

Chemical Patents and Filing Practices in India: Trends, Processes, and Legal Framework

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Abstract

India, recognized as the fifth-largest global economy, holds the 7th position in the chemical sector and ranks 11th in chemical and petrochemical exports worldwide. Despite this significant standing, the country witnesses comparatively fewer patent applications in this domain. The global chemical and petrochemical industry, although complex in nature, serves as a critical element of economic development and supply chain operations. This paper explores the interconnectedness of innovation, patents, and chemical sciences, highlighting how intellectual property rights foster advancements in chemical engineering. It investigates how patents contribute to scientific discovery, technological progress, and commercialization within the sector. The study also presents a comparative analysis of patent filing procedures in India and across international jurisdictions, identifying key procedural, infrastructural, and awareness-related challenges that result in limited filings from Indian stakeholders. Drawing on recent patent statistics and selected case studies, the paper highlights influential areas such as sustainable materials, polymer innovation, and chemical synthesis where patent activity is gaining momentum. In doing so, it identifies emerging research trends as well as gaps that hinder broader participation from Indian researchers and industry players. The analysis advocates for enhanced awareness, simplified filing mechanisms, and stronger industry-academia collaboration to bridge the existing innovation gap. Overall, the paper aims to redefine the role of patents as a strategic tool for advancing chemical sciences and contributing to India's global scientific competitiveness.

Keywords: Chemical patent, composition, pharmaceutical, compound, TRIPS

INTRODUCTION

The chemical industry continuously drives innovation by developing new areas and processes, with research in chemical sciences reported through various channels. On the other hand, patents cater an active role for the advancement of research in chemicals and safeguarding the intangible properties across all the knowledge sectors [12]. A survey of patent data highlights significant growth in patent filings worldwide, reflecting contributions from various countries [3].

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The Delphion database was evaluated for patent filings from 2003 to 2008, covering sectors such as automotive industries, chemical sciences, pharmaceuticals, electronics, medical devices, telecommunications, and biotechnology [6]. The analysis shows that patent filings are prominent in every sector where innovation occurs. For instance, leading automotive companies like Ford, General Motors, Toyota, and Honda file patents to protect their technologies. Similarly, the electronics industry, with major players like

Phillips, Hitachi, Sony, and General Electric, has shifted from copyright protection to patents due to increased specialization and automation. In the telecommunications sector, companies like Siemens and Nokia are significant patent filers, with Siemens standing out globally. Medical sciences also show a rising trend in patent filings, with the USA leading in this area through companies such as Boston Scientific and Medtronic [17].

The field of chemical sciences, including pharmaceuticals and environmental sciences, has experienced significant demand and rapid growth in patent filings. Leading countries in this area include the USA, UK, Germany, Japan, China, France, and Korea [16]. Major companies such as Bayer and Dupont file hundreds of patents annually, underscoring the significant role of patents in chemical sciences. This global increase in patent filings across disciplines reflects the ongoing and dynamic nature of innovation in chemical research and development [12]. A chemical patent can be granted for different aspects, such as a compound, which may include a specific compound, a class of compounds, or a group of compounds. It may also cover mixtures composed of two or more compounds, compositions that incorporate the compound, or products made from or containing the compound. Additionally, the patent can encompass processes for producing the compound, mixture, or composition, as well as methods for utilizing the compound in specific applications, such as curing a polymer system or treating a medical condition.

SIGNIFICANCE OF CHEMICAL SCIENCES

Chemical sciences hold a distinctive and central role within the broader spectrum of scientific disciplines [3]. Chemistry's inherent versatility is evident in its interdisciplinary connections, enabling it to integrate with fields like biology, medicine, physics, and engineering. These intersections create numerous opportunities to apply scientific knowledge for the betterment of humanity [4]. *It encompasses a wide range of research areas, including organic chemistry (the study of carbon-based compounds), inorganic chemistry (the study of metals and non-metals), and physical chemistry (which explores the mechanisms and reasons behind chemical interactions).* In the chemical and allied fields, patents may cover a variety of subject matters, including compounds (defined as a class or specific compounds), mixtures of multiple compounds, compositions incorporating the compound, articles made with or containing the compound, processes for producing the compound, mixture, composition, or article, and methods of using the compound for specific purposes, such as curing polymer systems or treating medical conditions [9].

Furthermore, Eco-chemistry is revolutionizing industries by focusing on sustainability and minimizing environmental impact [15]. In the pharmaceutical industry, innovations like atom economy and safer solvents have significantly reduced waste during drug synthesis. Agriculture has embraced biopesticides, offering eco-friendly pest control solutions that are less likely to induce resistance and pose minimal environmental risks [3]. The plastics industry is evolving towards the use of biodegradable materials, improved recycling methods, and adopting circular economy principles. These advancements demonstrate how eco-chemistry fosters sustainable development, balancing industrial growth with environmental preservation [14].

The progress in chemical sciences research has been remarkable, giving rise to numerous specialized sub-disciplines, such as materials science, solid-state chemistry, surface science, nanotechnology, and chemical biology. The growth of research and development in the chemical sciences over the past century has been extraordinary, far surpassing the advancements made in previous years [13]. The introduction of quantum mechanics has significantly enhanced our understanding of the nature of bonding between atoms in chemical compounds. This understanding, when combined with insights into the structural aspects of chemical entities (specifically the three-dimensional arrangement of atoms within a molecule), has enabled scientists to predict various properties of chemical compounds [4].

The recognition of the significance of molecular structures led to the development of various spectroscopic techniques. These advanced techniques, along with the ability to observe atoms within molecules have greatly advanced our understanding of chemical systems. These tools have been particularly valuable in fields such as materials science, surface science, and catalytic processes, contributing to significant advancements in these areas. Chemical patents grant scientists exclusive rights to develop, experiment with, use, and market specific chemicals, compounds, and molecules. These patents also extend to the application of these compounds in various substances or products. By securing a chemical patent, researchers can safeguard their discoveries and innovations [7].

CHEMICAL PATENTING AND INDIA

India has made remarkable progress in chemical science, significantly contributing to its industrial and technological development. The industry is a global leader in manufacturing, driven by innovations in chemical formulation and synthesis, supported by world-class R&D centers [11]. Justice Ayyangar Committee report in India had specifically addressed patents for chemical inventions, recommending that only process patents should be allowed for chemical substances. This approach was adopted in the Patents Act 1970, which permitted process patents for products of chemical reactions but excluded product patents for these inventions (Section 5). The Act aimed to prevent monopolies on chemical products while encouraging innovation in processes. After the WTO agreement and the TRIPS framework in 1995, India was required to introduce both product and process patenting in all fields, including chemicals. A phased transition followed, with the introduction of mail-box provisions and Exclusive Marketing Rights (EMR) in 1999. Finally, in 2005, product patents for chemical inventions were allowed, marking the end of the previous restrictions [7].

Under the Patent Act of 1970, India initially only granted patents for processes used to manufacture chemical substances, excluding patents for the chemical products themselves. However, after India joining the TRIPS agreement in 1995, significant reforms were introduced. The TRIPS agreement set minimum standards for intellectual property (IP) laws that member countries, including India, were required to adopt. India adheres to TRIPS and allow grant of product patents in addition to process patents. This change enabled inventors to secure patents not only for the processes involved in creating chemical products but also for the chemical products themselves. Chemical patents thus provide exclusive rights to inventors, allowing them to market, use, and sell specific chemicals, compounds, and molecules. These patents cover various aspects of chemical development, including experimentation, usage, and commercialization. By securing a chemical patent, researchers can protect their discoveries and innovations in the chemical field [10].

Patent filings in India saw a notable rise of 24.64%, increasing from 66,440 applications in 2021-22 to 80,211 in 2022-23, representing an overall growth of 5.94%. In 2017-18, approximately 6,343 chemical patent applications were filed, highlighting strong interest in chemical innovations [11]. Chemical engineering patents encompass a broad spectrum of categories, including physical and chemical processes, textile treatments, mechanical engineering, electricity generation, and specialized chemistry fields. This variety of technologies is reflected in the companies leading in patent applications in the chemical engineering sector. In the United States, patents for chemical innovations are classified under the utility patent category.

PATENT

The patent regime in India commenced in 1856 with the introduction of Act VI. It was inspired by the British Patent Law of 1852 [5]. This Act, titled "Certain Exclusive Privileges Granted to Inventors of New Manufactures for a Period of 14 Years," provided inventors with the opportunity to secure exclusive rights for their inventions. One notable instance was George Alfred DePenning, who filed the first petition under this act for his "Efficient Punkah-Pulling Machine" on March 3, 1856, designated as petition No. 1 of 1856 [15].

Within three years of its implementation, the Act was amended and renamed Act XV, focusing on “Patent Monopolies Called Exclusive Privileges.” Subsequent amendments occurred in 1872, 1883, 1888, 1911, and 1970. The Patents Act of 1970 (Act 39), effective from April 20, 1970, serves as the foundational legislation, having undergone amendments in 1999, 2002, 2005 and 2021. These significant amendments not only introduced product patents in fields of chemicals, agro-chemicals and pharmaceuticals ensured alignment with the requirements of the (TRIPS) agreement [16].

As per section 159 of the Patents Act, 1970, the Central Government has the authority to create rule and regulations for the effective implementation of the Act and the administration of patents. Consequently, the Patents Rules, 1972, were enacted alongside subsequent amendments leading to the introduction of the Patents Rules, 2003, which replaced the earlier rules. Additional amendments followed in 2005, 2006, and 2019, with the latest updates taking effect on September 18, 2019 [16].

The Patent Act, 1970 grants inventors (or their assignees) the exclusive right to file patent applications, ensuring a monopoly for 20 years over the manufacturing, use, sale, import, distribution, licensing, and preventing unauthorized third-party actions. This document outlines the various procedures for filing patent applications in India. Thus for an invention to be patentable, it is required novelty, inventive step, and has to be industrially applicable. Furthermore, it must not fall under the exclusions outlined in Sections 3 and 4 of the Patent Act, 1970 [5].

Novelty, inventive step, and industrial applicability are the core criteria for patentability. For an invention to be considered novel, it must not have been previously published or used publicly in India or elsewhere, nor should it have been claimed in any prior patent application within India. An inventive step requires that the invention demonstrates technical advancement or economic significance, making it non-obvious in the relevant sector. Lastly, the invention must be capable of being utilized ensuring its practical utility and industrial applicability. These criteria collectively ensure that only genuine innovations are granted patent protection [14].

The Patent Act, 1970, under Sections 3 and 4, outlines specific exclusions where certain inventions are not eligible for patent protection.

The relevant subsections for chemical compounds and processes are:

- “Section 3(d): Discovering a new form of a known substance, including derivatives and polymorphs, that does not enhance its known efficacy is not patentable.
- Section 3(e): Substances resulting from a mere admixture, where the properties of the components are simply aggregated, or processes for creating such substances, are not patentable.”

Inventions falling under section 4 (1) of subsection 20 of the *Atomic Energy Act, 1962*, are excluded from patent eligibility. This includes inventions concerning compounds of uranium, beryllium, thorium, plutonium, radium, graphite, lithium, and other substances specified by the Central Government [11].

Filing of Patent Application in India

The American Inventors Protection Act (AIPA) of 1999 introduced significant reforms to U.S. patent laws, notably eliminating the confidentiality of patent applications filed with the U.S. Patent and Trademark Office (PTO). These applications are now published 18 months after the filing date [14]. Additionally, the term of patent protection was extended to 20 years from the filing date, with adjustments made for delays caused by the PTO, ensuring that the protection period is comparable to the 17 years from issuance under previous U.S. patent laws (Mishra & Tiwari, 2020). In contrast, the patent application process differs from country to country due to varying patent laws [9]. In India, under Section 6 of the *Indian Patent Act, 1970*, patent applications can be filed individually or jointly

by the true and first inventor(s), the assignee of the true and first inventor(s) with proof of assignment, or the legal representative of a deceased inventor or assignee. The date of first filing, known as the priority date, is essential in determining the patent's priority. In India, applicants have three methods available for filing their patent applications [8].

Ordinary Application

Applicants can file a patent application in the prescribed format, either online or by submitting it directly to one of the Patent Offices (Delhi, Mumbai, Kolkata, or Chennai) based on jurisdiction. Ordinary applications can be of provisional and complete. The former one can be filed based on an idea at an abstract stage, without claims. The latter one must be filed within 12 months from the filing date of the provisional application. It includes all claims and specifications [14].

Conventional Application

An applicant has the option to submit a conventional application in any recognized country within 12 months from the initial filing date. This application can then be submitted in the prescribed format to any Patent Office in India, either online or offline.

Role of Indian patent office in Chemical patenting and PCT National Phase Application

The Indian government is prioritizing the chemicals sector through initiatives such as the Production-Linked Incentive (PLI) scheme, the establishment of Petroleum, Chemicals, and Petrochemicals Investment Regions (PCPIRs), and the protection of Intellectual Property Rights (IPR).

These efforts have led to a significant increase in foreign direct investment (FDI) in the chemical industry, with cumulative equity inflows reaching US\$20.8 billion from April 2000 to September 2022. The Government aims to enhance domestic production, reduce import dependence, and promote investment through its 2034 vision. The PLI scheme will offer output incentives of 10% to 20% for the chemical sector, while the PCPIR Policy 2020-35 targets attracting INR 15 trillion by 2030, and INR 20 trillion by 2035 [1]. The Department of Promotion of Industry and Internal Trade (DPIIT) works for the development and implementation of policies under the Ministry of Commerce and Industry. It has a vital role shaping the CGPDTM, which has five main administrative sections in all over India as listed below in **Figure 1**. In addition, the Indian Patent office works for the registration of patent. The IPO's work for the protection of Novel chemical compounds includes processes or applications related to it. The IPO administration including Controller and Examiners of patent, handles patent filing, examination, grant and disposal of disputes in pre and post grant thereof. The criteria for chemical patenting like Novelty, Inventiveness and Utility promoting innovation are levered by IPO.

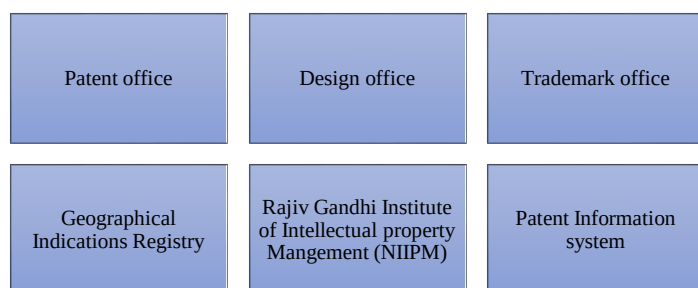


Figure 1. Indian administrative offices.

The significance of a composition claim lies in the results achieved through the combination of its components. When the integration of known elements produces a "new article, or a better article, or a cheaper article than before," it can be classified as an invention or a manufacture under the relevant statute, making it potentially patentable. Therefore, if a composition claims to be successful, it must show that the interaction between the components creates a synergistic effect that is different from the

simple aggregation of their individual effects. The Manual of Patent Office Practice and Procedure (MPOPP) from the Indian Patent Office differentiates a combination invention from a mere aggregation by stating that the former "requires that the relationship between the features or groups of features is one of functional reciprocity or that they exhibit a combinative effect that exceeds the sum of their individual effects [11]."

The patent law encourages innovation and creativity by rewarding the innovators a term of protection for 20 years along with their exclusive rights as per section 53, 43 and 48 of the Indian Patent Act. In addition, India patent system recognizes both process and product patents, allowing for the protection of new chemical entities while also enabling the production of generics through process patents. This encourages innovation in drug development while maintaining access to affordable medications. As discussed above, sec 3(d) provides patenting of minor modifications or new forms of existing drugs unless they demonstrate a significant enhancement in therapeutic efficacy. Apart from this, sec 3(e) of Indian Patent Act, deals with the non- patentability of admixture combination and that applies to chemical patenting also. There are various cases where question of improvement was raised [11]. In the case of IPA No. 10885/DELNP/2015, a composition claim was deemed non-patentable under Section 3(e) of the Act because the observed improvement was attributed to the method of administration rather than the interaction among the components of the composition. The aforementioned provisions are particular to the Indian patent system and are intended to prevent the practice of ever-greening through altered compositions. To address the limitations set by these regulations, it is important to prepare the specification with sufficient data that clearly illustrates the synergistic effects and efficacy of the composition. To make the innovation accessible and available to the general public, the Indian Patent Act, sec 84, 90 and 92A provide the scope of compulsory licensing [8].

Applicants may file an application with the International Bureau (IB, Geneva) or through any receiving office (RO). It can be filed within 12 months of the first filing date. Applicants are required to submit their application to the Indian Patent Office. The same has to be within 31 months of the initial filing date. They can file the application with the International Bureau (IB) in Geneva or through any receiving office (RO). This can be either at the time of the initial filing or within 12 months of it. The details of forms used for patent filing and their purposes are mentioned below in Table 1. The patent application and their process can be proceeded through online or offline with the help of these forms.

Table 1. List of forms for patent registration.

Form Number	Name	Purpose
Form 1	Application for Grant of Patent	Primary form for filing a patent application; requires details about inventors and declaration.
Form 2	Complete Specification	Contains the detailed description of the invention, including claims and abstract.
Form 3	Statement and Undertaking regarding Foreign Applications	Provides information on similar applications filed abroad. It must be submitted within six months.
Form 5	Declaration as to Inventorship	Required for all application types except ordinary applications with complete specifications.
Form 13	Request for Correction	Used for making corrections to the application. It is not mandatory for every application.
Form 18	Request for Examination	Essential for initiating the examination process. It must be filed by the applicant or an interested party.
Form 26	Power of Attorney	Required if a patent agent is appointed. It can be submitted with the application or within three months.

Table 2. Timeline for patent filing (Patent Amendments Rules 2024).

Provision	Key Amendments in Patent Amendment Rules 2024
Rule 12 (Section 8)	Time to inform Controller of foreign applications reduced from 6 to 3 months after first objection. Controller can access databases and grant 3-month extension via Form 4.
Rule 13 (Divisional Applications)	Allows multiple divisional applications from provisional, complete, or further filings under Section 16.
Rule 24B/24C (Request for Examination)	Deadline reduced from 48 to 31 months. 3-month extension allowed via Form 4. Provision retained for applications filed before 2024 rules.
Rule 55 (Pre-grant Opposition)	Introduced prima facie review. If no case made, Controller notifies opponent. Applicant's reply time reduced from 3 to 2 months. Hearing rules aligned with Rule 62.
Rule 56 (Opposition Board)	Deadline to submit report shortened from 3 to 2 months.
Rule 70A (Certificate of Inventorship)	New provision introduced. Inventorship certificate and duplicate may be issued upon request via Form 8A.
Rule 80 (Renewal Fee)	10% rebate on e-payment of renewal fees for minimum of 4 years in advance.
Rule 131 (Working Statement)	Filing once every 3 years instead of annually. 3-month extension permitted via Form 4.
Rule 138 (Extension of Time)	Controller empowered to condone delays or grant extension up to 6 months via Form 4. Multiple requests allowed within the 6-month window.
Amended Forms	Forms 1, 3, and 27 revised. New Forms 8A (Inventorship) and 31 (Grace Period) introduced.
Fee Amendments	Revised fees for oppositions, inventorship certificates, and grace period. E-filing incentivized with reduced fees compared to physical filing.

Source: Patent Amendment Rules - India – 2024. Available at Patent Amendment Rules - India

In addition, some important amendments were brought to the Patent Rules in the year of 2024 which represent a major change in India's intellectual property framework, intended to enhance efficiency, improve transparency, and align more closely with international standards. These changes aim to simplify procedures, reduce compliance burdens, and accelerate the patent process by shortening timelines for various submissions such as examination requests and working statements [11]. Key additions include the issuance of inventorship certificates, incentives for electronic renewal payments, and flexible deadlines in certain cases. The Table 2 below summarizes the key modifications brought about by these amendments.

EXAMINATION OF PATENT APPLICATION

The Indian Patent Office begins the examination of a patent application only after the applicant submits a formal request using Form 18 (or Form 18A for expedited processing) along with the necessary fee. This request must be made either at the time of submission or within 48 months from the priority date; failure to do so results in the application being considered withdrawn [11].

Once the request is filed, a patent examiner is assigned to review the application. The examiner conducts a prior art search to identify existing documents that may conflict with the claimed invention. This search uses platforms such as Google Patents, INPASS, and Espacenet.

If the prior art search reveals no conflicting documents, the applicant is informed that the patent will be granted, provided all other requirements are met. However, if relevant prior art is found, the examiner issues a report analyzing the invention's novelty, inventive step, industrial applicability, and compliance with sections 3 and 4 of the Patents Act, 1970.

MAJOR CHALLENGES IN CHEMICAL PATENTING

The Indian pharmaceutical and chemical sectors face numerous obstacles in securing patents, particularly for product-based innovations. A primary issue stems from Section 3(d) of the Indian

Patent Act, 1970 which restricts patent rights for modified versions of existing substances unless they can clearly demonstrate a considerable improvement in therapeutic effect. This has led to the rejection of many patents for new chemical entities or slightly altered compounds, even when they have practical utility. In India, even newly synthesized molecules may not qualify for patent protection unless they show a synergistic outcome, rather than just a combination of known properties [14].

Another challenge involves the need to prove inventiveness and non-obviousness, which can be difficult when the behavior or working of chemical compounds is predictable. The Indian Patent Office also tends to reject applications that define a compound only by its function or use, especially in areas like biotech or antibody-related inventions, unless detailed structural characteristics are provided. This requirement often makes the patenting process complex and technically demanding.

Additionally, India has adopted a narrow view of what constitutes improved efficacy, particularly after the Supreme Court ruling in *Novartis v. Union of India* (2013). This has made it harder to patent variants such as salts or isomers unless their enhanced effectiveness can be firmly demonstrated. Patent processing is also slowed by administrative delays and inconsistent decisions, especially in complex scientific applications. Furthermore, patent applicants must provide extensive supporting data and experimental results, and failing to do so often leads to outright rejection of the application [16]. Thus, India must strike a balance between encouraging innovation and protecting public interest to remain competitive on the global stage.

CONCLUSION

The global rise in patent filings, including a notable 24.64% increase in India during 2022-23, underscores the dynamic growth in chemical innovations. As industries shift towards sustainable practices, patents continue to safeguard advancements in green chemistry, biodegradable materials, and eco-friendly technologies. As emerging technologies like AI continue to shape chemical research and sustainability becomes an increasing focus, a supportive patent system will be crucial in guiding the future of chemical sciences in India. This system will ensure that innovations make a significant contribution to societal and environmental advancements. The evolution of India's patent regime, from process patents under the 1970 Act to the introduction of product patents post-TRIPS compliance in 2005, demonstrates the nation's commitment to aligning with global intellectual property standards. In chemical sciences, the rise in patent filings reflects significant advancements in research, including eco-chemistry, materials science, and pharmaceutical innovations. India's robust framework for patent filing and examination, encompassing forms like Form 1 (application submission) and Form 18 (request for examination), highlights its systematic approach to fostering innovation. As industries continue to evolve, the chemical sector remains pivotal in balancing technological progress with sustainability. Patents in this field protect intellectual contributions and drive global competitiveness, underscoring their vital role in shaping the future of science and industry.

REFERENCES

1. ASSOCHAM. (2023). Indian Specialty Chemicals Industry: ready for a quantum leap. Available at [ey-indian-specialty-chemical-industry-report-v1.pdf](#)
2. Banerjee, R. (2013). The success of, and response to, India's law against patent layering. *Harvard International Law Journal*, 54, 205–232.
3. Biglu, M. H. (2008). Scientometric study of patent literature in medicine. In H. Kretschmer & F. Havemann (Eds.), *Proceedings of WIS 2008, Berlin, 4th International Conference on Webometrics and Scientometrics*. Retrieved from <http://creativecommons.org/licenses/by/2.0>
4. Cook, T., Doyle, C., & Jabbari, D. (1991). Patents for chemicals. In *Pharmaceuticals, Biotechnology & the Law* (pp. 1–4). Palgrave Macmillan. https://doi.org/10.1007/978-1-349-21828-8_4

5. CGPDTM (2008). Gov.In. Retrieved June 25, 2025, from https://www.ipindia.gov.in/writereaddata/Portal/Images/pdf/Organizational_Structure_of_office_of_CGPDTM.
6. DPD: Delphion Search Algorithm. (n.d.-b). Georgetown.edu. Retrieved June 25, 2025, from <https://dnapatents.georgetown.edu/SearchAlgorithm-Delphion-20030512.htm>
7. Dhar, B., & Gopakumar, K. M. (n.d.). Effect of product patents on the Indian pharmaceutical industry. Indian Institute of Foreign Trade. Retrieved October 14, 2024, from <https://wtocentre.iift.ac.in/Papers/3.pdf>
8. Durham, A. L. (2013). Patent law essentials: A concise guide. Retrieved from https://scholarship.law.ua.edu/fac_books/28
9. Grubb, P. W., & others. (2016). Filing a patent application. In *Patents for Chemicals, Pharmaceuticals, and Biotechnology*. Oxford Academic. <https://doi.org/10.1093/oso/9780199684731.003.0007>
10. Hasford, S. (2018). Patent law basics for chemicals and research professionals (1st ed.). Academic Press.
11. Indian Patent Office. (2023). Annual report 2022–23. Retrieved from <https://ipindia.gov.in>
12. Lorbeer, C., & Ezekoye, O. (2024, December 18). The state of the chemicals industry: Time for bold action and innovation. Mckinsey.com; McKinsey & Company. <https://www.mckinsey.com/industries/chemicals/our-insights/the-state-of-the-chemicals-industry-time-for-bold-action-and-innovation>
13. Michael J. W. (2014). Chapter 3, Chemical patents. In J. N. Currano & D. L. Roth (Eds.), *Chemical Information for Chemists: A Primer* (pp. 53–90). The Royal Society of Chemistry.
14. Mishra, B., & Tiwari, R. (2020). Patent filing system and examination in India: An overview in the context of process and product in chemistry. *Journal of Scientific Research*, 64(1), 192–198. <https://doi.org/10.37398/jsr.2020.640140>
15. Poddar, A. (2023). Case studies in eco-chemistry: Proactive approaches to environmental pollution control. *European Chemical Bulletin*, 12(5), 5890–5901. <https://doi.org/10.31838/ecb/2023.12.5.454>
16. Racherla, U. S. (2019). Historical evolution of India's patent regime and its impact on innovation in the Indian pharmaceutical industry. In *ARCIALA Series on Intellectual Assets and Law in Asia* (pp. 271–298). Springer Nature Singapore.
17. Title 35 of the U.S. Code. (n.d.). Retrieved November 3, 2024, from <https://www.law.cornell.edu/uscode/text/35>