

What Every Chemist Should Know About Patents

(Fourth Edition - 2019)¹

Foreword

Patents play an important role in the chemical enterprise, both as a means for protecting the fruits of research and development from unauthorized use by competitors and as a major component of the chemical literature. Historically, patent laws around the world have varied in significant ways from country to country, with United States patent applications kept in secrecy until grant of a patent and correspondence between patent applicants and patent offices kept in closed files. Changes in laws since the late 20th century have introduced major differences in the availability of patent documents and information about the progress of the patent procedure.

The American Inventors Protection Act (AIPA) of 1999 introduced major changes in U.S. patent laws. Among the most significant changes:

- A U.S. patent application is no longer kept in secrecy by the U.S. Patent and Trademark Office (PTO), but is usually published 18 months after the application filing date.
- The term of protection granted for a patent is now 20 years from filing with adjustments to compensate for delays caused by the PTO during the examination of the application from which the patent was granted, with the intention of providing the 17-year term (from issuance) guaranteed by earlier U.S. patent laws.

The America Invents Act (AIA) of 2011 introduced additional major changes in U.S. patent laws, including:

- Adoption of a first-inventor-to-file standard for settling conflicts between two or more applicants for patents on the same invention, replacing the first-to-invent standard previously in place.
- Revision of the one year grace period during which an applicant retained patent eligibility after publication of information about the claimed invention.
- Expansion of the type of prior art publications available to defeat grant of a patent.

¹ This publication is produced by the American Chemical Society's Joint Board-Council Committee on Patents and Related Matters; the lead author and editor is Edlyn S. Simmons. The Purpose of this Edition is to provide a brief overview of patents. It is for general information only and is not meant to replace legal advice. It is strongly recommended that questions regarding patents and patent law be directed to a qualified patent attorney or patent agent on the register of the U.S. Patent and Trademark Office.

- Expanded opportunities to correct and challenge patents after they have been issued and patent applications during pendency.

In addition to the changes enacted by the U.S. Congress in the AIPA and AIA, administrative initiatives taken by the PTO provide for online filing of a patent application and making available for online review the PTO's internal data on the history and status of a patent application. Similar electronic file history and status information is available for patent applications filed in many other countries.

In light of all these changes, the Subcommittee on Education and Outreach of the ACS Joint Board-Council Committee on Patents and Related Matters prepared this fourth edition of *What Every Chemist Should Know About Patents* to update the Committee's 2002 edition.²

Introduction

A patent is a form of property known as intellectual property. It can be licensed, sold outright, exchanged, or even given away. Some patents prove to be commercially valuable; others may have little or no commercial value.

The PTO has granted more than 9 million patents 1790, including a great number of patent applications granted since 2001. Patenting nowadays is very much an international phenomenon. International patent databases contain records for over 70 million patent documents from 155 countries and regional patenting authorities. In the following discussion, the main focus is on U.S. patents, with brief comments on patenting procedures in other countries.

A chemical scientist or engineer may encounter patents in various ways, including the following:

- as citations in the chemical literature;
- when preparing a patent application, as an inventor or in some other capacity;
- when involved in the negotiations for licensing a patent;
- when a patent is the subject of litigation;
- when analyzing a product to help establish infringement;

² Though outdated, the Committee's Third Edition of "What Every Chemist Should Know About Patents," (Third Edition) is freely available online at the Committee's website, <https://www.acs.org/content/dam/acsorg/about/governance/committees/what-every-chemist-should-know-about-patents.pdf>, along with the Committee's 2006 Supplement, <https://www.acs.org/content/dam/acsorg/about/governance/committees/patents/what-every-chemist-should-know-about-patents-2006-supplement.pdf>.

- when helping to defend against a charge of infringement of the patent;
- when serving as an expert witness; or
- when helping establish or attack the validity of the patent.

The basis for U.S. patent rights

In the United States, patent rights flow from Article I, Section 8 of the U.S. Constitution, which states that the Congress “shall have [the] Power ... to Promote the Progress of Science and Useful Arts, by securing for limited Times to ... Inventors the exclusive Right to their ... Discoveries ...” The patent laws enacted pursuant to this clause of the Constitution provide that “whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.” 35 U.S.C. § 101.

Intellectual assets, including patent rights, are commonly viewed as a necessary incentive for private investment in scientific and technical research and development. The justification for the patent monopoly is an issue that is revisited periodically, particularly in developing countries faced with major public health crises where patents may be viewed as unwarranted obstacles in the efforts to address those crises. Nevertheless, patenting has become increasingly important in the global economy.

In return for the grant of U.S. patent rights, an inventor is required to describe the invention in a patent in a manner sufficient for others to practice the invention. After the term of protection granted with the patent has expired, anyone can practice the invention freely, thereby providing a benefit to society at large. In theory, this disclosure requirement in a patent, as opposed to keeping the invention secret, may spur others to improve on the patented technology and produce yet another invention benefiting society. It is important to understand that only the subject matter of the claims is protected by a patent. The supporting information in the disclosure is part of the public domain, and can be used by anyone during the life of the patent.

Subject matter patentable in the United States

As indicated in the language of the patent statute cited above, 35 U.S.C. § 101, the following subject matter may be patented in the United States: a process, a machine, an article of manufacture (*i.e.*, a manufactured product), or a composition of matter.

In the chemical and allied fields, a patent may protect any of the following subject matter that falls into at least one of the categories cited above:

- a compound, which may be defined as a class of compounds or as a specific compound or group of specific compounds;

- a mixture containing two or more compounds;
- a composition containing the compound;
- an article made from the compound or containing the compound;
- a process for preparing the compound, mixture, composition; or article, or
- a method of using the compound for a specific purpose (*e.g.*, for curing a polymer system or for treating a medical condition).

Subject matter not patentable in the United States

The following subject matter cannot be patented in the United States because of specific prohibitions in the patent statutes or as a result of court decisions interpreting and applying those patent statutes:

- inventions useful solely in the utilization of special nuclear materials or atomic energy for atomic weapons; or
- laws of nature, physical phenomena or scientific principles, abstract ideas, purely mental processes, and mathematical algorithms.

Conditions for patentability in the United States

As set forth in 35 U.S.C. § 101, to be patentable, an invention must be useful or have utility, and as set forth in 35 U.S.C. § 102, the invention must be novel. In addition, 35 U.S.C. § 103 requires that the invention also be non-obvious. Together, the three requirements of utility, novelty, and non-obviousness are commonly known as the three statutory requirements for patentability in the United States. There are also other requirements, including for example, that the patent application must provide an adequate written description and must explain how the invention should be made and used.

One-year grace period in the United States

Prior to the changes made by the AIA, an application for a U.S. patent had to be filed no later than one year after the earliest date on which:

- the invention was disclosed in writing anywhere in the world to the public (such as in a paper delivered at a scientific conference or an article published in a journal); or
- the invention was offered for sale in the United States, such as by providing a nonconfidential sampling to another party; or

- the invention was actually used publicly or sold in the United States.

If an inventor failed to file a U.S. application within the one-year period (known as the “grace period”), the public disclosure, the public use, the offer for sale, or the sale of the invention prevented a valid patent from being issued to the inventor for that invention.

Under the AIA, an application for a U.S. patent must be filed no later than one year after the earliest date on which the inventor(s), or those who derived it from the inventors, disclosed the invention to the public or offered the invention for sale anywhere in the world, provided that no other party made an earlier public disclosure of the invention, in order to receive the benefit of the grace period.

The one-year grace period is also available for a U.S. patent application which claims priority based on an earlier filed foreign patent application, in which case the foreign application must be filed within the one-year grace period. However, there is no similar grace period available for patent applications in most other countries. Thus, many inventors elect not to take advantage of the grace period, delaying public disclosure of an invention until a patent application has been filed and thereby retaining the maximum foreign rights.

Description requirements for U.S. patent application

Inventions that meet the three statutory requirements of utility, novelty, and non-obviousness nevertheless cannot be patented unless the patent applications also satisfy the following requirements of 35 U.S.C. § 112:

- the applications must contain a written description of the invention;
- the descriptions must be sufficient to enable any person skilled in the art to which it pertains to make and use the same; and
- the descriptions must set forth the best mode contemplated by the inventor of carrying out his or her invention.

These description requirements are meant to ensure that the patent applicants deliver on their end of the bargain, by which the government grants a patent monopoly in return for the public disclosure of the invention.

U.S. patent rights are rights of exclusion

A U.S. patent grants to an inventor the right to exclude others from making, using, importing, or selling the patented invention for a specified period of time (i.e., the term of the patent) in the United States. A patent does not, by itself, give the patentee the right to practice the invention. In some cases, the ability to practice the patented invention may be circumscribed by factors such as the existence of patents for the same technology that are owned by other parties, or the existence of restrictions imposed by laws other than patent laws.

Three types of U.S. patents

Three types of patents are granted in the United States:

- utility patents, which constitute the greatest portion of U.S. patents and generally provide the strongest form of patent protection;
- plant patents, which could be considered a subgroup of utility patents granted exclusively for asexually reproduced new plant varieties (*i.e.*, plants reproduced by methods other than seeds³; and
- design patents, which provide protection for a shorter term than utility patents for the ornamental designs of articles having a practical utility.

Who is an inventor?

U.S. law defines an inventor as the person or persons who conceived the invention in a complete manner. Conception is the cornerstone of invention, and conception is complete when a definite and permanent idea of the invention is established. It is a mental act.

The mental conception must be a complete conceptualization of how to proceed for completing the invention, as opposed to being an idea undergoing change. While reduction to practice is required to carry the conception to the next step, it is not required to establish conception or who the inventor or inventors are.

The mental conception must be the inventor's own. In contrast, the physical steps necessary to complete the reduction to practice of the invention may be performed either by the inventor or by another person under the direction of the inventor. U.S. law also considers the filing of a patent application to be a form of reduction to practice of the invention, that is, the filing of the application constitutes constructive reduction to practice of the invention.

Chemists are accustomed to publishing their work in journals, where everyone who contributed to the success of the project is named as a coauthor. Because the law recognizes only the individuals who originated the concepts embodied by patent claims as inventors, the colleagues, associates and supervisors who worked to develop the concepts cannot be named as inventor.

³ Plants reproduced by seeds may be protected by a Certificate of Plant Variety Protection issued by the U.S. Department of Agriculture. Plants created by biotechnology may be protected by regular utility patents (as opposed to plant patents).

Overview of the U.S. patenting process: An example

For illustration, the process for obtaining a U.S. patent is described in this section for an invention made by Chemist A in organization X. This example shows a typical path for illustration. In practice, the patenting process before the PTO may vary greatly from case to case.

- Chemist A conceives of the idea (*i.e.*, thinks of the idea) for an improved method of making a compound in a greater yield than was previously possible. In this case, chemist A writes a proposal that describes the steps of the synthesis, and the proposal is reviewed and approved by a supervisor. (Note: The chemist's proposal is evidence of the conception of the invention by chemist A).
- Chemist A carries out the synthesis of the compound with the help of a laboratory technician who conducts the experiments as instructed by chemist A. The experiments are recorded in a laboratory notebook kept by the technician. The notebook entries are dated and witnessed daily by a co- worker of chemist A who is not working on the synthesis project. (Note: The performance of the synthesis by the technician under the direction of chemist A constitutes reduction to practice of the invention).
- Chemist A prepares an invention disclosure by following the guidelines and using the form provided by the patent administrator of organization X. The invention disclosure identifies the pages of the laboratory notebook where the experimental results are recorded.
- A committee of organization X, of which the patent administrator is a member, reviews all the invention disclosures received in the last calendar quarter for inventions made in organization X. The committee selects the improved synthesis developed by chemist A for patenting, and determines that chemist A is the sole inventor.

The patent administrator has a patent application prepared by a patent attorney or patent agent, who may work directly with inventor A in addition to interacting with the patent administrator in preparing the patent application.

The text of the patent application must have at least the following parts:

- a description of the invention, known as the specification, that is sufficient to illustrate the invention and to show a person in the same technical field how to make and use the invention defined in the claims of the application. The description may include a discussion of the technical/scientific background and some experiments illustrating the invention;
- at least one claim, worded in such a precise and clear manner that the subject matter protected by the patent can be readily ascertained from the claim; and

- an abstract of the invention described in the application.

Some applications may also contain figures of line drawings or photographs, amino acid or nucleic acid sequences, or computer program text, as appropriate.

Once a patent application has been filed with the PTO, it cannot be modified unless the modification is considered to add no “new matter” to the application. Only revisions of an editorial nature and those supported by the original application (*i.e.*, revisions that are inherent in or evident from the original text) are permitted. The text of the patent application eventually becomes the text of the patent that issues from the application, with the incorporation of any changes made during the PTO’s examination of the application.

Although an inventor may file and prosecute a patent application, experience has shown that it is important for the application to be prepared by a patent professional to minimize defects in the application at the onset. The patent professional may be a patent agent or patent attorney. A person with sufficient appropriate experience, although not recognized and registered by the PTO as an agent or attorney, can help with the application preparation but cannot represent the inventor before the PTO.

Although the assistance of a patent professional is recommended for the preparation of the patent application, the input of the inventor is of utmost importance. With knowledgeable participation by the inventor, it is possible to write a patent application strategically to protect those aspects of the invention that are potentially most important, and to make it difficult for the competition to circumvent the patent.

- A U.S. patent application for inventor A’s invention is filed by submitting to the PTO the application papers that include at a minimum:
 - the text of the application, including the specification, claims, abstract, and any drawings, photographs, sequence listing, or computer program text, as appropriate;
 - an oath or declaration for patent application; and
 - the application filing fee.

The payment of the application filing fee may also be deferred until receipt of a notice from the PTO requiring payment to complete the application filing. Information on the application filing fee and other PTO fees is available from the PTO’s website (www.uspto.gov).

- In this illustration, because inventor A’s employment contract with organization X specifies that all inventions made by A in the course of A’s work for organization X belong to the organization, an assignment form is signed and dated by inventor A, assigning (*i.e.*, transferring) A’s rights in the invention to organization X. The assignment is submitted to the PTO, which records the transfer. This assignment may be

submitted either at the same time as the original application papers or at a later date. The assignment is kept in separate records at the PTO and is not placed in the PTO's file for the application. The public can search the PTO's assignment records to determine the ownership of a particular patent.

- The PTO assigns the application a filing date, a serial number and a projected publication date. That information is printed on a filing receipt, which is sent by the PTO to the correspondence address given in the application. Ordinarily, the filing receipt also indicates that a foreign filing license is granted, which authorizes the applicant to file a patent application for the same invention in foreign countries.

- All foreign patent applications for the same invention must be filed within a year from the filing date of the U.S. application, to benefit from the filing date of the U.S. application under the terms of the Paris Convention for the Protection of Industrial Property. The patent attorney (or patent agent) and the patent administrator enter into their patent calendar docket the deadline for foreign filing, that is, for filing patent applications for the same invention in other countries. A selection is made well in advance of that deadline of the countries and/or regional patent systems (such as the European Patent Office (EPO) in which corresponding applications will be filed. Instructions are sent to patent agents registered in those countries (or in the regional patent organizations serving those countries) to prepare and file applications based on the U.S. application.

- The U.S. application is assigned by the PTO to a patent examiner. Patent examiners have backgrounds in science or engineering and receive training in patent examination from the PTO. The examiner reviews the application with particular emphasis on the claims and conducts a search of the prior art, that is, the body of published information existing at the time of the filing date of the application. This prior art search is conducted electronically, although experienced examiners often have developed their own collection of paper copies of prior art relevant to their field of examination. The examiner selects a number of references (*i.e.*, publications) considered to be particularly relevant to the invention as defined in the claims of the application, and cites those references on a notice of references cited.

- As in a typical case, the result of the examiner's examination is a communication known as a "first office action" (see the [Glossary of abbreviations and terms](#) at the end of this pamphlet), in which all or some of the claims of the application may be rejected as being unpatentable over one or more of the references listed on the notice of references cited. This type of rejection is known as a "prior art rejection." Such prior art rejection may be on the grounds of anticipation, meaning that the examiner considers a single cited reference to describe all the features cited in the rejected claim. The rejection may also be on the grounds of obviousness, when the examiner considers that the subject matter of a claim would have been obvious from the teachings of one or

more cited references, none of which taken individually shows completely all the features cited in the rejected claim. The examiner may also cite the knowledge of a person of ordinary skill in the art as an indication of obviousness.

- In addition to rejections based on prior art, the examiner may reject the claims for failing to define the claimed invention in sufficiently definite terms or for failing to enable others to practice the invention without undue experimentation. The claims may also be rejected because the specification fails to provide a sufficient description of the invention being claimed or the best mode for practicing the invention. The examiner may also reject the claims on the grounds that the utility of the claimed subject matter has not been demonstrated convincingly, or the claimed subject matter is not the type of subject matter that can be patented under U.S. law.

- In summary, the application examination process determines whether the claimed invention meets the statutory requirements for patentability (novelty, non-obviousness, and utility), and whether the application meets the subject matter and description requirements mentioned above.

- The patent attorney/agent reviews this first office action and discusses the rejection with inventor A and the patent administrator for organization X. An agreement is reached among them on the approach to be followed for responding to the office action.

The patent attorney/agent prepares a response that is submitted to the PTO within the three-month deadline set in the office action. The response presents arguments to rebut the assertion made by the examiner that the claims are not patentable over the references cited in support of the rejection of the claims. The response may also request that the claims be amended, in those cases where the patent attorney/agent and the applicant (*i.e.*, the inventor and the inventor's employer) believe that the subject matter described in the prior art reference(s) cited by the examiner is fairly close to the subject matter of the rejected claims.

The amendments and the arguments must be based on information already present in the originally filed application or on information known in the technical field of the invention at the time of the filing of the patent application. In addition, new information (usually in the form of experimental data) can be submitted to demonstrate the properties and/or operation of the invention. This new information has to be in a special format called a declaration or affidavit⁴ signed by the person who obtained the experimental data or supervised the work of obtaining the experimental data. The declaration is not incorporated into the text of the patent issuing from the

⁴ This declaration or affidavit, known as a declaration or affidavit under Rule 132, is different from the declaration or oath for patent application signed by the inventors to complete the filing of a patent application.

application, but is placed in the PTO's examination file for the patent (commonly known as the file wrapper or prosecution history for the patent).⁵

- Within approximately 18 months of the U.S. application filing date, the PTO publishes the application by way of posting a copy of the document on the PTO's website. The published application enters into the body of prior art that is applied against other applications filed in the PTO after the filing date of inventor A's application or by patent examiners anywhere in the world after the date of publication of inventor A's application.

- After reviewing the response filed by the attorney/agent in inventor A's application, the examiner issues a second office action, in which the examiner maintains the rejection of some of the claims but allows the remaining claims. This rejection is made final, which means that the applicant now has the option of appealing the rejection to the PTO's Patent Trial & Appeal Board. In practice, however, few applicants appeal immediately, choosing instead to submit for the examiner's consideration a response to the final office action.

In this illustrative example, only some of the claims are rejected and the remaining claims are allowed. The patent attorney/agent prepares a response, which specifically addresses and rebuts the comments made by the examiner in the final office action about the arguments previously presented by the attorney/agent.

Note: If this second response fails to convince the examiner to allow the application, the applicant may proceed to the appeal stage before the Patent Trial & Appeal Board, or may choose to avoid the appeal stage by filing a request for continued examination ("RCE") of the application or by filing a continuation application. By paying the fee for the RCE or the continuation application (which are essentially the same as the filing fee for the original application), the applicant in effect can "buy" a second round of examination for the application.⁶ Another option in this case is to cancel the rejected claims and let the application issue as a patent with the allowed claims.

⁵ The word prosecution as used in patent prosecution has an entirely different meaning than it does in a criminal context. Patent prosecution refers to the interactive process that takes place between the PTO and the applicant during the examination of an application. In this context, prosecution in effect means solicitation.

⁶ The practice of filing a continuation application or obtaining another round of examination by other mechanisms provided by the PTO previously had no effect on the term of a patent issuing from the application. However, such practice may shorten the patent term by prolonging the prosecution of the application and delaying grant of the patent.

In summary, the give-and-take process between the applicant and the examiner often helps to narrow the issues and results in a meeting of the minds as to which aspects of the invention are patentable. This process is commonly referred to as the prosecution of the application.

An important side note associated with this winnowing process is that matter that was not allowed by the examiner may be estopped, meaning it may not be available for recapture through filing new applications or through litigation. This can become quite a complex part of patent law and the advice of trained professionals is recommended if an inventor has questions about what has and has not been permanently surrendered as part of the prosecution process leading to allowable claims

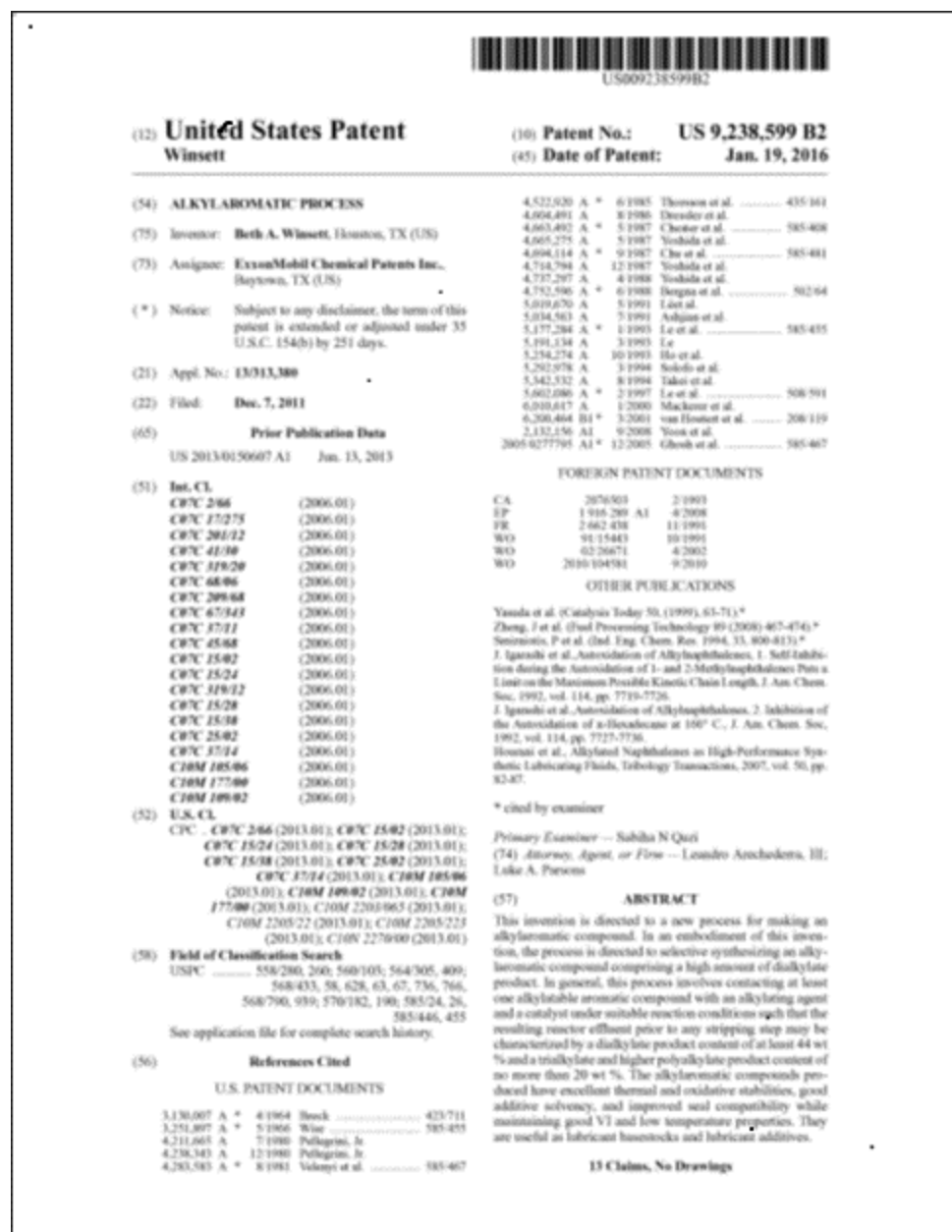
- Upon consideration of the response to the final office action, the examiner decides in this case to allow all the claims of the application that were not cancelled in response to the rejection and issues a notice of allowance that sets a three-month period for payment of the issue fee and payment of the application publication fee.⁷

- If the patent attorney/agent pays the issue and publication fees in a timely manner, then the PTO will issue the patent a few months later. In this illustration, there had been some delays in the PTO's handling of the application, so a patent term adjustment ("PTA") is granted for this patent. The PTA compensates the applicant for delays caused by the PTO in the examination of the application, from which are subtracted any delays caused by the applicant. The PTA is indicated on the cover page of a patent, but without any details on its calculation, which may be rather complicated. The applicant's representative may double-check that calculation by accessing online the PTO's application database, using the Patent Application Information Retrieval ("PAIR") database provided by the PTO and a digital certificate that may be obtained from the PTO by the attorney/agent.

- Maintenance fees must be paid periodically to keep the patent in force. To avoid missing the deadline for payment, the patent may be added by organization X to its account with an annuity payment service (operated by a commercial entity). Before the first maintenance fee is due for payment (3-1/2 years after the issuance of the patent), the annuity payment service sends reminders to organization X, which instructs the service to pay the first maintenance fee. The value of the patent to organization X is reassessed each time a patent maintenance fee is due. A decision may be reached at some point to not pay a maintenance fee and allow the patent to lapse because the value of the patent is outweighed by the increasing cost of the maintenance fee (the second maintenance fee is, due at 7.5 years, higher than the first maintenance fee, and the third maintenance fee, due at 11.5 years, is even higher).

⁷ PTO is permitted to collect from an applicant a fee for the application publication only after the application has been allowed.

What does a U.S. patent look like?



The original patent grant, sometimes referred to as letters patent, is a ribboned official document issued by the PTO bearing the seal of the United States. The PTO issues patents every Tuesday. The official letters patent are sent to the patentee, and the PTO places copies into public circulation by way of its electronic publication server. An example of a United States patent is US 9,238,599 B2, which may be viewed in full on the USPTO website by clicking this link: [US 9238599](https://www.uspto.gov/patents/publications/9238599) and clicking on “Images.” It serves as an example of a granted U.S. application that has been extended to adjust for delays in issuance (as indicated on the cover page of the patent); it

claims a process for producing chemical compounds, only one variety of chemical subject matter to which a patent claim may be directed.

The format of a U.S. utility patent, as prescribed by the PTO, includes the following consecutive parts, which are all derived from the patent application:

- A cover page, showing at a minimum the patent number and issue date, the title of the invention, the names and residences of the inventors, the application number and filing date, the classifications assigned to the patented technology, the references cited in the examination of the application, the name of the examiner for the patent, and an abstract describing the invention. The cover page may also cite any prior applications having an earlier filing date, the benefit of which is claimed in the patent. The assignee and the attorney for the patent may also be listed on the cover page.
- Drawings, photographs, sequence listings, or computer programs (not found in all patents).
- A specification, that is, a body of text describing the invention and corresponding to the specification originally filed for the patent application.
- At least one claim that defines the subject matter covered by the right of exclusion granted by the patent. The claims are the most legalistic aspect of a patent because they define the property held by the patentee. The invention claimed in the claims may be of the same scope as, or narrower than, the invention disclosed in the specification. Subject matter disclosed but not claimed is not protected by the patent, and the patent owner cannot prevent others from using it. However, the publication of that subject matter is prior art against subsequently filed patent applications.

The content and format of the cover page of patent documents are largely standardized so that fields of data on any country's patents can be identified by numerical tags called "INID" (*i.e.*, Internationally-agreed Numbers for the Identification of Data) codes. The cover page of US 9,238,599 is shown as an example.

Classification codes are assigned by patent offices to organize files according to technology and aid in searches of patent databases by patent examiners and the public. The International Patent Classification ("IPC") system is a hierarchical code covering all of the world's technologies. Patent offices assign one or more codes to each patent and print the codes on the cover page. Historically, many countries created their own patent classification systems, with US Patent Class ("USPC") codes assigned only to U.S. patents and Japanese F Terms and FI codes assigned only to Japanese patent documents. European Patent Classification ("ECLA") codes were assigned after publication to records in a database of families of patents as aids to searching, intended as aids for searching rather than being printed on patent documents. To counter the problems created by the proliferation of code systems with varying systems for updating, the USPTO and EPO

jointly created the Cooperative Patent Classification (“CPC”) system to replace both the USPC and ECLA.

Although the cover pages of patent documents have current classification codes and the names of the current owners of the patent rights on their pages, this information can become outdated as the classification schemes are updated, patent rights are transferred, and company names are changed. The information in patent database records can be updated to reflect the changed status of the patents.

What does a published U.S. patent application look like?

All U.S. patent applications filed on or after November 29, 2000, are published by the PTO approximately 18 months after the application filing date, except for applications by independent inventors who have requested an exemption from publication. Patent applications are published every Thursday. In appearance, a published application is very much like an issued patent. After an application is published, a copy of the papers in the application file kept by the PTO may be obtained from the PTO’s PAIR database, ending the secrecy under which an application was previously kept.

An example of a published U.S. patent application is US 2013/0150607 A1, which may be viewed in full on the USPTO website by clicking this link: [US 20130150607](#), and clicking on “Images.” This is the application that matured into US 9,238,599 B2. The published application contains the same description of the invention, but the claims differ so as to reflect amendments made during prosecution of the application. The first page has less information: no assignment had been filed at the time of publication, and there are no cited references or patent term adjustment, as this information is created only after the application has been examined.



US 20130150607A1

(19) **United States**
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WINSETT (43) **Pub. Date: Jun. 13, 2013**

(54) **NEW ALKYLAROMATIC PROCESS** CPTC 2502 (2006.01)
CPTC 211/05 (2006.01)
CPTC 119/22 (2006.01)
(76) **Inventor: Beth A. WINSETT, Houston, TX (US)** (52) **U.S. CL.**
USPC: 558/260; 585/446; 568/67; 568/63; 570/190;
568/939; 568/628; 568/58; 585/455; 564/409;
560/103; 568/790; 568/433; 568/766; 568/736;
585/24; 585/26; 570/182; 564/305

(21) **Appl. No.: 13/013,300**

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Publication Classification

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CPTC 201/22 (2006.01)
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CPTC 68/06 (2006.01)
CPTC 209/68 (2006.01)
CPTC 67/143 (2006.01)
CPTC 17/11 (2006.01)
CPTC 45/68 (2006.01)
CPTC 15/02 (2006.01)
CPTC 15/24 (2006.01)
CPTC 15/28 (2006.01)
CPTC 15/38 (2006.01)
CPTC 121/26 (2006.01)

(57) **ABSTRACT**

This invention is directed to a new process for making an alkylaromatic compound. In an embodiment of this invention, the process is directed to selective synthesizing an alkylaromatic compound comprising a high amount of dialkylate product. In general, this process involves contacting at least one alkylatable aromatic compound with an alkylating agent and a catalyst under suitable reaction conditions such that the resulting reactor effluent prior to any stripping step may be characterized by a dialkylate product content of at least 44 wt % and a trialkylate and higher polyalkylate product content of no more than 20 wt %. The alkylaromatic compounds produced have excellent thermal and oxidative stabilities, good additive solvency, and improved acid compatibility while maintaining good VI and low temperature properties. They are useful as lubricant basestocks and lubricant additives.

How to obtain information on patents and published patent applications

The text of U.S.-issued patents and published patent applications are available online from the PTO's website (www.uspto.gov), both in searchable full-text format or as images of the actual patent documents. The same information is also available from database operators. Full text and images of the patents and published applications from countries around the world can be obtained from other countries' patent offices or from database operators and other vendors. One of the most complete collections of patent documents is provided by the European Patent Office's Espacenet database, found at <https://worldwide.espacenet.com>.

Collections of U.S. patents and assistance in patent searching are available in every state of the United States from a number of university libraries and public libraries known as Patent and Trademark Resource Centers (“PTRC”) affiliated with the PTO. For information on those libraries, visit the PTO website or consult the Resources section at the end of this booklet.

The PTO website provides a wealth of other information useful to a newcomer to patent law as well the experienced patent professional.

How to calculate the term of a U.S. patent

A U.S. patent – or a patent issued by most other countries - expires 20 years from its filing date, but there are a number of factors that can affect the term of a patent, including when the application was filed and whether maintenance fees are paid.

Until enactment of the GATT/TRIPS (General Agreement on Tariffs and Trade-The Agreement on Trade-Related Aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods) legislation in 1994, the term of a utility patent or a plant patent began on the date of issue (grant) by the PTO and ended 17 years after the issue date. That simple-to-calculate patent term changed, however, with the enactment of the GATT/TRIPS legislation.

For a patent issuing from an application filed on or after June 8, 1995, the patent term still begins on the date of issue but ends 20 years from the effective filing date of the patent application from which the patent issued.

For (a) a patent issued from an application filed before June 8, 1995, or (b) a patent already issued that was still in force on June 8, 1995 (*i.e.*, had not lapsed for failure to pay a maintenance fee), the patent term is the longer of (a) the term as calculated under the old rule (*i.e.*, 17 years from the issue date), and (b) the term as calculated under the new method (*i.e.*, 20 years from the filing date). By 2019, a few patents with 17-year terms were still in force.

The AIPA made the calculation of a patent term even more complex, by providing a patent term adjustment (“PTA”) to compensate for delays incurred during the PTO's examination of a patent application filed on or after November 29, 2000. The PTA granted under the AIPA in effect guarantees a 17-year patent term as measured from the date of patent grant, to be reduced by any delays during the examination that are attributed to the applicant.

In summary, the term of protection granted now varies from patent to patent, depending on the following factors, among others:

- how much time was taken up in the PTO’s examination of the application;
- how much of the delay during examination is attributed to the applicant;

- whether the application is a continuation or a division for which the effective filing date is the filing date of a prior application;
- whether the applicant has been granted a patent so closely related to an earlier-filed patent that it was issued with a terminal disclaimer, conditioning that the second patent will stay in force only as long as the earlier patent is commonly owned and maintained in force; and whether the application is the U.S. national stage of an international patent application, in which case the 20-year period begins with the international filing date (see Extending Patent Protection to Other Countries for a description of the PCT system and timeline).

A drawback of all these changes in the law governing patent term is that it is no longer possible for an uninitiated person to look at the face of a patent and determine whether its term has expired. Such determination now requires thorough consideration of rather complex rules. The PTO will print on the face of a patent the length of any PTA. However, the PTO will not print the expiration date on the face of the patent, apparently to prevent unwarranted reliance on that information in case a patent has lapsed before the expiration of its full term because a required maintenance fee was not paid.

The maintenance fees for a U.S. patent are due at three successive intervals after the issue date of the patent and increase incrementally with each interval. A patentee who no longer has an interest in maintaining a patent can allow the patent to lapse by failing to pay a maintenance fee. The PTO publishes a notice of that lapse in its weekly Official Gazette, which can be viewed on the PTO website. Maintenance fee payment status can also be searched through the maintenance fee records on the PTO website for an individual patent to determine whether the patent is being maintained or has lapsed.

The option of filing a provisional application

The legislation implementing the GATT/TRIPS provisions introduced a new form of U.S. patent application called a provisional application. Unlike a regular U.S. patent application, the provisional application need not contain any claims. The government fee required for the provisional application is small compared with the fee for a regular application. The provisional application is not examined for patentability by the PTO and does not issue as a patent.

The intent behind the provisional application is to make it possible for an inventor to lock in an application filing date at a lower cost and with less effort than would be required in the preparation and filing of a regular U.S. patent application. (In particular, a provisional application could be filed on short notice before the invention was disclosed to the public, e.g., before publication in a journal.)

Within one year of filing a provisional application, the inventor must file in all countries in which patent protection is desired, including the United States, a regular application for the same

invention as described in the provisional application. The provisional application automatically expires one year after its filing.

A benefit to the applicant in filing a provisional application is that the 20-year period for calculating the patent term (for a U.S. patent issuing from the application) begins not with the filing date of the provisional application but with the filing date of the regular U.S. application that is based on the provisional application. At the same time, for the purpose of avoiding prior art references, the applicant benefits from the earlier filing date of the provisional application, yet without having the 20-year period for calculating the U.S. patent term be counted from the filing date of the provisional application. Another advantage is that any U.S. patent issuing from a regular application based on a provisional application is effective as prior art as of the filing date of the provisional application (as opposed to the filing date of the regular application) and thus may be more useful in preventing other parties from patenting similar inventions.

The provisional application can also serve as the basis for the filing of an application in a foreign country or the filing of an international application within 1 year of filing the provisional application. A drawback of the provisional application procedure is that it may encourage applicants and their attorneys to prepare and file provisional applications with a lesser degree of care than would be given to a "regular" patent application, a fact that may be regretted later when the "regular" U.S. application and the foreign and/or or international patent applications are filed. It may be realized at that time that the provisional application may be lacking a fully adequate description of the invention to support the claim to priority (in those subsequent applications) for the earlier filing date of the provisional application.

Application fees

An application filing fee must be paid to the PTO when the patent application is filed. The basic filing fee is increased by a surcharge when the application contains more than three independent claims and/or more than 20 claims in total and also when the application contains one or more multiply dependent claims (*i.e.*, a claim that depends on two or more other claims).

Additional fees may become due during the examination of the application, for example, fees for an extension of a response period when the applicant's required response to an action of the PTO is filed after the original deadline set by the PTO.

An issue fee is due after the application is allowed, and maintenance fees are due at successive intervals after the patent issues. The fee for the publication of the application is also due after the application is allowed.

Most PTO fees are subject to a reduction of 50% for an application that qualifies for small entity status, that is, when:

- the application is assigned to a company having no more than 500 employees or to a nonprofit organization, or
- The application is by one or more inventors who are under no obligation to assign the application to an organization that does not qualify for small entity status.

AIA introduced a new status of microentities, which may be individuals, academic institutions or small entities that have previously filed no more than four patent applications and have a gross income less than three times the current gross median income. Applicants qualifying as microentity are entitled to a total of a 75% reduction on most, but not all, fees.

Proof of priority of invention (first to invent)

A patent application contains no information on the actual date of invention of the subject matter claimed in the application. In most cases, there has never been a need for the applicant to offer any information about the date of invention. However, in some instances the applicant may have to prove that the invention was made before the effective date of a reference cited by the examiner in support of the rejection of the claims of the application. Proof of being first to invent is also necessary in an interference proceeding when two or more inventors (or groups of inventors) are attempting to patent the same invention in an application filed before the first-inventor-to-file standards of the AIA became effective.

For the purpose of proving the date of invention, it is essential that the history of the development of the invention be recorded appropriately in laboratory notebooks

At one time, the proof of invention was limited to activities in the United States. For proving priority of invention based on activities outside the United States, only the act of filing a patent application in a foreign country was accepted as proof, and only when the U.S. application claims the benefit under the Paris Convention of the filing date of that foreign application. The legislation implementing GATT/ TRIPS in the United States has changed U.S. patent laws greatly by permitting a patent applicant to rely on records of activities outside the United States, in addition to relying on the filing of a foreign patent application, to prove priority of invention.

First-to-invent patent system is unique to the United States: No grace period in most other countries

The U.S. patent system for patent applications filed prior to March 16, 2013, is known as a first-to-invent system. It awarded a patent to the party who was first to invent the subject matter claimed in an application (as opposed to the party who was first to file an application for the invention) as long as the application was filed within the year grace period discussed in the section “One-year grace period in the United States:”

In contrast, other countries have a first-to-file patent system that awards the patent to the party who is the first to file an application, regardless of whether that party was first-to-invent.

The most important thing an inventor planning to file patent applications in foreign countries should know is that there is no grace period in substantially all of those countries. Most foreign countries will grant the benefit of the earlier filing date of the U.S. application to a foreign patent application that is filed within one year of the filing of the U.S. application. However, the patent laws of those countries require so-called absolute novelty for the invention at the time of the filing of the first application (*i.e.*, the U.S. application in this case). That absolute novelty may be destroyed if there has been any public disclosure or sale of the invention before the filing of the U.S. application, by the inventor or by others. Therefore, applicants must file their applications in the United States prior to any public disclosure or sale of the invention if they plan to seek patent protection outside the United States. For countries that do have a grace period, the grace period is based on the date of disclosure. Therefore, applicants who disclose their invention prior to an application filing must file both U.S. and foreign applications within the term of the grace period. Foreign applications filed outside of the grace period, but within the one-year priority period from the first application will be invalid.

An earlier filing before the AIA went into effect would have been beneficial if the application were involved in an interference. In such a proceeding, the PTO is asked to (or may on its own initiative) declare an interference because similar subject matter is claimed in two applications, A and B, pending in the PTO at the same time, or an application A and a patent issued from an application B that was co-pending in the PTO at some point in time with application A.

The PTO determines in the interference proceeding which of the respective inventors (or groups of inventors) was first to invent the subject matter claimed in the applications or patent. The interference rules place the burden of proving prior inventorship on the party with the later-filed application. There is, therefore, a substantial advantage in being the first to have filed a patent application for the invention.

Finally, another reason for filing a patent application as soon as possible prior to March 16, 2013 was that in the following two situations, a patent applicant would be required to prove that due diligence was exercised (*i.e.*, that there was no unreasonable delay) in completing and filing a patent application:

- when the application is involved in an interference proceeding, and the applicant is first in conception of the invention but last in filing a patent application; and
- when the claims in the application are rejected by the PTO examiner over a prior art reference, and the applicant had conception of the invention before the publication date of the prior art reference, but filed a patent application after the publication date of the reference.

Grace period under the first-inventor-to-file system

The AIA significantly modified the grace period for U.S. patent applicants. Whereas an applicant could obtain a patent by “swearing behind” any reference published after conception of an invention and less than one year prior to filing under the first-to-file system, the current grace period now applies only to publications by the inventors or their associates within the year before a patent application is filed. Publications by others before any publication by the inventors are part of the prior art.

The first inventor defense for methods of doing business

The AIPA created a new defense, known as the first inventor defense, to protect a first inventor from a charge of infringement of a patent granted to another inventor for a business method. For this defense the first inventor must prove that he or she in good faith had reduced to practice in the United States the invention for that method of doing business, and had used that invention commercially in the United States before the filing date of the application by the other inventor that issued as the patent in question. Since the first inventor defense is limited to patents for methods of doing business, the immediate application of the first inventor defense to the work product of chemical scientists is considered at this time to be limited.

Priority of invention under AIA (First-inventor-to-file)

Beginning on March 16, 2013, the U.S. law was changed to grant priority to the first inventor to file a patent application on an invention claimed in one or more applications filed by other inventors. In most cases, only the filing date of the first patent application claiming the invention (either a U.S. application or an application filed elsewhere and relied upon for priority under the Paris Convention or another treaty) is considered in determining which of the applicants will receive a patent. When more than one inventor files a patent application on the same invention, the dates of conception and reduction to practice are not relevant, nor is diligence if preparing to file an application after the invention is completed. If the applicant with the later filing date believes that the earlier applicant derived the claimed subject matter from him or an associate, a Derivation Proceeding can be declared, and records can be brought forward to document the date on which information about the invention was provided to the earlier applicant.

Post-issuance processes before the PTO: Reissue, reexamination, post-grant review

After a U.S. patent issues, the following two procedures provide for a renewed examination of the patent: a reissue application and a request for reexamination.

A reissue application is undertaken to correct a significant error in the application, usually in the claims, and can be filed only by the inventor or patent owner.

A reexamination request can be filed by anyone, including a third party, such as a competitor. The U.S. Congress enacted legislation in 1984 to permit the reexamination of the claims of a patent in light of prior art references that are relevant but were not considered in the original examination. The AIPA of 1999 expanded reexamination by providing for an optional *inter partes* reexamination in which a third party requester of a reexamination can participate throughout the reexamination process. Prior to the AIPA, the participation of a third party requester ended with the filing of a request for reexamination. *Inter partes* reexamination ended September 12, 2012, following the enactment of AIA.

The AIA established additional procedures for post-grant review

A patent owner may request Supplemental Examination asking the PTO to “consider, reconsider or correct” information relevant to the patent.

Within nine months of grant, a non-patentee may petition for Post Grant Review on any grounds for invalidity.

A non-patentee may petition the PTO to initiate “Inter Partes Review” for novelty or nonobviousness at any time more than nine months after grant of a patent.

For a period of eight years after September 16, 2012, an accused infringer may petition for Transitional Covered Business Methods Review within nine months of grant of the patent.

In any of these post-issuance reconsideration procedures, the term of the original patent remains unchanged if the PTO concludes at the end of the reissue or reexamination procedure that the claimed subject matter is patentable.

Extending patent protection to other countries

A U.S. patent protects an invention in the United States only. To obtain worldwide protection, patent applications must be filed in each of the countries where patent protection is desired. Most patent-granting countries will give an applicant the benefit of the earlier application filing date in the United States. However, as discussed above, most countries also require absolute novelty as a condition for patentability.

Starting from a patent application filed in the United States, an applicant may choose from two scenarios for filing corresponding applications in foreign countries.

In the first scenario, known as the Paris Convention route, an application is filed within one year of the initial U.S. application filing in each of the selected foreign countries. In accordance with the Paris Convention for the Protection of Industrial Property, those countries grant to the applicant the benefit of the earlier U.S. filing date.⁸

The second scenario, known as the PCT route, involves filing an international application under the Patent Cooperation Treaty (“PCT”) in one of the “receiving” offices of the World Intellectual Property Organization (“WIPO”).⁹ Applicants in the United States and other countries are increasingly using this PCT route. For example, an international application is filed in the PTO, which serves as a U.S. receiving office, within one year of an initial U.S. application filing, and claims priority under the Paris Convention based on the U.S. application. The international application designates the countries (or regional patent organizations such as the EPO,¹⁰ in which the applicant is entitled to obtain patents.

The international application is published by WIPO approximately 18 months after the international filing date (or the priority date if priority is claimed as in this example), the publication being in the language in which the application is filed. The published application shows the countries that are currently signatories of the Patent Cooperation Treaty or, for older publications, designated by the applicant, which informs other parties of the applicant's right to pursue a patent in those countries.

Within 30 (or 31 months, according to national law) from the initial U.S. filing date, known as the “priority date,” the applicant must complete the formalities for entering into the “national stage” of the international application for each of the designated countries in which a patent is being sought. Those formalities include paying the official filing fees and submitting translations (if necessary) of the international application into the languages accepted by the designated countries. Each of the countries in the PCT system accords to the “national stage” application the benefit of the earlier international application filing date, and in the case where the international application claims the benefit under the Paris Convention of an earlier domestic application (which

⁸ A similar filing may be effected in a country such as Taiwan, which does not adhere to the Paris Convention but grants priority based on U.S. patent applications or in any World Trade Organization member country.

⁹ The World Intellectual Property Organization, an agency of the United Nations, is headquartered in Geneva, Switzerland, and administers the PCT system. See www.wipo.int/pct for an introduction to the PCT system.

¹⁰ In a regional patent organization the application is processed and reviewed by the regional patent organization, with either subsequent transfer of the proceedings to the national patent-granting organizations of individual countries that belong to the regional patent organization or issuance of a regional patent covering all of the countries.

is the U.S application in this example) each country in the PCT system accords to the national stage application the benefit of that earlier priority date.

Whichever scheme is chosen for filing patents in more than one country, the patents and applications publications by all countries will carry the date and serial number of the priority application, with substantially the same disclosure as in the priority country. Claims are likely to differ somewhat because national laws allow somewhat different subject matter and verbiage and prosecution history will differ among countries. One difference is that a requirement that claims contain an “inventive step” may take the place nonobviousness as a condition of patentability. A group of patents with the same priority and subject coverage are known as a patent “family.” Many databases group patent documents into patent families, simplifying the work of indexing patents for inclusion in the database and allowing database users to streamline their review of search results by scrutinizing a single member of an extended patent family in a single language.

Patent laws differ from country to country, so it may be easier to obtain patents in some countries than in others. Unfortunately, whether effective enforcement of patent rights can be obtained also varies from country to country. Since patenting worldwide is very expensive, applicants usually weigh the prospects for successful enforcement when deciding where to seek patent protection outside the United States.

Although patent applications must be filed in every country where the applicant hopes for protection, it is possible to file a single regional patent application that will cover the invention in a group of countries belonging to an international patent organization that issues patents for more than one country. The European Patent Organization (EP) processes patents for over 35 European countries. The Eurasian Patent Office (EA) grants patents covering most of the former Soviet Union. The Gulf Cooperation Council (GC) covers about six countries in the Middle East, and OAPI and ARIPO issues patents for African countries.

National security considerations: Secrecy order, foreign filing license

In its initial review of patent applications, the PTO may identify some applications as potentially affecting U.S. national security. Such applications are subject to further review, which in some instances may result in the imposition of a secrecy order for a period of at most one year (subject to extension by renewal of the secrecy order). During that period, the invention must be kept secret, and the grant of a patent on the invention is withheld.

A related security requirement is that no patent application may be filed in a foreign country on an invention made in the United States unless a patent application for the invention has been first filed in the United States and the applicant waits for at least six months before filing the foreign application or obtains a foreign filing license.

Ordinarily, the official filing receipt issued by the PTO for the application contains a notice to the applicant that a foreign filing license has been granted. Even if no official filing receipt has yet been received yet, the applicant is free to file an application in the foreign country at the end of the six- month period following the U.S. filing date.

Closing remarks

It is impossible to provide in this introductory booklet all of the information that may interest chemical professionals. A Resource section is provided for researching specific areas and general reading. The list is just a sampling of the many sources of information available that are constantly increasing. As with any information on the Internet, the reader must be alert and exercise good judgment.

In the AIPA, the U.S. Congress directed the PTO to serve as watchdog over invention promotion companies, some of which have been known to prey on independent inventors who come to them for help in promoting their inventions. The section of the PTO's website for independent inventors (<https://www.uspto.gov/learning-and-resources/inventors-entrepreneurs-resources>) should be consulted for information on scams perpetrated by invention promotion companies, as well as for general information on patents.

Glossary of Selected Abbreviations and Terms

AIA	America Invents Act of 2011
AIPA	American Inventors Protection Act of 1999
CAFC	Court of Appeals for the Federal Circuit
EPO	European Patent Office
GATT-TRIPS	General Agreement on Tariffs and Trade-The Agreement on Trade-Related Aspects of Intellectual Property Rights, Including Trade in Counterfeit Goods
IP	Intellectual property
PCT	Patent Cooperation Treaty
PAIR	Patent Application Information Retrieval (software)
PTA	Patent term adjustment
PTAB	Patent Trial & Appeal Board
PTDL	Patent and trademark depository library
PTO	U.S. Patent and Trademark Office
PTRC	Patent and Trademark Resource Center
RCE	Request for Continued Examination
SIR	Statutory invention registration
USC	U.S. Code
WIPO	World Intellectual Property Organization

Abstract. The section of a patent that provides a brief summary of the invention described in a patent.

Allowance (of application). Decision by patent examiner at the PTO to allow the claims of a patent application and permit issuance of a patent containing the claims.

Amendment (of part of application). A modification of a portion of an application, which may be in the specification, the claims, or the abstract.

Amendment or response. A written response to an office action of the PTO rejecting the claims of a patent application. The response may request that amendments be made to the application.

Annuity. A fee required to be paid annually to the patent-granting organization of a country to maintain a patent application or a patent. See Maintenance fee (for U.S. patents).

Anticipation. The basis for rejecting a patent claim over a prior art reference that shows all the features cited in the claim. See Novelty.

Application. A document submitted to the patent office of a country to describe an invention for which a patent is sought.

Application publication. The publication by the patent office of a country or by WIPO of an application submitted by an applicant for patent. The publication ordinarily occurs 18 months after the filing date of the application, or 18 months after the earliest claimed priority date.

Assignment (of an invention). A document signed by the owner of an invention (the assignor) to transfer ownership of the invention to the assignee. See also License (of patent).

Best mode disclosure. A requirement in U.S. patent law that the inventor disclose in the patent application the best mode for practicing an invention.

Claim. A statement that defines the invention protected by a patent. An independent claim defines an invention without referring to another claim, for example, "Claim 1. A compound represented by the following formula (I) ... " A dependent claim further defines the invention recited in another claim to which the dependent claim refers, for example, "Claim 2. A compound according to claim 1, wherein X is hydroxyl:" A multiply dependent claim depends on one or more alternative claims, for example, "Claim 3. A compound according to any one of claim 1 or 2, wherein Y is a heterocyclic aromatic five- membered ring structure:"

Conception. The mental concept of an invention and how to make the invention.

Continuing application (or continuation application). An application that contains the same description of the invention as a prior filed application and claims the benefit of the filing date of the prior application. See also Request for Continued Examination.

Court of Appeals for the Federal Circuit. A U.S. federal court of appeals established in 1982 that reviews all appeals for patent cases from federal district courts.

Declaration (or affidavit) for presenting additional information. A formal statement, signed by the person making the statement who is not necessarily an inventor, that is optionally submitted to the PTO on behalf of a patent applicant during the examination of an application. The statement introduces additional information, for example, experimental data, to support the argument that the invention defined in the claims is patentable.

Declaration (or oath) for patent application.

A formal statement required to be submitted to complete a patent application in the PTO, signed by the inventors to declare that they are the original inventors of the invention claimed in the application, and that they made or authorized the application.

Dependent claim. A claim that further defines the invention recited in another claim to which the dependent claim refers, for example, "Claim 2. A compound according to claim 1, wherein X is hydroxyl:"

Derivation Proceeding. A proceeding under U.S. patent law to determine whether an inventor named in an earlier patent application had derived the invention from an inventor named in a later

application. Derivation proceedings replace interferences for applications filed on or after March 16, 2013.

Design patent. A type of U.S. patent protecting the ornamental designs of an article having a practical utility for a term of 14 years from the date of issue of the patent.

Disclosure. Description of the invention in a patent application or a patent. Disclosure is often used interchangeably with Specification in referring to a patent or patent application. See also Duty of disclosure and Invention disclosure.

Divisional application. An application that contains the same description of the invention (or inventions) as a prior filed application and claims the benefit of the filing date of the earlier application, but contains claims that are related to only a portion of the original disclosure.

Drawings (or figures of drawings). Line drawings or photographs submitted as part of a patent application to help describe the invention.

Duty of disclosure. A legal obligation on the part of an inventor and other individuals involved directly or indirectly in the prosecution of a patent application before the PTO to disclose to the PTO any information of which the individual is aware, or should be aware, that may be material to patentability. See Information material to patentability.

Enablement; enabling disclosure. The requirement that a patent application describe the invention sufficiently to enable a person of ordinary skill in the field of the patent to practice the invention claimed in the patent.

Estoppel. Preventing a party from asserting a fact or a claim inconsistent with a position that party previously took. (example: if you said it was not being claimed and later tried to assert it that claim for the same thing.)

File wrapper; also prosecution history. The physical or digital file at the PTO that contains the official record of the examination of the application.

Filing receipt. A document issued by the PTO formally acknowledging the filing of a patent application and informing the applicant of the filing date and serial number of the application. Since 2001, the filing receipt also indicates the confirmation number that serves as a cross-check for identifying the application.

Final office action (or final rejection). A formal written communication from the PTO that maintains on a "final" basis a rejection stated in a prior office action. After the issuance of a final office action, the applicant has the right to appeal the examiner's decision immediately to the PTO's Patent Trial & Appeal Board, and the option of submitting another written response to the rejection.

First inventor defense. A defense available to a person who was first to invent in good faith and to use commercially in the United States a method of doing business but did not patent it, and another inventor subsequently files a patent application that issues as a patent for the same method. The first inventor is protected against a charge of patent infringement of the patent.

Foreign filing license. A written statement from the PTO granting the applicant of a patent application filed in the PTO permission to file corresponding patent applications in other countries. The foreign filing license is ordinarily a statement that is incorporated into an official filing receipt issued by the PTO for the application.

Grant or issue (of patent). Publication of the formal grant of a patent, on which date the patentee can begin enforcing the patent.

Independent Claim. A claim that defines an invention without referring to another claim, for example, "Claim 1. A compound represented by the following formula (I) ... "

Independent inventor. An inventor who has applied for a patent without assigning ownership rights to an employer or other entity. Independent inventor status gives certain special considerations under US. patent laws, such as a 50% discount for most PTO fees, and the option of avoiding publication of a patent application if the independent inventor declares in writing that no corresponding foreign applications will be filed for the same invention.

Industrial Property. An alternative name for Intellectual Property.

Information material to patentability. Information that compels a conclusion that a claim of a patent application is unpatentable.

Infringement. The trespass on the rights of the owner of a patent by another party.

Intellectual property. A generic description encompassing patents, trademarks, copyrights, trade secrets and other available forms of protection for the products of mental work. In some countries, industrial property is used interchangeably with intellectual property.

Interference. A proceeding in the PTO for determining which inventor or group of inventors was first to invent an invention claimed in an application X under examination, which is also claimed in another application Y or in a patent Z. Interferences have been replaced by Derivation Proceedings for patent applications filed after March 15, 2013

Invention disclosure. A form provided by organizations for use by their inventors to report their invention to management for consideration for possible patenting.

Inventive step. A requirement for patentability in many patent issuing authorities for a non-obvious difference between the claimed invention and the prior art.

Issue fee. A fee to be paid to the PTO after a patent application has been allowed, to prompt the PTO to issue (grant) the patent by publishing it. An allowed application becomes abandoned if the issue fee is not paid in a timely manner.

Issue (of patent). See Grant or issue (of patent).

License (of patent). An agreement, usually in writing, in which the owner of a patent grants to another party the right to practice the patented invention without giving up ownership of the patent. A license may be granted to the party on an exclusive or non-exclusive basis.

Maintenance fee. Fee required to be paid periodically to the PTO to maintain an issued patent.

Markush structure. A representation of a group of chemical substances in which a fixed portion of the structure is substituted by a group of allowable moieties listed as alternatives.

National stage (of international application filed in PCT system). The procedure of completing the formalities for a patent application in a country X after the filing in the PCT system of an international patent application in which X is designated as a country in which a patent is sought. The fee for an international application is small compared with the cost of entering the national phase in each designated country. Therefore, the national stage eventually may not be entered for all the designated countries. The text of the international application is used as the text for the national stage, with translation into the language of country X as necessary. (Note: An application may also be filed directly in country X without relying on the PCT system.)

Micro Entity. An independent inventor, small entity or academic institution entitled to pay one fourth of the regular PTO fees. Eligibility requires that a non-academic applicant not have been named on more than 4 previous U.S. patent applications, have limited income, and not be obligated to assign patent rights to an entity not qualifying for micro entity status.

Multiply dependent claim. A claim that depends on more than one claim in the alternative, for example, "Claim 3. A compound according to any one of claims 1 or 2, wherein Y is a heterocyclic aromatic five- membered ring structure:"

Non-obviousness. A basic requirement for a claimed invention to be patentable under US. laws. The claimed invention must not be obvious to a person of ordinary skill in the relevant art from previously known technology.

Novelty. A basic requirement for a claimed invention to be patentable. See Anticipation. In the United States, a claim lacks novelty if it is anticipated by a reference.

Oath. See Declaration (or oath) for patent application.

Obviousness. A basis for rejecting a claim in a patent application because the subject matter claimed is considered by the PTO examiner to be obvious from the technology described in a reference (or references) cited by the examiner.

Office action. A formal written communication from a patent examiner, usually containing a rejection of the claims of a patent application.

Paris Convention. The Paris Convention for the Protection of Industrial Property is a treaty requiring each adhering country to accord to a patent applicant the benefit of the filing date of an application for the same invention filed not more than 1 year before in another country that adheres to the Paris Convention.

Patent. A grant by a government to a patentee, as evidenced by an official document, of exclusive rights to the subject matter or invention claimed in the patent.

Patent attorney. An attorney registered by a patent office authorized to represent a patent applicant in proceedings before the patent office, to render opinions on the validity or infringement of a patent and/or to represent their clients in Federal courts.

Patent agent. An individual registered by a patent office authorized to represent a patent applicant in proceedings before the patent office. U.S. patent agents are registered to represent applicants before the PTO, but are not qualified to render opinions on the validity or infringement of a patent or to represent their clients in Federal courts.

Plant patent. A type of US. patent protecting plant varieties that are reproduced asexually, for a term that is the same as for utility patents, without the requirement that maintenance fees be paid throughout the patent term.

Prior art; prior art reference. A document or other evidence of previously known technology against which the patentability of an invention is assessed.

Priority (claim to priority). The claim in a patent application to the benefit of the filing date of an earlier filed patent application for the same invention. Priority may be claimed under the Paris Convention based on the filing date of an earlier foreign application. Priority may also be claimed domestically in the United States based on a prior filed U.S. application.

Prosecution. The history of the examination of a patent application in the PTO.

Prosecution history. See File wrapper.

Provisional application. A form of U.S. patent application requiring a much smaller filing fee and less stringent formalities than for a regular patent application. A provisional application automatically expires 1 year after its filing date and must be followed by the filing in the PTO, and in other appropriate patent-granting organizations as desired, of a regular patent application that claims priority based on the provisional application.

Provisional rights. A form of patent rights created under the AIPA to grant limited protection to a patentee for the period between the publication of a patent application and the date of issue of a patent.

Reduction to practice. The making of an invention. (The filing of a patent application is considered to be a form of reduction to practice, known as constructive reduction to practice.)

Rejection (of claim). A statement by an examiner that a claim in a patent application is not patentable for a reason specified by the examiner.

Request for Continued Examination. A procedure for obtaining a new round of examination for a patent application by making a request accompanied by a fee after a final office action or a notice of allowance has been issued by the PTO.

Response (to office action). See Amendment.

Small entity. A status granted under U.S. laws to independent inventors, nonprofit organizations, and small businesses with the benefit of a 50% discount in most PTO fees and the option of avoiding publication of a patent application if the small entity declares in writing that no corresponding foreign applications will be filed for the same invention.

Specification. The portion of a patent application that describes in writing the invention, including the background of the invention.

Statute and interpretation by a court. A statute is a provision of law enacted by the U.S. Congress and signed by the President. A court interprets the statute in applying it to a case before the court.

Statutory invention registration. A publication by the PTO at the request (before March 16, 2013) of an applicant of the description portions of a patent application (i.e., without any claims). The applicant waives all rights to a U.S. patent in return for the publication, also known as defensive publication, which will prevent other parties from patenting the same technology.

Term (of patent). Time period for which patent protection is granted.

Trade Secret. Business Information that is generally unknown and not readily ascertainable to another and provides an economic advantage because of its secrecy. The subject matter is reasonably protected such that its secrecy is maintained (e.g., the formula for Coca-Cola).

Utility. A basic requirement for an invention to be patentable under U.S. law, i.e., usefulness for a category of use for which patents may be granted. All applications, whether for utility, plant, or design patents, must describe an invention that has utility for it to be patentable.

Utility model. A type of intellectual property available in some countries, issued with a shorter term and less rigorous examination than a utility patent issued by that country.

Utility patent. The most common type of U.S. patent, which generally conveys the most protection compared with the other two types of U.S. patent (design and plant patents).

Resources

Patent documents from most patent offices are widely available online through governmental website and commercial organizations. The information provided by the various organizations varies from simple listings of patents to the full text of the patent documents, PDF images of the patent publications, indexing of individual chemical structures and/or generic Markush structures, controlled indexing applied by human or artificial intelligence, and/or translations of the original text. The proliferation of such document servers and the improvements that are often made to search and display platforms make it impossible to provide a complete listing in a document such as this one. The following list of resources includes some, but not all, of the reliable resources known to the author at the time of this writing.

Internet sites of governmental patent offices

U.S. Patent and Trademark Office: www.uspto.gov

The PTO website offers a large amount of information under the Learning Tools & Links. The full text of U.S. patents and published applications issued since 1976 can be searched and full-page images of patents issued since 1790 can be viewed on the PTO website. The list of attorneys and agents registered to practice before the PTO can be searched on the PTO site. The Publication Site for Issued and Published Sequences (PSIPS), <http://seqdata.uspto.gov/>, allows display of biosequences and other supplemental information not printed in U.S. patent documents. The USPTO.gov website also includes resources for searching U.S. trademarks. Links to other sources of patent information, including the European Patent Office and the World Intellectual Property Organization (listed below), can also be found at the PTO site.

Members of the public can perform searches and obtain help and instruction from staff at the Public Search Room at the U.S.P.T.O. facilities in Alexandria VA as well as Patent and Trademark Resource Centers (PTRCs) in 47 states, the District of Columbia and Puerto Rico.

World Intellectual Property Organization www.wipo.int

The WIPO website is dedicated to all forms of intellectual property overseen by the World Intellectual Property Organization, including the Patent Cooperation Treaty (PCT) system. The text of international treaties and national patent laws of over 200 countries are provided.

The PatentScope database (<https://patentscope.wipo.int/>) contains full text patent documents including PCT applications, European patents, and national patents from other countries searchable in their original languages and displayable as images. PatentScope includes WIPO Pearl, a multilingual technology portal and WIPO Translate, a powerful tool trained specifically to translate patent texts between numerous language pairs, including those in Chinese, Korean,

Japanese, and Russian characters. There is a chemical structure search tool that allows searching by chemical structure or name of US and WO documents.

European Patent Office <http://www.epo.org/>

The EPO website contains information about the patent law and practice of the European Patent Organization and provides a link to its very extensive patent database Espacenet

Espacenet, <https://worldwide.espacenet.com/>

The full text of patent applications published by the EPO and the full text of patents granted by the EPO can be searched on this site. The full text of international patent applications filed in the PCT system and published by WIPO (as "WO" patent documents) can also be searched, as a PCT applications are effective as applications for European patents. Espacenet is linked to the prosecution history of European patents in the EPO Register.

The Espacenet database also provides searchable English abstracts and titles for published applications and granted patents from a host of other countries.

Full-page images of and, for many documents, displayable text in the language of publication can be viewed in the Espacenet database. Patent Translate, designed jointly by the EPO and Google, allows an Espacenet user to translate patent text from and into English, French and German for a total of 29 different languages, using software trained to handle elaborate patent vocabulary and grammar.

Academic Internet sites

The libraries of many universities have websites with guides to searching and information resources. These may include links to licensed databases that are accessible only to university students and staff as well as publicly accessible databases, and guides prepared by the university library and technology transfer departments. The following are excellent sites at United States and Canadian universities.

University at Buffalo
<http://research.lib.buffalo.edu/patents>

University of California at Santa Barbara
Patents LibGuide at <http://guides.library.ucsb.edu/patents>.

California Institute of Technology
libguides.caltech.edu

Stanford University
<http://library.stanford.edu/guides/patents>

Penn State

<http://guides.libraries.psu.edu/patents>

Queen's University, Kingston, Ottawa CA

<http://guides.library.queensu.ca/c.php?g=501420>

<http://guides.library.utoronto.ca/patents>

Professional societies' sites

American Intellectual Property Law Association www.aipla.org

2001 Jefferson Davis Highway, Suite 203 Arlington, VA 22202

703-415-0780; fax 703-415-0786

Most of the information in this website is for attorneys practicing in intellectual property. However, the document "An Overview of Intellectual Property-What is a Patent, a Trademark, and a Copyright?" (<http://www.aipla.org/about/iplaw>) provides a brief overview for the nonspecialist

Association of University Technology Managers www.autm.net

This site offers samples of forms and other documents provided by member institutions, such as invention disclosure forms, intellectual property policies of the institutions, agreements between the institutions and researchers, licensing agreements, and others.

Patent Information Users Group (PIUG)

PIUG, The International Society for Patent Information Professionals, has a website (www.piug.org) and wiki (<http://wiki.piug.org/dashboard.action>) with extensive links to patent information resources and discussions of patent search techniques and issues.

American Chemical Society (ACS)

www.acs.orgCommittee on Patents and Related Matters (CPRM), is a Joint Board – Council Committee tasked with studying and making recommendations on intellectual property issues, nominating chemists for national awards, and providing education to ACS members on IP issues important to the chemical enterprise. The CPRM website has links to external resources and documents created for nonspecialists by members of the committee

Internet sources not charging a fee

Google Patents, <https://patents.google.com/>

A simple interface for searching patents from the US, EPO, WO, China, Germany and Canada.

Internet patent databases charging a fee

Fee-based patent databases vary considerably in cost, platform features and the level of value-added indexing and standardization of data. Institutional subscriptions may allow sharing of search results across many members of an organization.

Lexis-Nexis www.lexisnexis.com

Lexis-Nexis, an information service provider for the legal profession, offers research and delivery of U.S. or foreign patent documents to subscribers.

LexisNexis TotalPatent

<http://www.reedtech.com/products-services/intellectual-property-solutions/lexisnexis-totalpatent-one>

Patent search platform designed for professionals, with worldwide full text patents searchable in English and native languages.

Questel

<https://www.questel.com/>

Orbit Intelligence and Orbit Express platforms with worldwide full text patents searchable in English and native languages.

Derwent World Patents Index

<http://clarivate.com/?product=derwent-world-patents-index-dwpi>

Worldwide patents with value-added indexing and English language abstracts, searchable on the Thomson Innovation platform and the STN International and Questel search services.

Chemical Abstracts Service

Chemical Abstracts

Worldwide chemically related patents with value-added indexing and English language abstracts, searchable on the SciFinder platform and the STN International search service.

Full text United States patents with Chemical Abstracts indexing searchable on the STN International search service

FIZ Karlsruhe

Full text patents from individual patenting authorities, the European Patent Office's INPADOC database, and the Derwent World Patents Index, searchable on the STN International search service

Print publications

Stephen R. Adams. *Information Sources in Patents*, 3rd Ed. K. G. Saur, Munich. 2011.

Michael J. White. "Chapter 3, Chemical Patents" in *Chemical Information for Chemists, A Primer*. Judith N. Currano and Dana L. Roth (Eds), The Royal Society of Chemistry, pp. 53-90 (2014).

Doreen Alberts, et al. "Part I Introduction to Patent Searching" in *The Information Retrieval Series, Vol. 29, Current Challenges in Patent Information Retrieval*, Lupu, M.; Mayer, K.; Tait, J.; Trippe, A.J. (Eds.), Springer pp. 3-44 (2011).

Sarah Hasford. *America Invents Act Primer*, 1st Edition. Academic Press, 2017.

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