

The Science and Engineering of Materials:

Chapter 1 Exercises

Skills Learned: Knovel search engine, Knovel website capabilities and tools

Knovel Problems:

K1-1 Site Navigation/Browsing Content

- Convert 7750 kg/m^3 to lb/ft^3 using the Unit Converter.
- Using the Periodic Table, determine the atomic weight of magnesium.
- What is the name of Section 4 in *Perry's Chemical Engineers' Handbook (7th Edition)*?
- Find a book title that encompasses the fundamentals of chemistry as well as contains interactive tables of chemical data.

K1-2 Search Engine

- Using the basic search option in Knovel, find as much physical and thermodynamic data associated with ammonium nitrate as possible. What applications does this chemical have?
- Using the basic search, find the formula for the volume of both a sphere and a cylinder.
- Using the Knovel Data Search, produce a list of five chemicals with a boiling point between 300 and 400 K.

K1-3 Interactive Tools


- Using the Equation Plotter, determine the enthalpy of vaporization of pure acetic acid at 360 K.
- What is the pressure (in atm) of air with a temperature of 200°F and a water content of 10^{-2} lb water/lb air?
- Find three grades of polymers with a melting point greater than 325°C.

These three sets of problems are designed to provide an introduction to Knovel, its website (<http://www.knovel.com/web/portal/browse>), and the interactive tools available on it.

Information on Knovel can be found either by browsing or by 2 types of search, Basic and Data.

1. To browse, go to <http://www.knovel.com/web/portal/browse> and click on a Subject Area link (highlighted in yellow below):

You are not logged in, [log in Now](#)
























 Options ▾ Search ▸ Recent Searches

[Browse](#) [Data Search](#) [Tools ▾](#) [Support ▾](#) [Live Chat](#) [Free Titles](#) [About Us](#)

Browse

[Titles by Subject](#) | [Titles A-Z](#)

[All Titles](#) [New Titles](#) [Titles with Interactive Tools](#)


 Adhesives, Coatings, Sealants & Inks	 Industrial Engineering & Operations Management
 Aerospace & Radar Technology	 Mechanics & Mechanical Engineering
 Biochemistry, Biology & Biotechnology	 Metals & Metallurgy
 Ceramics & Ceramic Engineering	 Nanotechnology
 Chemistry & Chemical Engineering	 Oil & Gas Engineering
 Civil Engineering & Construction Materials	 Pharmaceuticals, Cosmetics & Toiletries
 Earth Sciences	 Plastics & Rubber
 Electrical & Power Engineering	 Safety & Industrial Hygiene
 Electronics & Semiconductors	 Sustainable Energy & Development
 Environment & Environmental Engineering	 Textiles
 Food Science	 Transportation Engineering
 General Engineering & Engineering Management	

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On the Subject Area page displayed, click on the appropriate topic (highlighted in blue below) to display the title list (see below). Some titles have interactive tables, equations and graphs and are identified accordingly. For example, the title *Paint & Ink Formulations Database* below has an icon () identifying it as having interactive tables.

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► Recent Searches

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Browse


Browse by Subject >> Adhesives, Coatings, Sealants & Inks >> Coatings


Adhesives, Coatings, Sealants & Inks

Adhesives & Sealants **Coatings** Inks

Coatings

All Titles Titles with Interactive Tools

- Coating Materials for Electronic Applications - Polymers, Processes, Reliability, Testing
- Electrodeposition - The Materials Science of Coatings and Substrates
- Electroless Plating - Fundamentals and Applications
- Failure Analysis of Paints and Coatings
- Fluorinated Coatings and Finishes Handbook -The Definitive User's Guide and Databook
- Foundations of Vacuum Coating Technology
- Handbook of Environmental Degradation of Materials
- Handbook of Paint Raw Materials (2nd Edition)
- Handbook of Plasma Processing Technology - Fundamentals, Etching, Deposition, and Surface Interactions
- Handbook of Polymer Coatings for Electronics - Chemistry, Technology and Applications (2nd Edition)
- Manual on Maintenance Coatings for Nuclear Power Plants: (MNL 8)
- Military Handbook - MIL-HDBK-1110: Handbook for Paints and Protective Coatings for Facilities
- Paint & Ink Formulations Database 

Then click on the desired title to display its Table of Contents (see below). Click on the small Plus and Minus icons to expand and collapse it, respectively. Then click on the links in the Content Results column to display the content. This column may have links to text, tables and graphs identified by different icons, e.g.,  **Text** for text files in PDF format. To see the content, you need to be logged in and have the right permission. For more information on browsing Knovel, go to the Help Guide (http://www.knovel.com/html/themes/knovel_mktg/pdf/Knovel_Help%20Guide.pdf).



Electrodeposition - The Materials Science of Coatings and Substrates

Search Within

By: Dini, J.W. © 1993 William Andrew Publishing/Noyes

Description: Electrodeposition allows the "tailoring" of surface properties of a bulk material or, in the case of electroforming, the entire part.















Title Details

Citation

Sections

- Front Matter
- Preface
- Table of Contents
- 1. Introduction
- 2. Hydrogen Embrittlement
- 3. Adhesion
 - Introduction
- Testing
 - A. Conical Head Tensile Test
 - B. Ring Shear Test
 - C. Flyer Plate Tests
 - D. Peel Test
- Comparing Adhesion Test Results
- Techniques for Obtaining Good Adhesion
- References

Content Results

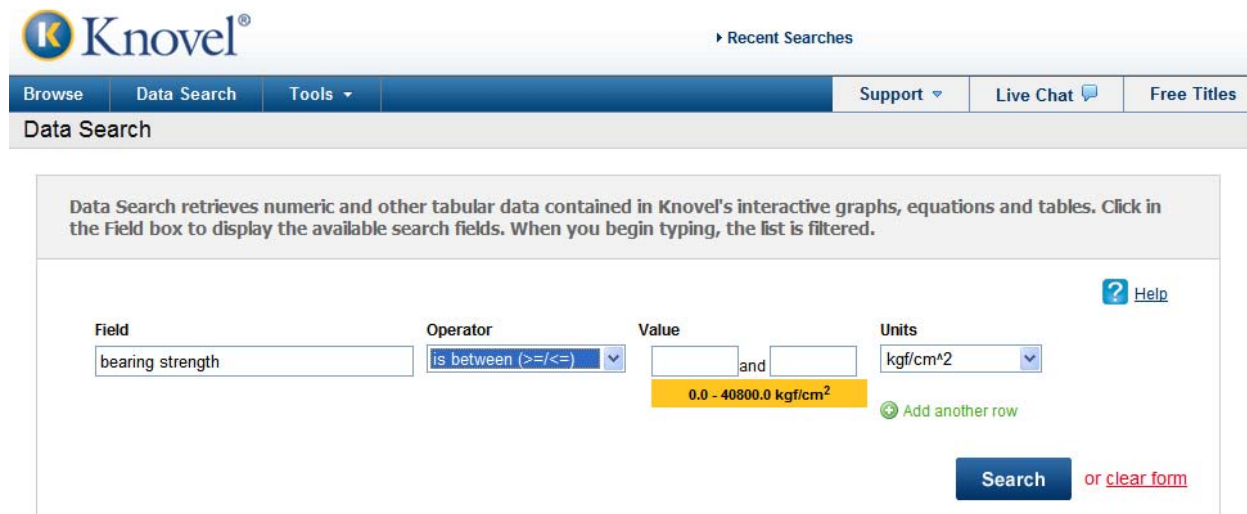
-  Text
-  Text
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-  Text

2. To search using Basic Search, type one or more keywords in the search box located in the top portion of every page and click the Search button:

You can search the entire site, your subscription only, or within an individual title. You do not need to be logged in to search.

Keywords separated by spaces will be found on the same page of text within about 10 words. If you enclose the keywords in quotation marks, they'll be found next to each other. Keywords connected by the Boolean AND will be found anywhere on the same page of text. You can truncate keywords by using asterisk (*) to find plural and other forms of the same word. A keyword autocomplete feature is available for your convenience. Recent searches are saved and can be re-run by clicking on the Recent Searches link.

To search using Data Search, click on the Data Search link on the main toolbar. Click in the Field box to display the list of available search fields and key the field name to find it quickly using the Look up. Some field are textual but most are numeric. The latter have several range Operators, e.g., "in between". Select an appropriate operator, numeric values and the unit and click the Search button. You can specify up to 3 search criteria using the Booleans AND, OR and NOT.



The screenshot shows the Knovel Data Search interface. At the top is the Knovel logo and a 'Recent Searches' link. Below is a navigation bar with 'Browse', 'Data Search' (selected), 'Tools', 'Support', 'Live Chat', and 'Free Titles'. The main section is titled 'Data Search' and contains a descriptive text box: 'Data Search retrieves numeric and other tabular data contained in Knovel's interactive graphs, equations and tables. Click in the Field box to display the available search fields. When you begin typing, the list is filtered.' Below this is a search form with four columns: 'Field', 'Operator', 'Value', and 'Units'. The 'Field' column has a text box containing 'bearing strength'. The 'Operator' column has a dropdown menu showing 'is between (>=<=)'. The 'Value' column has two text boxes, one containing '0.0' and the other '40800.0', with a yellow highlight under the range '0.0 - 40800.0 kgf/cm²'. The 'Units' column has a dropdown menu showing 'kgf/cm²'. To the right of the form is a 'Help' link. At the bottom right is a 'Search' button and a link to 'clear form'.

Field	Operator	Value	Units
bearing strength	is between (>=<=)	0.0 and 40800.0	kgf/cm²

0.0 - 40800.0 kgf/cm²

Add another row

Search or clear form

Titles retrieved as a result of search are displayed in the order of relevancy. Click on the title name to browse retrieved sections as it is described above:

You are not logged

Options ▾ Search ▶ Recent Searches

Browse
Data Search
Tools ▾
Support ▾
Live Chat
Free Titles

COLLAPSE ALL
Number of Titles Retrieved: 521 Page: 1 of 18

You searched for (tensile strength and steel*)

Titles: Relevancy

2007 ASME Boiler & Pressure Vessel Code, Section II - Materials (Includes Addenda for 2008 and 2009) ★ NEW

Sections	Relevancy	Content Type
Table Y-1: Yield Strength Values S_y for Ferrous and Nonferrous Materials (Customary)	100 %	Table (209)
Table Y-1: Yield Strength Values S_y for Ferrous and Nonferrous Materials (Metric)	100 %	Table (209)
Table 1A: Maximum Allowable Stress Values S for Ferrous Materials (Customary)	100 %	Table (206) Text
Table 1A: Maximum Allowable Stress Values S for Ferrous Materials (Metric)	100 %	Table (206) Text
Table U: Tensile Strength Values S_u for Ferrous and Nonferrous Materials (Customary)	93 %	Table (188) Text

[Show more results](#)

2007 ASME Boiler & Pressure Vessel Code, Section II - Materials (Includes Addenda for 2008) ★

Sections	Relevancy	Content Type
Table Y-1: Yield Strength Values S_y for Ferrous and Nonferrous Materials (Customary)	100 %	Table (209)
Table Y-1: Yield Strength Values S_y for Ferrous and Nonferrous Materials (Metric)	100 %	Table (209)
Table 1A: Maximum Allowable Stress Values S for Ferrous Materials (Customary)	99 %	Table (206)
Table 1A: Maximum Allowable Stress Values S for Ferrous Materials (Metric)	99 %	Table (206)
Table U: Tensile Strength Values S_u for Ferrous and Nonferrous Materials (Customary)	90 %	Table (188)

[Show more results](#)

2007 ASME Boiler and Pressure Vessel Code, Section II - Materials ★


100 %

Matched (hit) keywords and tabular data are highlighted in the retrieved titles. Each retrieved section will automatically open on the first page with hit keywords or data. You can switch to browsing in each title by clicking the link Table of Contents.

To learn more about Basic and Data Search go to the Help Guide

(http://www.knovel.com/html/themes/knovel_mktg/pdf/Knovel_Help%20Guide.pdf) and/or view tutorial available from the Support menu on the main toolbar.

3. Knovel has a number of interactive tools including Tables, Equation Plotter, Graph Plotter and Graph Digitizer. You can learn about these in the Help Guide. Here we briefly describe the use of the most common tool - Interactive Tables.



Typical Properties of phenolics - (Metric Units)

Table: Typical Properties of phenolics - (Metric Units)
Table Type: Interactive Table
Search Query: (*compressive yield strength* EXISTS)
Total Number of Search Hits: 303
Total Number of Rows: 363
Number of Hidden Columns: 9

Pages: << < 1 2 3 4 > >>
Jump to: 1 of 7
Display: Data Found | [All Data](#)

no.	material name / M...	supplier	processing method	density (g/cm ³)	linear mold shrink...	Charpy impact, n...	compressive yiel...	flexural modulus ...	flexural strength ...	hardness, Rock..
1	Overview - Phen...			1.31-1.44			164-277	6.3-15.7	102-183	
2	Overview - Phen...			1.32-1.39			75.2-91	8.07-11.7	123-139	
3	Overview - Phen...			1.37-1.45	0.004-0.006		159-207	4.8-11	69-86	93 (E); 120 (h
4	Overview - Phen...			1.36-1.71	0.003-0.013		186-221	9-9.7	69-83	
5	Overview - Phen...			1.36-1.45	0.0025-0.005	0.68	138-169	8.3-11	69-128	76-86 (E); 98-
6	Overview - Phen...			1.38-1.45	0.003-0.0085	0.2-0.4	139.3-213	6.19-7.72	60.6-83.2	63-92 (E)
7	Overview - Phen...			1.76-1.77	0.0011-0.0029	0.3-0.38	214.4-244	12.69-14.63	132.5-144.5	96-99 (E)
8	Overview - Phen...			1.33	0.0035		120	3.1	55	60 (M)

Plastic Material Data Sheets
2004 MatWeb - Division of Automation Creation, Inc.

Interactive Tables have the following features:

Select Rows – to select a row, click on the row and then on the Select Rows button. You can select several rows at once and then add and delete these or clear the selections by clicking the Back to Table button.

Filter Data – to filter data, click on the Filter Data button, select a field from a dropdown menu, select Match criteria and enter a value. Then click Filter.

Print Table – to print table, click the Print Table button and click Print. You can print no more than 50 rows at one time.

Export Table – to export table in several available format (Excel being most popular), click the Export Table button, go skip first dialog (unless you want to export rows as text), select output format and click Export. Then, for Excel, click on the Open or Save button on the File Download dialog.

Sort – to sort, click on the column header and then on the down arrow button to display a menu. Select A to Z (Ascending) or Z to A (Descending) sort. Sort is alphabetic, numeric or alphanumeric depending on the field.

Hide/Unhide Column – From the same menu as Sort, display Columns submenu and check or uncheck columns to unhide or hide them, respectively.

Column Width – Can be changed by grabbing (press left mouse key), dragging and dropping vertical line separating the columns.

Column Position - Can be changed by grabbing (press left mouse key), dragging and dropping column header.

In addition to these main features, there are a number of additional features available, e.g., *Unit Converter* and *View Table Notes*. To learn more about Interactive Tools go to the Help Guide

(http://www.knovel.com/html/themes/knovel_mktg/pdf/Knovel_Help%20Guide.pdf) and/or view tutorial available from the Support menu on the main toolbar.

Knovel Solutions:

K1-1

- (a) We know that kg/m^3 is a unit of density. On Knovel under the Tools menu, open the Unit Converter. Scroll the Property dropdown to find density and enter the input value and units. Then click convert:

Knovel Unit Converter

Property: density, concentration (mass based) ▼

Input Value

7750

Output Value

483.82

Significant digit

5 ▼

Convert from

kg/m^3 ▼

>

Convert to

lb/ft^3 ▼

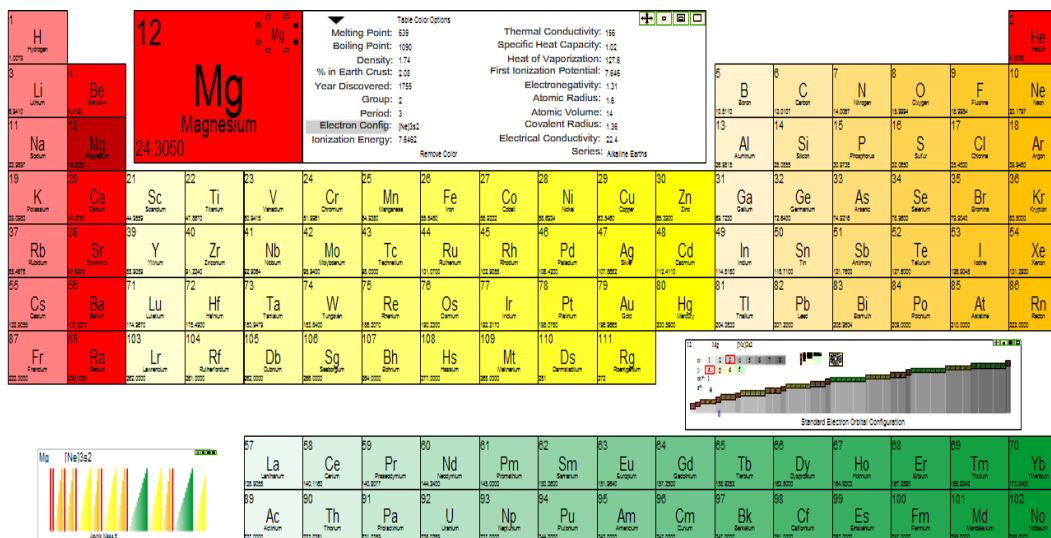
CONVERT

COPY

HELP

$$7750 \text{ kg/m}^3 = 483.82 \text{ lb/ft}^3$$

(b) The symbol for magnesium is Mg. Use the Periodic Table tool on Knovel. Place the cursor over Mg:

















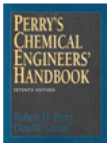





Atomic mass of Mg = 24.3050 g/mol

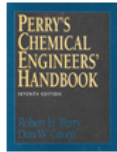
- (c) Search for *Perry's Chemical Engineers' Handbook* on Knovel. The 7th edition of *Perry's* is the second search result. Click on the title and then on the Table of Contents link to display the book's Table of Contents:

You searched for (perrys chemical engineers handbook)

Titles:

		Relevancy	
 Perry's Chemical Engineers' Handbook (8th Edition)   		100 %	
	Search Within	Relevancy	Content Type
	Table 13-9 Variables for an Equilibrium Stage	100 %	 Text
	13.11.4 Approximate Calculation Procedures for Binary Mixtures	67 %	 Text
	13.4.2 McCabe-Thiele Method	67 %	 Text
	13.11.5 Shortcut Methods for Multicomponent Batch Rectification	34 %	 Text
	13.11.6 Calculation Methods and Simulation	34 %	 Text
Show more results			

 Perry's Chemical Engineers' Handbook (7th Edition)   		100 %	
	Search Within	Relevancy	Content Type
	Front Matter	100 %	 Text
	Approximate Multicomponent Distillation Methods	50 %	 Text
	Nomenclature and Units	50 %	 Text
	Properties of Materials	50 %	 Text
	Shortcut Methods for Multicomponent Batch Rectification	50 %	 Text



Perry's Chemical Engineers' Handbook (7th Edition)

Search Within

Edited by: Perry, R.H.; Green, D.W. © 1997 McGraw-Hill

Description: This new seventh edition of the world-famous classic provides you with unrivaled, state-of-the art coverage of all aspects of chemical engineering, from the fundamentals to details on computer applications and control. Definitive reference for chemical and process engineers.

Title Details

Citation

Table of Contents

Filter By



Content Results

- Front Matter
- Table of Contents
- Interactive Graphs
- Preface to the Seventh Edition
- ▣ 1. Conversion Factors and Mathematical Symbols
- ▣ 2. Physical and Chemical Data
- ▣ 3. Mathematics
- ▣ 4. Thermodynamics
- ▣ 5. Heat and Mass Transfer

Text

Text

Table (54)

Text

Text

Text

Text

Text

Text

(d) Here we can search for “chemistry.”

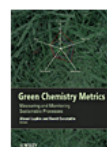
You searched for (chemistry)

Titles:

Relevancy

Green Chemistry Metrics - Measuring and Monitoring Sustainable Processes

100 %



Search Within	Relevancy	Content Type
E. Safer Chemistry Design Tools	100 %	Text
2.3 Existing Motivators for Implementing Green Chemistry	93 %	Text
References	61 %	Text
3.3.3.2 Eco-Innovation Compass	29 %	Text
1. Introduction	25 %	Text

[Show more results](#)

Chemistry and Technology of Polyols for Polyurethanes

100 %



Search Within	Relevancy	Content Type
6.2 The Chemistry of the Graft Polyether Polyol Synthesis	100 %	Text
8.1 Chemistry of Polyester Polyol Synthesis	100 %	Text
15.1 Mannich Polyols	42 %	Text
4.1.2.2 Kinetics of PO and EO Anionic Polymerisation (Propagation Reaction)	35 %	Text
References	28 %	Text

[Show more results](#)

Handbook of Weather, Climate, and Water - Atmospheric Chemistry, Hydrology, and Societal Impacts

100 %

Atmospheric Chemistry and Physics - From Air Pollution to Climate Change (2nd Edition)

100 %

Kent and Riegel's Handbook of Industrial Chemistry and Biotechnology, Volumes 1 & 2 (11th Edition)

100 %

Cheese - Chemistry, Physics and Microbiology (3rd Edition)

100 %

Comprehensive Organometallic Chemistry III, Volumes 1 - 13

100 %

Chemistry of Silica - Solubility, Polymerization, Colloid and Surface Properties and Biochemistry

100 %

Heterocyclic Chemistry (4th Edition)

100 %

Lange's Handbook of Chemistry (16th Edition)

100 %

In the search results, we find a book with an interactive table icon next to the name called

Lange's Handbook of Chemistry

This book has information on many different subject areas within chemistry and has a wide variety of interactive tables.



K1-2

- (a) Search on Knovel for “ammonium nitrate” to get information on this chemical. The *Handbook of Inorganic Chemicals* in the search results likely has data on ammonium nitrate.

You searched for ("ammonium nitrate")


Titles:

Relevancy



 **Sax's Dangerous Properties of Industrial Materials (11th Edition) Volumes 1-3**  

100 %



Search Within	Relevancy	Content Type
Silver Ammonium Nitrate (SDL500)	100 %	 Text
Triethyl Ammonium Nitrate (TJO100)	100 %	 Text
Dangerous Properties of Industrial Materials	16 %	 Table (4)
Dynamite (DYG000)	8 %	 Text
Explosives, High (ERF000)	8 %	 Text

[Show more results](#)



 **HazMat Data - For First Response, Transportation, Storage, and Security (2nd Edition)** 

99 %





Search Within	Relevancy	Content Type
Ammonium Nitrate	100 %	 Text
Urea, Ammonium Nitrate Solution (in aqueous ammonia)	100 %	 Text
Interactive Table	20 %	 Table (5)
Guide to Compatibility of Chemicals	8 %	 Text
Reactivity Groups	8 %	 Text

[Show more results](#)

 **Hawley's Condensed Chemical Dictionary (14th Edition)** 

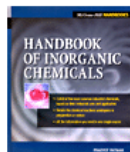
99 %

 **Handbook of Inorganic Chemicals** 

99 %

Click on the first text link to read about the uses of ammonium nitrate and its physical properties:

You searched for ("ammonium nitrate")



Handbook of Inorganic Chemicals

Search Within

By: Patnaik, Pradyot © 2003 McGraw-Hill

Description: This handbook is an invaluable resource for chemists, chemical engineers, laboratory technicians, and environmental engineers. Covering over 2000 of the most popular industrial chemicals, it details the chemical reactions the subject chemicals undergo either in preparation or naturally - all presented in a dynamic, easy-to-understand style.

[Table of Contents](#)

Title Details

Citation

Sections	Relevancy	Content Results
Ammonium Nitrate	100 %	 Text
Ceric Ammonium Nitrate	93 %	 Text
CAS Registry Number Index	8 %	 Text

AMMONIUM NITRATE

[6484-52-2]

Formula: NH_4NO_3 ; MW 80.043

Uses

The ammonium salt produced or consumed in largest amounts is ammonium nitrate. It is used widely as a fertilizer, and is the leading nitrogen fertilizer in the world. An advantage of this compound over other ammonium fertilizers is that it provides both nitrate and ammonia to soil without changing the pH. Also, it is used as a mixed fertilizer with other compounds, such as calcium phosphate, or calcium carbonate. It also is used as an explosive for

Physical Properties

White crystalline solid; occurs in five different crystallographic modifications as follows:

- (i) tetragonal form below -18°C
- (ii) rhombic form between -18 to 32.1°C
- (iii) rhombic form between 32.1 to 84.2°C
- (iv) tetragonal form between 84.2 to 125.2°C
- (v) cubic form between 125.2 to 169.6°C ;

density 1.725 g/m^3 at 20°C ; highly hygroscopic; the finely divided powder cakes to a hard mass on storage; melts at 169.6°C ; extremely soluble in water; its solubility in 100 g water is as follows:

0°C	118 g
20°C	150 g
40°C	297 g
60°C	410 g
80°C	576 g

Dissolution is endothermic, solution becomes cold (and hence its application in freezing bath); elevates the boiling point of water by 1° , 7.5° , 28.5° and 70°C at 10, 40, 80 and 95% (w/w) concentrations, respectively; vapor pressure of saturated solution, 11.2 torr at 20°C .

Thermochemical Properties

$\Delta H^{\circ}f$ (solid)	-87.37 kcal/mol
$\Delta H^{\circ}f$ (aq)	-81.23 kcal/mol
$\Delta G^{\circ}f$ (solid)	-43.98 kcal/mol
$\Delta G^{\circ}f$ (aq)	-45.58 kcal/mol
S° (solid)	$36.11\text{ cal/degree mol}$
S° (aq)	$62.10\text{ cal/degree mol}$
C_p (solid)	$33.3\text{ cal/degree mol}$

- (b) In the basic search box, type 'sphere volume formula' and in the search results, click on *Machinery's Handbook (28th Edition) & Guide to Machinery's Handbook*. Next, click on the text link for *Formulas and Their Rearrangement*. The formula for the volume V of a sphere is


$$V = \frac{4}{3} \pi r^3$$

where r is the sphere radius. For the volume of a cylinder, type in 'cylinder volume formula' and in the search results, click on *Standard Handbook of Biomedical Engineering and Design*. Next, click on the text link to open *Device Components*. The volume of a cylinder is

$$V = \pi r^2 h$$

where r is the cylinder radius and h is the cylinder height.

- (c) Use the Knovel Data Search. Key in the Field box 'boil' and select 'boiling point,' operator: 'is between (\geq / \leq),' values: '300' and '400,' units: 'K':

 [Browse](#) [Recent Searches](#)

Graphs Equations Tables (G.E.T.) Search

G.E.T. (Graphs Equations Tables) Search retrieves numeric and other tabular data contained in Knovel's interactive graphs, equations and tables. Click in the Field box to display the available search fields. When you begin typing, the list is filtered.






Field	Operator	Value	Units
boiling point	is between (\geq / \leq)	300 and 400	K

-86.0 - 6270.0 K

[Add another row](#)

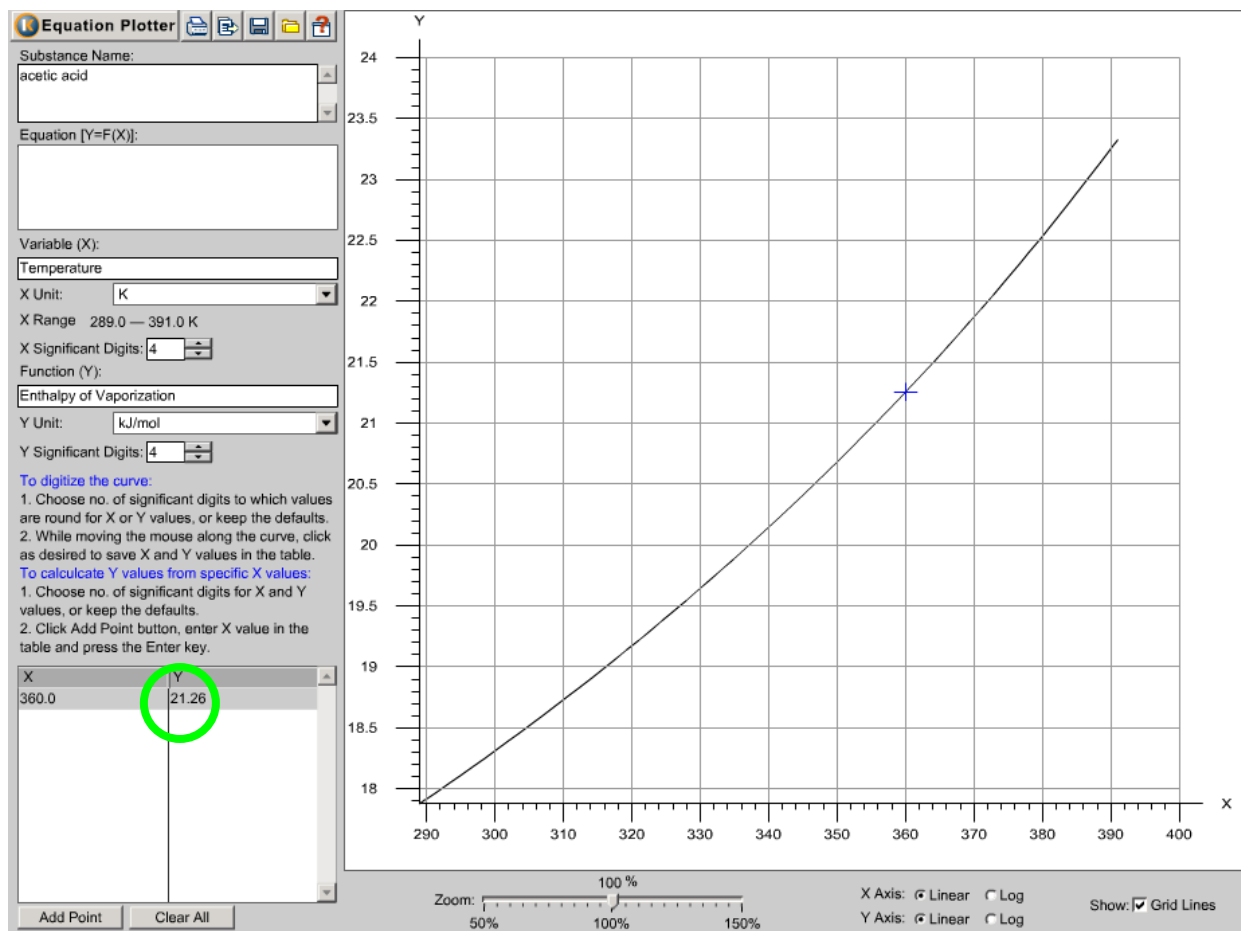
[Search](#) or [clear form](#)

In *Knovel Critical Tables (2nd Edition)*, click on the table *Basic Physical Properties of Chemical Compounds*. Five compounds listed with a boiling point between 300 and 400K are

Basic Physical Properties of Chemical Compounds								
Select Rows Filter Data Print Table Export Table View Table Notes Unit Converter Help								
no.	material or substance name	synonyms	mol. formula	structure	CAS Registry No.	mol. weight	density (g/cm ³)	boiling point (°C)
2	abscisic acid	view synonyms	C ₁₅ H ₂₀ O ₄		21293-29-8	264.32		120
10	acetaldehyde ammonia	view synonyms	C ₂ H ₇ NO		75-39-8	61.08		109.9
11	acetaldehyde diethyl acetal	view synonyms	C ₈ H ₁₄ O ₂		105-57-7	118.19	0.831	99.8–102.7
12	acetaldehyde dimethyl acetal	view synonyms	C ₆ H ₁₀ O ₂		534-15-6	90.12	0.85	61.3–64.8
13	acetaldehyde, ethylenedehydrazone				592-56-3	84.12		95.85
14	acetaldehyde oxime; (cis+trans)	view synonyms	C ₂ H ₅ NO		107-29-9	59.07	0.968	114–115.1

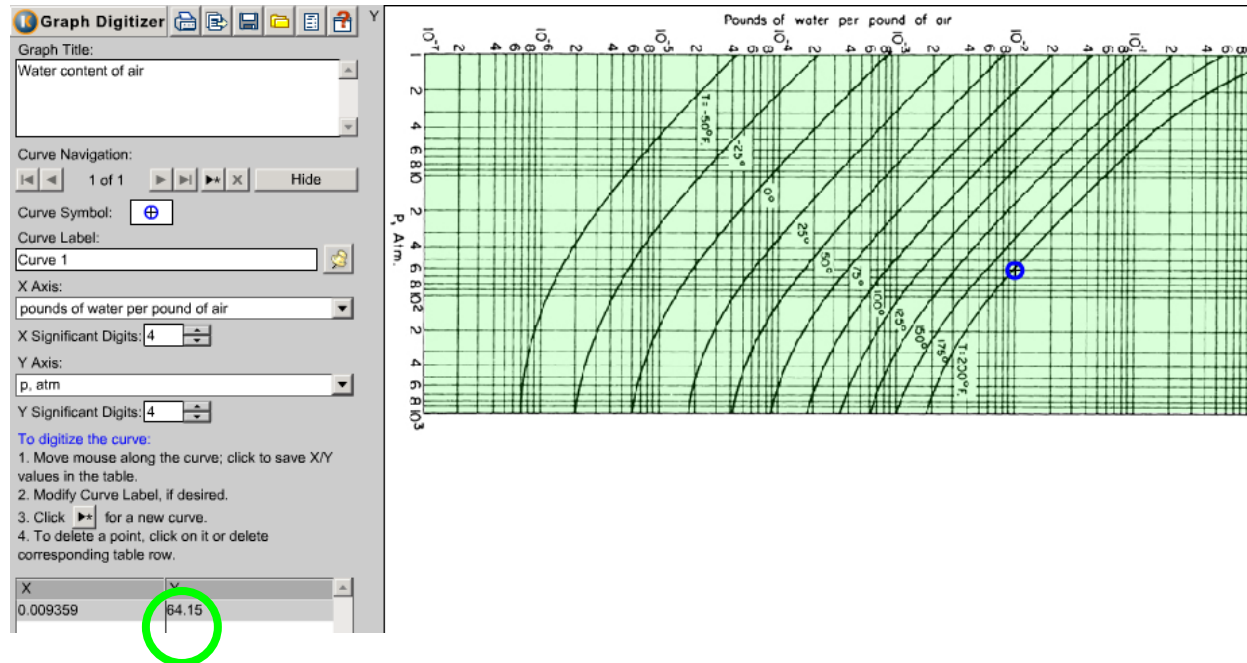
K1-3

- (a) Type 'enthalpy of vaporization and acetic acid' into the basic search, and click on *Knovel Critical Tables (2nd Edition)*. Click on the Table link next to *Enthalpy of Vaporization* in the search results. Find acetic acid in the table and open the Equation Plotter. Plot the point for the enthalpy of vaporization of acetic acid at 360 K:



21.26 kJ/mol

- (b) Search 'water content in air' on Knovel. Click on the title *Perry's Chemical Engineers' Handbook (8th Edition)*. Click on the table *Interactive Graphs* and then on the Graph Digitizer for "water content of air". Plot a point for a temperature of 200°F and a water content of 10^{-2} lb water/lb air. The pressure is 64.15 atm.



- (c) Use the Knovel Data Search. Key in the Field box ‘melt’ and select ‘melting point,’ operator: ‘greater than or equal to (\geq),’ value: ‘325,’ units: ‘°C.’

G.E.T. (Graphs Equations Tables) Search retrieves numeric and other tabular data contained in Knovel's interactive graphs, equations and tables. Click in the Field box to display the available search fields. When you begin typing, the list is filtered.

Field	Operator	Value	Units
melting point	greater than or equal to (\geq)	325	°C
-309.0 - 8800.0 °C			



[Add another row](#)

[Search](#) or [clear form](#)

Information is available in the title *Plastic Material Data Sheets*. A few families of polymers are listed in the search results: polyamides, liquid crystal polymers, and fluoropolymers.

You searched for (*melting point* \geq 325 °C)

Titles:

 **Plastic Material Data Sheets** 

Relevancy

100 %








Search Within

Relevancy

Content Type

Typical Properties of nylons (polyamides, PA) - (Metric Units)
 Typical Properties of nylons (polyamides, PA) - (US Customary Units)
 Typical Properties of liquid crystal polymers (LCP) - (Metric Units)
 Typical Properties of liquid crystal polymers (LCP) - (US Customary Units)
 Typical Properties of fluoropolymers - (Metric Units)

100 %  [Table](#) (28)
 100 %  [Table](#) (28)
 97 %  [Table](#) (27)
 97 %  [Table](#) (27)
 86 %  [Table](#) (24)

[Show more results](#)

Click on the Table link for *Typical Properties of liquid crystal polymers (LCP) – (Metric Units)* to display the data for a few LCP polymers with melting points $>325^{\circ}\text{C}$:

no.	material name / MDS	density (g/cm ³)	linear mold shrin...	Charpy impact, ...	flexural modulus ...	flexural strength...	Izod impact, not...	tensi
25	DuPont Zenite® 6115L BK LCP, Lubricated 15%	1.5			9.65	142	2.67	
26	DuPont Zenite® 6115L WT LCP, Lubricated 15%	1.56			9.65	142	2.67	
27	DuPont Zenite® 6130 BK LCP, 30% Glass Reinf...	1.63	-0.0007; 0.005 (...)		11	158	1.25	
28	DuPont Zenite® 6130 WT LCP, 30% Glass Reinf...	1.68	-0.0007; 0.005 (...)		11	158	1.25	
29	DuPont Zenite® 6130(L) BK LCP, Lubricated 30%	1.63	-0.0007; 0.005 (...)		11	158	1.25	
30	DuPont Zenite® 6130(L) WT LCP, Lubricated 30%	1.68	-0.0007; 0.005 (...)		11	158	1.25	
31	DuPont Zenite® 6140 WT010 LCP, 40% Glass	1.77			15.2	177	0.85	
32	DuPont Zenite® 6330 BK LCP, 30% Mineral	1.64	0; 0.005 (TD)		9.6	125	1.6	
33	DuPont Zenite® 6330 NC LCP, 30% Mineral	1.63	0; 0.005 (TD)		9.6	125	1.6	
34	DuPont Zenite® 6330(L) BK LCP, Lubricated 30%	1.64	0; 0.005 (TD)		13.9	158	1.6	