 50,000-200,000 should be accepted, plus 2.5% royalty on sales should be negotiated but on non-exclusive licensing as this is a technology suited for multiple licensing bases to SMEs who cannot afford upfront lump sum premiums of over Rs. 2 to 5 lakhs. State specific exclusivity for Tamarind producing states (Tamil Nadu, Madhya Pradesh & Orissa) can be considered and negotiated).

3) Option 1 is the most suited, because the Railways very rarely buy technology, they buy only products. There interest in new technology is only to carry out the field trials. However, after the railways have approved the product the technology can be licensed to major electronic manufacturing companies such as ECIL, BHEL, etc at the terms given in option 3 with limited period exclusivity.

8.13 REFERENCES AND SUGGESTED READINGS

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