

SEARCH SUPPORT: HOW DIGITAL TOOLS ARE HELPING CHEMISTS NAVIGATE THE VAST SCIENTIFIC LITERATURE LANDSCAPE

INTRODUCTION

The chemical industry manufactures countless components of products found in everyday life, from dish soap to smartphone faces. Chemists push the boundaries to create novel products every year by relying on information about existing chemicals and chemical products.¹ In other words, innovation is rooted in established knowledge.

For example, chemists working to develop a new heat-resistant material for reusable spacecraft wouldn't start from scratch. Rather, they would jump-start the discovery process by exploring the literature on thermal-resistant substances. Searching key terms such as "heat capacity" or "thermoplastic" in a generic search engine such as Google or within specific scientific databases like SciFinder may be good for broad searches but isn't likely to turn up all relevant scientific information.

Relying solely on search engines and databases may be limiting in other ways, too. Once they find an article of interest—say, about a specific polymer resin and its heat capacity properties—chemists may need to track down the original publication outside the search engine or database they originally used. This can take time, or they may face a paywall block they can't address. Even when they gain access to content, understanding how to responsibly share it with team members may not be clear cut.

Research has shown that integrating digital tools into the information-gathering stage of scientific discovery can help chemical companies shift their approach to innovation for the better.^{1,2} Software that specifically helps scientists find, access, and share chemical content provides a critical road map in the ever-expanding literature landscape that can speed the journey from idea to product.

FACING THE LITERATURE LANDSCAPE

Chemical companies rely on research and development to drive innovation and address evolving market needs.¹ In recent years, the chemical industry has become increasingly complex; certain sectors, such as electronic and materials science technology, are expanding rapidly. Innovators need to balance production with consumer demand and regulatory pressures surrounding sustainability.²

Access to chemical content is essential to guiding the R&D process and team collaboration. Finding and extracting information from published literature, including journal articles, conference proceedings, and standards, can help chemists jump-start their projects and ensure that their research is sufficiently novel.

“Chemical literature isn’t just important; it’s critical for research,” says Sarat Munjal, a scientist in plastics process research who recently retired from Dow. “We don’t want to duplicate research that’s already out there and waste money or resources, and we want to make sure we’re pursuing something new.”



Source: Copyright Clearance Center

In the era of big data, scientific literature is increasingly published and available online. To advance the development and innovation process, researchers require software and digital tools for streamlined, easy access to content whenever and wherever they need it. The COVID-19 pandemic has also shifted the way research is done and has made remote access to the literature more important than ever.

Chemical companies may take varied approaches to provide scientific content to their researchers. Information managers and corporate librarians can facilitate the process, although some companies don’t have the resources to establish such positions or have a less centralized method of information management.

In addition, published scientific literature and data are inherently subject to copyright and intellectual property laws, with each database or journal adopting different licensing models. This can make collaborating on content research between team members a legal minefield, which researchers shouldn't have to navigate alone.

Studies have shown how the chemical industry can benefit from digitalization of the research and development process,¹ such as the adoption of digital tools that aid in information management. Such tools enable researchers to collaborate more easily and to access and manage needed content in a streamlined, copyright-compliant way so that they can drive innovation and get to experimentation more quickly.

OVERCOMING INFORMATION OVERLOAD

The amount of chemical content is vast and steadily growing. From 2008 to 2018, output of peer-reviewed science and engineering journal articles and conference papers rose about 40%, from 1.8 million to 2.6 million.³

With about 18% of this published material attributed to chemistry, engineering, and materials science, chemical researchers face over 450,000 articles and conference proceedings published worldwide annually.³ This doesn't include patents or other non-peer-reviewed sources of information, or anything classified as biochemistry or medicinal chemistry.

The size and scale of the chemical literature universe could leave researchers with information overload. Searching numerous siloed databases individually to locate and assess relevant research is inefficient and slows the research process.

"It's always a challenge for researchers to navigate through source material," says Denise Callihan, manager of R&D library shared services at PPG. "We need a good set of resources and training to orient users and need systems in place to help them overcome that search hurdle."

Many chemical companies have information specialists like Callihan to help with this process. Callihan's team supports global R&D by ensuring researchers have the content they need to do their jobs, gaining access to that content and facilitating compliant collaboration practices.

Search engine and document delivery software like RightFind from Copyright Clearance Center (CCC) is designed to help researchers navigate the chemical literature and access content more efficiently. It can free up resources so that scientists can focus on the work needed to drive product development.

EXPANDING INFORMATION RESOURCES

Chemical research and information is vital to researchers' work, and with employees sharing more external content, chemical companies can benefit



Source: Copyright Clearance Center

from digital tools that facilitate finding content and collaborating on that content.⁴ Surveys conducted by the research group Outsell in partnership with CCC—which helps organizations integrate, access, and share information through licensing, content, software, and professional services—reported that 45% of information that chemists shared with one another in 2020 was sourced externally.⁴

Paywalls and other barriers make external content sourcing and remote collaboration difficult, but the right software can help overcome these challenges by giving researchers easy access to high-value content from wherever they're working. For instance, software like RightFind can be integrated into research workflows to deliver chemical content. Such tools can help researchers search and pull content from a multitude of available databases in just a few clicks—critical to having a competitive edge.

“You need to keep on top of the competition to know if your research is innovative and inventive and ensure you're not infringing on existing intellectual property rights,” Munjal says. “It's important from a resource point of view to get the data that's already there, and it's the fastest way to get research started.”

When starting a new project, Munjal would begin with a search to quickly appraise the existing literature. He says software like RightFind has made it progressively easier to look for and find articles, making the search process as well as document delivery smoother and more efficient.

Specifically, RightFind can operate as a stand-alone search tool or can integrate into a user's workflow. Users can enter specific terms relevant to their project—like “synthetic rubber” or “agrochemical”—and search scientific literature and

standards. A general overview of the search results can give users an idea of what the published data contain (figure 1).

Users can also integrate RightFind into their workflows as a bookmarklet or an extension of their browser. For example, they might use SciFinder to identify specific articles or content they want to access and then the RightFind tool to

The screenshot displays the RightFind search interface. At the top, the search term 'ethanol polypropylene' is entered in the search bar. Below the search bar, there are options for 'Advanced Search' and 'Search Tips'. The main area shows a list of search results, each with a title, authors, journal title, publication date, volume, issue, and pages. The results are sorted by relevance. On the left side, there are filters for 'Refine Search Results', 'Exclusions', 'Narrow by Content Type', 'Publication Date', 'Starts With', and 'Narrow by Collection'. At the bottom of the interface, it says 'Powered by Copyright Clearance Center' and 'Get Help'.

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Refine Search Results [Clear all](#) 1 - 50 of 393 results for ethanol polypropylene, sorted by relevance [Sort ↑↓](#) [Save](#) [Share](#) [Export](#) [Feeds](#) [Alerts](#) [Get the Content](#)

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Journal Title: European Polymer Journal Publisher: Pergamon
Publication Date: 1/1990 Volume: 26 Issue: 4 Pages: 453-455
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Journal Title: American journal of health-system pharmacy : AJHP Publisher: American Society of Health System Pharmacists (ASHP)
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Journal Title: Chemical Communications Publisher: The Royal Society of Chemistry
Publication Date: 3/1/2021 Volume: 57 Issue: 17 Pages: 2156-2159
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Figure 1. Example of the results of a RightFind search

Source: CCC

extract the citation and gain access to the full text immediately. Citations and documents requested in RightFind are automatically added to a user's personal library, which aids in maintaining an active repository of chemical content.

“RightFind offers workflow innovation to meet [researchers and information specialists] where they are and get them access to content as quickly as possible,” says Keri Mattaliano, CCC’s director of corporate solutions. “By tying users’ preferred search workflows together with seamless access to the full text from their organization’s subscriptions, previously purchased content, open access, and document delivery, it can save them valuable time and resources and increase efficiency,” she adds.

Even if a company doesn’t have a subscription to a particular publication, software tools specializing in document delivery can find the original publisher and allow researchers to buy an article. Some software, including RightFind, lets organizations set price limits and require administrative approval to purchase documents over a certain cost, helping balance budget considerations with research requirements.



Source: Copyright Clearance Center

Having a centralized search system helps information professionals assess what journals and data sources their employees use the most. Specifically, RightFind allows for real-time content usage and spend tracking. Companies can then make data-driven decisions about the information they want to access with budget in mind.

“Information managers can track what publications users are accessing most across the organization and determine where they could strategically invest in subscriptions,” Mattaliano says. “In this way, content management tools can help the efficiency of the organization as well as the researcher.”

STRIVING FOR COMPLIANT COLLABORATION

After finding relevant chemical content, researchers may want to collaborate on the content with team members. In fact, surveys conducted by the research group Outsell in partnership with CCC have shown that the amount of information being shared across professional chemical and plastics environments has more than doubled since 2016; respondents shared work-related content on average 12.7 times per week with 9 other people in 2020 compared with 5.3 times per week with 10 other people in 2016.⁴

Because of copyright laws, compliant reuse may not include sending the article to a colleague in an email attachment. Publishers have varying reuse limitations associated with their material, so sharing it with a colleague may in fact be copyright infringement.

In 2020, 48% of chemical industry employees were unaware of their organizations' copyright policies or were unsure of the details.³ Many databases and servers don't include clear guidelines on how to properly use an article after it has been purchased, leaving researchers and information managers to try to figure it out themselves. This increases the potential risk of unlicensed content

sharing and puts companies at risk.

Software with built-in features that address compliance, such as RightFind, can help overcome these challenges and give researchers a clear picture of copyright and restrictions on reusing chemical content (figure 2).

“RightFind not only gives researchers access to a document but will also check the organization’s direct publisher agreements and copyright licenses,”

Mattaliano says. “This way, they know how they can properly reuse and collaborate using this content without having to leave their workflows to check. Without these features in place, the user could be inadvertently putting the company at risk of copyright infringement.”

Information managers and researchers can seamlessly stay abreast of compliance issues by incorporating the RightFind software into their research workflow. Whenever they find content they want to use, they can immediately understand how to reuse it in a compliant manner.

Furthermore, these digital tools can help teams work together and collaborate using documents. As a cloud-based software, RightFind allows groups to place collaborative work in a shared library space. Within these shared libraries, users can review, annotate, tag, and comment on specific citations, allowing them to connect with their colleagues in real time in accordance with their publisher subscriptions and license agreements. With these checks in place, such collaboration is seamless and supports compliant use of copyrighted materials.

“We can use RightFind to make sure we’re clear to reuse a copy of an article or other published material with our people and with collaborators as permitted by our subscription and license agreements,” says Callihan. “Since our employees collaborate among research centers around the globe, we feel safer with these checks in place.”

The screenshot shows a window titled "Content Usage Options" with a close button in the top right corner. Below the title, there is a section for "JOURNAL ARTICLE" with the following details: "Diffusion of ethanol and ethyl laurate through preswelled polypropylene films using a radiotracer technique", "Authors: Barson, C.A.; Dong, Y.M.", "Journal Title: European Polymer Journal", "Publisher: Pergamon", "Publication Date: 1/1990", "Volume: 26", "Issue: 4", "Pages: 453-455", and "DOI: 10.1016/0014-3057(90)90051-5". Below this metadata is a list of four permission types, each preceded by a green checkmark icon and followed by a "TERMS" link. The permissions are: "Digital sharing and storage within your organization", "Photocopy sharing within your organization", "Responsive Rights", and "Regulatory Submission". Each permission type is followed by the text "This permission type is covered". At the bottom right of the list is a "View more uses" link. At the very bottom of the window is a link that says "Need to purchase this content or additional rights?".

Figure 2. After a search using RightFind, users can identify how they can reuse content while maintaining copyright compliance.⁵ The availability and terms of digital and photocopy sharing are displayed next to each search result.

Source: CCC

Although critical to scientific progress, navigating the vast chemical literature landscape can be difficult. By enabling researchers to confidently access and reuse chemical content, search engine and document delivery software can move researchers to experiments faster, helping drive innovation and address market needs.

CONCLUSION

Chemical products and the decision-making surrounding their development will only continue to get more complex,² and the amount of information available to chemists can seem overwhelming even now. As such, chemical companies may want to reevaluate their traditional approaches to collecting and sharing information.

Fortunately, chemists have the option of capitalizing on digital technology that provides easy access to the expansive landscape of existing chemical content and facilitates seamless collaboration. Those who adopt these informatics-based tools will have a competitive edge in the innovation process and help guarantee that R&D pipelines remain nimble and adaptable to current and future market demands.

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