

Elsevier R&D Solutions
FOR CHEMICALS

Knovel[®]

An engineering decision-support solution that delivers trusted answers to technical questions.

INFORMATION ESSENTIALS

Multi-disciplinary and specialized technical content for industry needs

MATERIAL SOLUTIONS

Data resources that support productivity and aid in material analysis and selection

SMART CONTENT & ANALYTICS

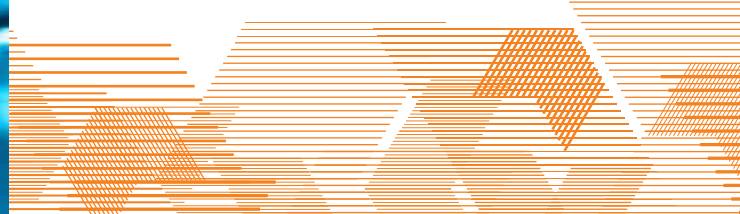
Interactive analytical tools and specialized data search

WORKFLOW INTEGRATIONS

Connections with engineering software and information discovery platforms



ELSEVIER



Help engineers mitigate risk while achieving operational excellence and maximum productivity



Get answers to engineering questions: Over 80% of Knovel users find information that is directly applicable to a project



Reach market faster and increase efficiency: Knovel users reduce project completion and rework time by 8-9%, and avoid spending 3-15 hours per month looking for information



Solve design and development problems and meet specifications using trusted data: Knovel users more easily find ways to innovate, meet specifications, and cite trusted sources in documentation



Build technical knowledge on current industry topics: Knovel provides a wide range of essential technical information so that getting up-to-speed on new topics is easier

DELIVERING GROWTH AND MARKET DIFFERENTIATION WITHOUT ERODING MARGINS

Diversifying and expanding product portfolios. Achieving optimal production levels and minimal plant disruptions. Delivering new and differentiated products that can be scaled and commercialized. Responding to changes in environmental and safety regulations and raw material prices. Maintaining up-to-date knowledge on market-shaping trends such as 'green' chemistry and advanced materials. These business needs constantly weigh on engineering teams in Chemical companies.

To support business growth and profitability, engineers require reliable insights on new technologies and applications as well as best practices on process optimization and compliance. In particular, engineering design and development projects have some of the biggest demands for technical information. For example:

- Design and development decisions that can be traced back to **reputable sources**
- **Immediate answers** for engineering problems with expensive stakes and consequences
- **New insights** for exploring innovative solutions and approaches
- **External, validated best practice information** that enhances internal information and models

A SOLUTION THAT SUPPORTS ENGINEERING DECISIONS AND PRODUCTIVITY

Knovel is an engineering decision-support solution that enables confident answers to technical questions by drawing upon trusted data from more than 120 providers through a cloud-based platform with powerful search and interactive analytical tools.

Engineers at top Chemical companies worldwide turn to Knovel for best practice and technical application insights, validated equations, and substance and material properties data to innovate and solve a range of technical problems such as those related to chemical selection, process design, heat transfer, coatings for corrosion prevention, process hazard analysis, mitigation of environmental impact, industrial hygiene, safety, and energy efficiency.

With over 15 years in the market and repeated recognition as an awardee and finalist for the Software & Information Industry Association's (SIIA) CODIE Awards, Knovel offers:

- **Information Essentials** – Multidisciplinary and specialized technical reference content curated for industry needs
- **Material Solutions** – Data resources that support productivity and aid in material analyses and selection
- **Smart Content and Analytics** – Interactive tools that enable data analysis, and specialized data search and taxonomies that make it easy to discover answers to technical questions
- **Workflow Integrations** – Connections with engineering software and discovery platforms allow users to benefit from Knovel where and when they need it

“I needed references on corrosion of a nickel alloy and found multiple references on Knovel that provided the information to correctly diagnose the corrosion that led to the failure. Knovel also helped provide remedial measures to avoid the failures of the equipment in the future.”

– Engineer



INFORMATION ESSENTIALS

Knovel offers a broad and deep coverage of content needs through partnering with 120+ publishers and societies. Over 35 subject areas and premium content offerings are available, and top subject areas curated for engineers in the Chemicals Industry include:

- Chemistry & Chemical Engineering
- General Engineering & Project Administration
- Mechanics & Mechanical Engineering
- Safety & Industrial Hygiene
- Plastics & Rubber
- Process Design, Control & Automation
- Sustainable Energy & Development
- AIChE/CCPS — Chemical Process Safety

TOP KNOVEL SEARCHES

corrosion **process hazard analysis** heat transfer
flow calculations flow calculations **processes controls**
chemical properties evaporation rates
environment, health & safety vapor pressure coatings
quality testing **materials handling** process technology





“I write environmental hazard assessments of chemicals based on their unique physical and chemical properties/characteristics and I use Knovel as a resource to establish physical characteristics of organic and inorganic compounds.”

–Chemical Engineer

ENGINEERS USE KNOVEL TO:



Research substance and material properties and suitability for applications and process improvements



Perform calculations to solve process and application challenges



Troubleshoot issues and failures



Develop design, guidelines and criteria for equipment, maintenance and processes



Assess safety and risks with potential and existing processes and systems



Get up to speed on unfamiliar topics

MATERIAL SOLUTIONS

Through Knovel's exclusive critical tables and materials and substance databases, engineers have critical property data at their fingertips. Some examples of Knovel substance and materials data resources for Chemical industry customers are:

- **Chemical Resistance Database**

Available as a premium content offering on Knovel, this is a comprehensive, essential decision-support resource that helps companies select the best plastics and elastomers for a wide range of new product and process design and manufacturing settings. It delivers the largest compilation of normalized data that explains the effect of thousands of reagents, the environment and other exposure media on the properties and characteristics of plastics and elastomers.

- **COMING SOON: Knovel Substitute Chemical Database**

To be available as a premium content offering, this is a comprehensive, essential decision-support resource designed to help companies identify, evaluate and substitute auxiliary chemicals in their design or process based on environmental, health, safety, and performance factors.

- **Knovel Critical Tables**

Available to all Knovel subscribers, this resource includes — but is not limited to — physical, solvent, and thermodynamic properties. The physical property tables alone include over 21,000 inorganic and organic compounds, and pure substances.

- **Yaws' Critical Property Data for Chemical Engineers and Chemists**

Available to Oil & Gas Engineering and Chemistry & Chemical Engineering content offering subscribers, this resource provides access to properties for 35,000+ organic substances and over 5,000 inorganic substances and elements. The largest bank of correlations online, this compilation features measured and calculated data, validated by subject matter experts.

SMART CONTENT AND ANALYTICS

Engineering search capabilities and analytical tools enable users to discover new insights and related information, deepening the value they get from Knovel.

Multi-faceted Keyword Search

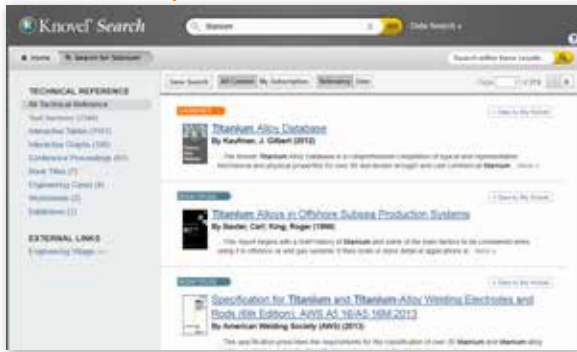


Figure 1: Knovel’s basic search results views offers multi-faceted refinement options for easy discovery of related insights across content types and resources.

Data Search



Figure 2: Knovel’s data search feature is a must-have for precise material/substance or property data search.

Optimized Search for Engineers

Knovel’s specialized search is extremely simple yet powerful, built upon a deep understanding of the engineer’s ‘language’ to deliver relevant results. It finds data hidden in tables, graphics, and equations, allows numeric range search, automatically performs unit conversion and performs multivariable searches.

Interactive Content and Productivity Tools

Knovel offers easy-to-use tools for initial calculations and information validation, as well as a breadth of interactive content that allows users to customize data before integrating into their work.

Interactive Equations with equation solver



Figure 3: Knovel Interactive Equations features over 500 equations paired with worked examples from multiple engineering disciplines and a web-based equation solver that allows users to calculate online and export your calculation in PDF, Mathcad, or HTML formats.

Interactive graphs and tables

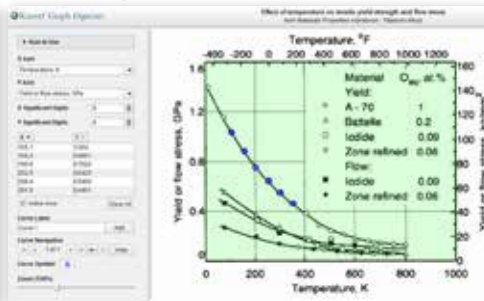


Figure 4: Knovel offers more than 100,000 interactive tables and graphs with ‘live’ data, allowing users to easily customize data.

Unit Converter



Figure 5: Knovel’s Unit Converter enables users to quickly convert any unit of measurement—or any combination of units—into another unit. Users can choose from a list of over 1,000 unique units for approximately 90 properties.

“I needed to estimate the vapor pressure of chemicals at elevated temperatures. Nine of the last 10 chemicals I needed could be found in Knovel... where I could see a graph and pick a vapor pressure for any temperature I needed. I did this in 2 hours for nine substances versus a literature search and a reconstruction of data [which would have required] 40 hours at least.”

–Chemical Engineer

WHO USES KNOVEL?

Chemical, Mechanical, Material, Environmental and Manufacturing engineers from Chemical companies use Knovel. Knovel’s global customer base include:

- **Engineers from ~700 organizations worldwide**, with an average of 2,400+ users per company
- **70+ of the Fortune 500 companies**
- **7 of the top 10 chemical companies** in the world
- **12 of the Top 15 US Engineering Schools** and **10 of 15 World’s Best Universities for Engineering**

WORKFLOW INTEGRATIONS

Knovel offers mobile capabilities as well as integrations with engineering software, applications and information discovery platforms, so engineers can benefit from where and when they need Knovel.

Material Name	Grade	Yield Strength (ksi)	Tensile Strength (ksi)	Modulus of Elasticity (ksi)
Unalloyed & Non-Alloyed Cr	CP Grade 1	185	215	190000
Unalloyed & Non-Alloyed Cr	CP Grade 1	195	225	190000
Unalloyed & Non-Alloyed Cr	CP Grade 2	185	215	190000
Alpha & Near-Alpha Ti	5-0.02%	140	160	160000
Alpha & Near-Alpha Ti	5-0.02%	141	161	160000
Alpha & Near-Alpha Ti	5-0.02%	140	160	160000
Alpha & Near-Alpha Ti	5-0.02%	141	161	160000
Alpha & Near-Alpha Ti	5-0.02%	141	161	160000
Alpha & Near-Alpha Ti	5-0.02%	141	161	160000
Alpha & Near-Alpha Ti	5-0.02%	141	161	160000
Alpha & Near-Alpha Ti	5-0.02%	141	161	160000

Figure 6: Knovel data is easy to export into standard engineering desktop tools like MS Excel and MCAD programs.



Figure 8: Knovel’s product website is optimized for mobile browser access and the My Knovel ToGo application provides users with mobile and offline access to content titles that are saved to a user’s online profile.



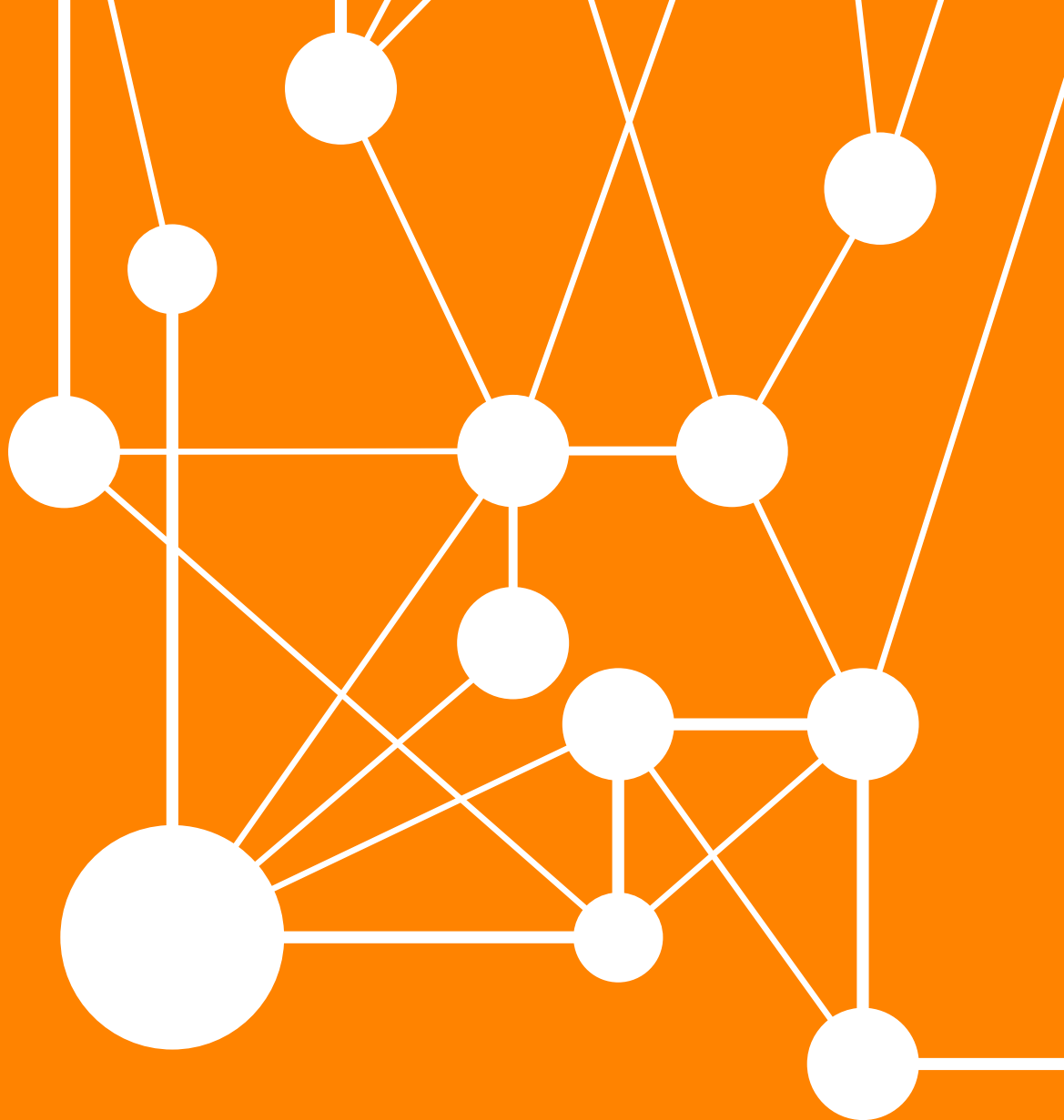
Figure 7: Knovel supports integrations with key information platforms such as Sharepoint and the EBSCO Discovery Service. It also offers search widgets that can be embedded onto a user’s desktop and websites to provide convenient access to technical insights, materials data and interactive content.

GET STARTED

To learn more about how Knovel can help position your company for success in the Chemicals Industry, contact your Elsevier sales representative or request for more information or a product demonstration by visiting [elsevier.com/knovel](https://www.elsevier.com/knovel)

“One search of Knovel provided me with information which I and others had been looking for. If I had looked here before, it would have saved me months of work. The company is employing external consultants to find the information I found here in 30 minutes.”

– Engineer



LEARN MORE

Contact us to discover how Elsevier's information tools and trusted content can help your company save time and gain cutting-edge insights to drive innovation.

Visit <http://www.elsevier.com/rd-solutions/chemicals> or contact your nearest Elsevier office.

ASIA AND AUSTRALIA

Tel: + 65 6349 0222

Email: sginfo@elsevier.com

JAPAN

Tel: + 81 3 5561 5034

Email: jpinfo@elsevier.com

KOREA AND TAIWAN

Tel: +82 2 6714 3000

Email: krinfo.corp@elsevier.com

EUROPE, MIDDLE EAST AND AFRICA

Tel: +31 20 485 3767

Email: nlinfo@elsevier.com

NORTH AMERICA, CENTRAL AMERICA AND CANADA

Tel: +1 888 615 4500

Email: usinfo@elsevier.com

SOUTH AMERICA

Tel: +55 21 3970 9300

Email: brinfo@elsevier.com