

# User Guide

Fast reliable insights accelerating  
materials science research

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## Your Quick Guide to SpringerMaterials

SpringerMaterials, one of the world's largest curated databases in materials science, takes center stage in scientific research. With an extensive collection of over 290,000 materials and 3,000+ physical and chemical properties, this comprehensive platform emerges as an indispensable asset for researchers in materials science, physics, chemistry, engineering, and beyond.

Whether you are an academic, a professional, an undergraduate or a researcher at every level, SpringerMaterials offers a wealth of curated data and advanced functionalities to propel your research to new heights.

This Quick Start Guide will demonstrate how property data can be identified quickly, how data can be used (e.g. download, manipulate, compare) in subsequent workflows and how data sets and diagrams are appropriately cited.

NB: This guide does not provide a complete overview of all functionalities, materials classes, and property information within the SpringerMaterials platform. For more information on how to use the platform, please contact your local SpringerMaterials product manager (see Contacts page). Access

SpringerMaterials can be accessed via [materials.springer.com](https://materials.springer.com)

The platform works on all major devices, desktops, and mobile devices. For smaller devices, e.g. iPhone or similar, some functionalities might be unavailable due to screen resolution and/or screen size. All major browsers are supported.

Users will need a valid license for SpringerMaterials, otherwise access to most of the content will be blocked.



### Tips for searching on SpringerMaterials

The best results will be achieved by

- Using a stepwise approach
- Searching for combinations of material(s) and properties

For example, if you are searching for a given materials-property combination (e.g. heat capacity of polyethylene), start your journey by searching for the material first (polyethylene) and subsequently refine by property (heat capacity). This approach allows you to better understand what the platform is doing and also avoids confusion in case the platform is unable to precisely interpret your query. All use cases below follow this guided principle.

SpringerMaterials is a smart technology, and will give you a preview of the content loaded behind each result retrieved. For example, when searching for the vapor pressure (property) of toluene (material), your first result indicates (in grey text) that it is from our SpringerMaterials Interactive module, and will be an interactive graph (per the icon to the right). This preview allows you to quickly scan the list of results to find exactly the format of data you need, and prevents you from wasting time clicking through unwanted results. It's that easy!

SpringerMaterials Interactive

**Vapor pressure of toluene and its mixtures**

Custom results provided from a range of data sources, including the Landolt-Börnstein series, providing information on vapor pressure of toluene and mixtures of toluene

Interactive

Page 1 of 1



### More Tips & Tricks

To request a special Tips & Tricks webinar, please contact your local SpringerMaterials product manager.

# Example Searches

## How to run a basic material & property search

**Example:** Find the *Young's Modulus* (=property) of *ZnO* (=material)

- 1) Go to [materials.springer.com](https://materials.springer.com)
- 2) Enter "*ZnO*" in the search box. This will generate a list covering ZnO, at the time of writing 779 results.

The screenshot shows the Springer Materials search interface. The search bar contains 'ZnO'. Below the search bar, there are navigation links for 'Elements search', 'Corrosion search', and 'Explore new MaterialsHub Beta'. The main content area displays '779 results for Substance: zno' and suggests searching with the phrase 'ZnO'. The results are categorized into 'Properties' and 'Data collections'. The 'Properties' section includes a search box and a list of property types such as 'absorbance', 'absorption coefficient', 'absorption line', 'absorption spectrum', 'acceptor energy', 'activation energy of resistivity', 'adsorption', 'angular frequency', 'atomic defect properties', and 'atomic environment'. The 'Data collections' section includes 'Corrosion' (1), 'Inorganic Solid Phases' (616), 'Landolt-Börnstein' (158), 'SpringerMaterials Interactive' (2), and 'Substance Profiles' (2). The search results list includes 'zinc oxide', 'zinc dioxide', 'Properties of zinc oxide', 'Nuclear Magnetic Resonance (NMR) Data for O-17 of Zn<sub>0.8</sub>Co<sub>0.2</sub>O', and 'ZnO hp thermal expansion'.

- 3) To refine results type '*Young*' into the Properties list and select Young's modulus. This will generate a single result which can be clicked to open.

This will show an overview of the content with a brief description and bibliographic information.

The screenshot shows the Springer Materials search interface with the search bar containing 'young'. The 'Properties' section is expanded, and 'Young's modulus' is selected. The 'Data collections' section is also visible, showing the same list of categories as in the previous screenshot.

Springer Materials

e.g. GaAs, benzene, Cd-Te, band gap

Elements search Corrosion search Explore new MaterialsHub <sup>Beta</sup>

Sneak a peek at the new battery materials data collection.


Landolt-Börnstein - Group III Condensed Matter

## ZnO: Young's modulus

**Abstract**

This document is part of Subvolume F 'New Data and Updates for several Semiconductors with Chalcopyrite Structure, for several II-VI Compounds and diluted magnetic IV-VI Compounds' of Volume 44 'Semiconductors' of Landolt-Börnstein - Group III 'Condensed Matter'.

[Download Chapter \(pdf\)](#)



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4) Click to **download chapter** or **view PDF**

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### Cite this content

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U. Rössler (ed.)  
SpringerMaterials

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Landolt-Börnstein - Group III Condensed Matter 44F  
(New Data and Updates for several Semiconductors with Chalcopyrite Structure, for several II-VI Compounds and diluted magnetic IV-VI Compounds)  
[https://materials.springer.com/lb/docs/sm\\_lbs\\_978-3-642-28531-8\\_83](https://materials.springer.com/lb/docs/sm_lbs_978-3-642-28531-8_83)

10.1007/978-3-642-28531-8\_83 (Springer-Verlag Berlin Heidelberg © 2013)  
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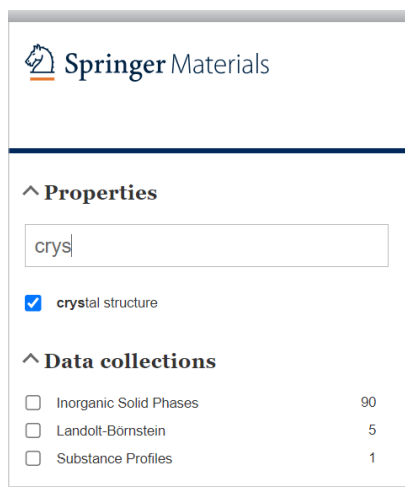
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## How to find a crystal structure & customize a 3D image

**Example:** Find the *crystal structure* (= property) of *BaZrO<sub>3</sub>* (= material), download a CIF file of the crystallographic data and customize a 3D image.

- 1) Go to [materials.springer.com](https://materials.springer.com)
- 2) Enter "*BaZrO<sub>3</sub>*" in the search box. This will generate a list covering BaZrO<sub>3</sub>, at the time of writing 96 results.
- 3) To refine results start to type '*crystal structure*' into the Properties list and select the same. This will generate 71 results. Click on the first to open.

This will show an overview of the compound and general information about the data set.



Springer Materials

^ **Properties**

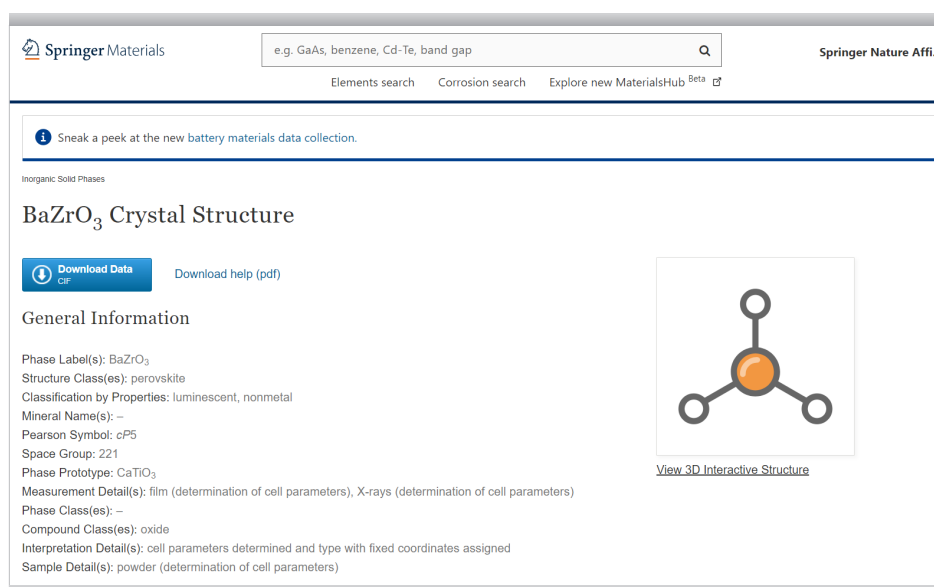
crys

crystal structure

^ **Data collections**

<input type="checkbox"/> Inorganic Solid Phases	90
<input type="checkbox"/> Landolt-Börnstein	5
<input type="checkbox"/> Substance Profiles	1

- 4) For computational applications of crystal structure data, a convenient way to download CIF files is available in the upper left corner. Click Download Data CIF. For troubleshooting purposes, a PDF is available to the right of the download button explaining the data structure of a CIF file.



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e.g. GaAs, benzene, Cd-Te, band gap

Springer Nature Affi...

Elements search Corrosion search Explore new MaterialsHub Beta

Sneak a peek at the new battery materials data collection.

Inorganic Solid Phases

### BaZrO<sub>3</sub> Crystal Structure

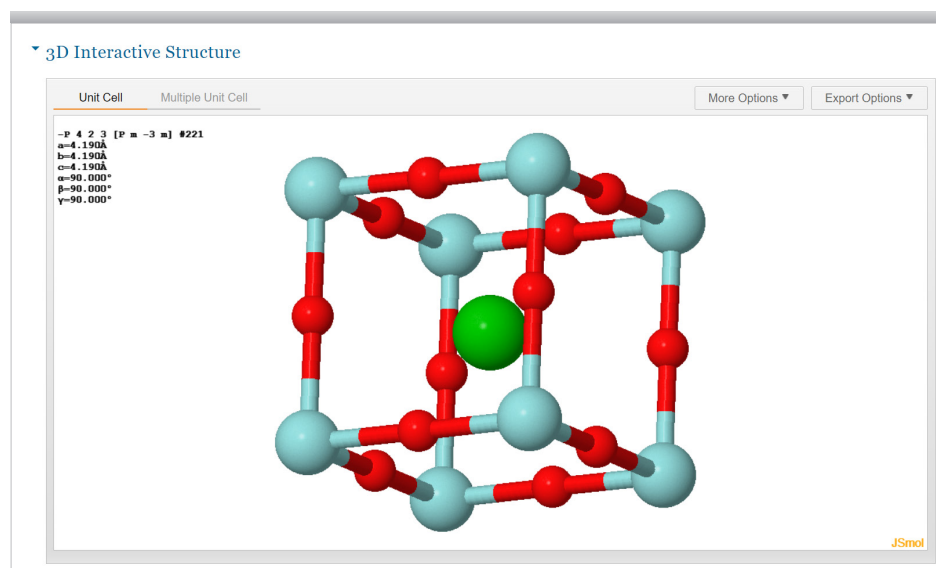
[Download Data CIF](#) [Download help \(pdf\)](#)

**General Information**

Phase Label(s): BaZrO<sub>3</sub>  
 Structure Class(es): perovskite  
 Classification by Properties: luminescent, nonmetal  
 Mineral Name(s): –  
 Pearson Symbol: *cP5*  
 Space Group: 221  
 Phase Prototype: CaTiO<sub>3</sub>  
 Measurement Detail(s): film (determination of cell parameters), X-rays (determination of cell parameters)  
 Phase Class(es): –  
 Compound Class(es): oxide  
 Interpretation Detail(s): cell parameters determined and type with fixed coordinates assigned  
 Sample Detail(s): powder (determination of cell parameters)

[View 3D Interactive Structure](#)

- 5) To view the interactive crystal structure, click '*View 3D Interactive Structure*'. Moving the cursor on the structure and scrolling allows you to zoom in and zoom out. Left click and hold, while moving your cursor allows you to rotate the structure. You can also toggle between Unit Cell and Multiple Unit Cell view.



- 6) Click **More Options** to select distance measurement or angle measurement.
- 7) Click **Export Options** to download a PNG or JPG file.
- 8) To correctly cite this document, scroll down to the bottom of the page and click the **'Download this citation'** button. This will copy the citation using common data formats like .BIB, .RIS or .EndNote.

### Cite this content

Pierre Villars (Chief Editor), PAULING FILE in: Inorganic Solid Phases, SpringerMaterials (online database), Springer, Heidelberg (ed.) SpringerMaterials

#### BaZrO<sub>3</sub> Crystal Structure

[https://materials.springer.com/isp/crystallographic/docs/sd\\_0304982](https://materials.springer.com/isp/crystallographic/docs/sd_0304982)

sd\_0304982 (Springer-Verlag GmbH, Heidelberg, © 2023)

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## How to use the Search by Elements feature & how to find a phase diagram

**Example:** Find a phase diagram, vertical section at 50 at.% Au (= property) of the ternary system Ag-Au-Cu (= material), customize the phase diagram, and find the phase diagram evaluation report.

- 1) Go to [materials.springer.com](https://materials.springer.com)

Springer Materials

e.g. GaAs, benzene, Cd-Te, band gap

Elements search Corrosion search Explore new MaterialsHub Beta

### Search by Elements

Select the component elements in the periodic table below, then choose the desired system from the panel on the right.

**Your Selection**  
Ag-Au-Cu

57 Matching element systems

- Ag-Au-Cu (127)
- Ag-As-Au-Cu (1)
- Ag-Au-Cu (1)
- Ag-Au-Cu-Fe (1)
- Ag-Au-Cu-Hg (1)
- Ag-Au-Cu-In (1)
- Ag-Au-Cu-Ir (1)
- Ag-Au-Cu-Ni (1)
- Ag-Au-Cu-O (1)
- Ag-Au-Cu-Pb (1)
- Ag-Au-Cu-Pd (4)
- Ag-Au-Cu-Pt (1)
- Ag-Au-Cu-S (1)
- Ag-Au-Cu-Si (2)
- Ag-Au-Cu-Sn (1)
- Ag-Au-Cu-Yb (1)
- Ag-Au-Cu-Zn (2)
- Ag-Al-Au-Cu-O (1)

Reset

- 2) Select *Search by Elements*

- 3) Select all elements which your system contains: "Ag", "Au" and "Cu". To the right of the table, a list of matching element systems will auto-populate with "Ag-Au-Cu" at the top. The number in brackets (127) shows the number of documents available for this element system.

**Properties**

phase

- phase diagram
- phase equilibrium
- phase stability
- phase transition

**Data collections**

- Inorganic Solid Phases 82
- Landolt-Börnstein 4
- MSI Eureka 41

- 4) Click on *Ag-Au-Cu* to see the list of documents.

- 5) To refine these results, select "**phase diagram**" from the Properties list on the left-hand side. To do this, you can scroll through the list or type "**phase diagram**" under the Properties box.
- 6) After refining by property, you end up with 109 results. Look at the headlines of the result list. The 3rd result is the phase diagram of choice, Vertical section at 50 at.% Au. Click to open.
- 7) Hovering your mouse over the phase diagram allows you to easily identify the composition and temperature at any given point on the diagram. Left mouse click on the

## Vertical section at 50 at.% Au [85Kog]

Figure 7 from evaluation report:

[Ag-Au-Cu Ternary Phase Diagram Evaluation](#)

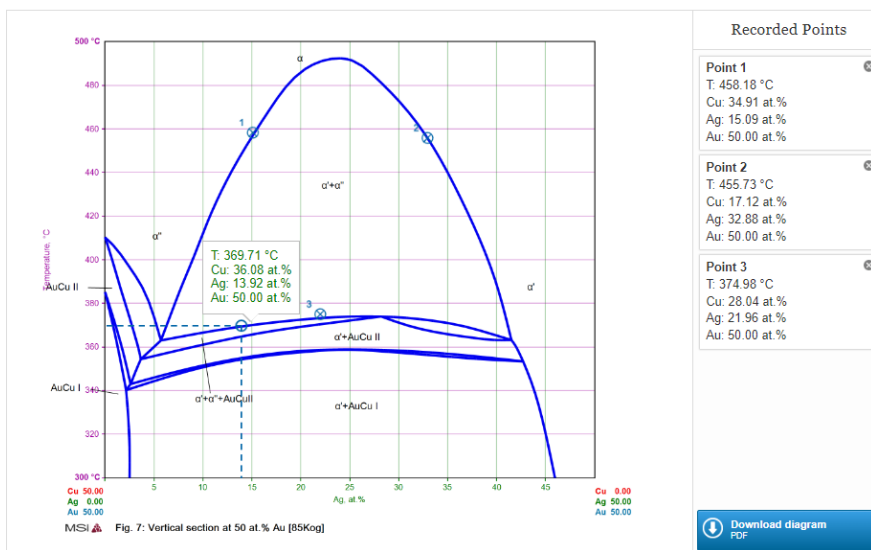


diagram to drop and record points of interest. All points are collected in the panel on the right-hand side. Download diagram allows you to store the customized diagram including the recorded points.

- 8) To access the evaluation report (from which the diagram has been taken), click on the link [Ag-Au-Cu Ternary Phase Diagram Evaluation](#) located at the top of the phase diagram.

### Cite this content

Alan Prince, updated by Ping Liang and MSIT© (1995)  
Effenberg, G. (Ed.)  
MSI Eureka in SpringerMaterials

**Vertical section at 50 at.% Au [85Kog]**  
Figure 7 from Ag-Au-Cu Ternary Phase Diagram Evaluation  
[https://materials.springer.com/msi/phase-diagram/docs/sm\\_msi\\_r\\_10\\_010255\\_01\\_full\\_LnkDia5](https://materials.springer.com/msi/phase-diagram/docs/sm_msi_r_10_010255_01_full_LnkDia5)

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## How to search for & compare semiconductors using SpringerMaterials Interactive

**Example:** Find the Hall Mobility (= property) of InN (= material #1) and compare it with GaN (= material #2)

- 1) Go to [materials.springer.com](https://materials.springer.com)
- 2) Enter "*InN*" in the search box. This will generate a list covering InN, at the time of writing 131 results.
- 3) To refine the results scroll or start to type '*Hall mobility*' into the Properties list and select the same. This will generate a single result, click to open.
- 4) This will provide an overview of the available content with a brief description of the data range. Click View to access the data for Indium Nitride (InN)

The screenshot shows the SpringerMaterials website interface. At the top, there is a search bar with the text "e.g. GaAs, benzene, Cd-Te, band gap" and a search icon. Below the search bar are links for "Elements search", "Corrosion search", and "Explore new MaterialsHub Beta". The main content area displays the search results for "Hall Mobility of Indium Nitride". It shows "1 Result(s)" and a table with two columns: "Semiconductor" and "Number of data points". The table contains one row for "Indium Nitride" with 13 data points. A "View" link is visible next to the data point count.

Semiconductor	Number of data points
Indium Nitride	13

- 5) Now, you see a diagram containing 13 data points for this material/property combination depending on the temperature. Clicking on any one of the data points in the diagram provides the exact numbers for this given data point, shown in the grey boxes below the graph.
- 6) Below the diagram, is a data table showing the same data in tabular form. Click on Tabular data to expand the tab and view the data in tabular form.
- 7) To compare the data sets of InN and GaN (or any other material), simply type "*GaN*" in the Compare substance search box above the diagram. Adding GaN to the system will automatically populate the associated theoretical and experimental data to the graph and Tabulated data section. \*Note, there is a limit to three material comparisons per graph as too much data will, at times, make the graph unreadable.



8) To correctly cite this document, scroll down to the bottom of the page and click the 'Download this citation' button. This will copy the citation using common data formats like .BIB, .RIS or .EndNote.

## How to find & compare adsorption isotherms using

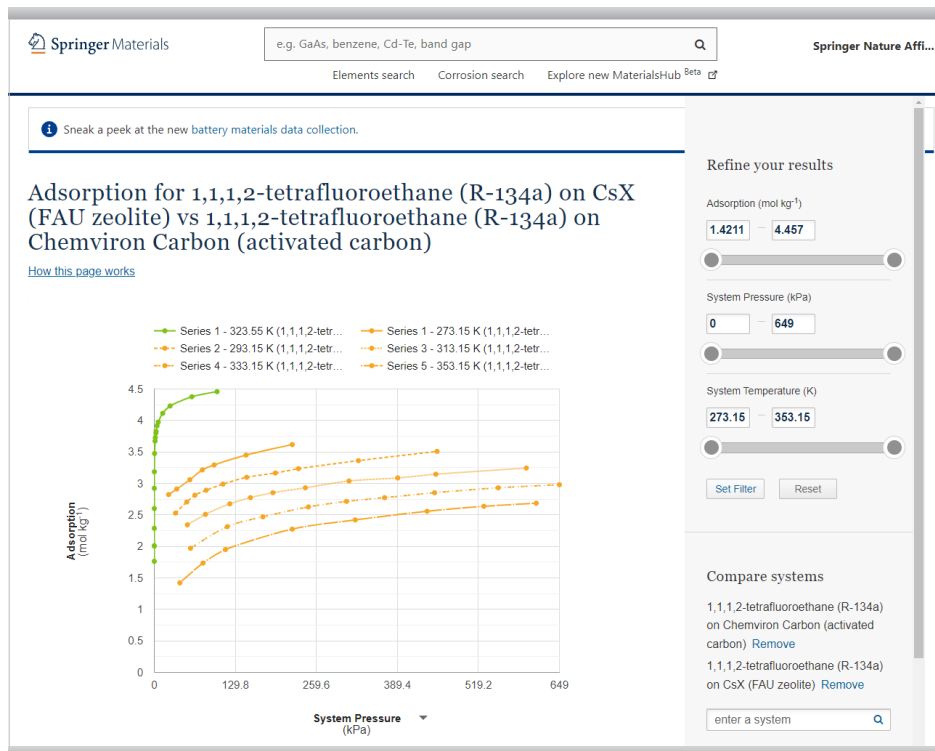
**Example:** Find the adsorption isotherm for 1,1,1,2-tetrafluoroethane (R-134a) on CsX (FAU zeolite) (=material #1) and compare with the adsorption isotherm of 1,1,1,2-tetrafluoroethane (R-134a) on Chemviron Carbon (activated carbon) (= material #2)

- 1) Go to [materials.springer.com](https://materials.springer.com)
- 2) Enter "**Tetrafluoroethane**" in the search box. This will generate a list covering Tetrafluoroethane, no matter which property you are looking for, at the time of writing 51 results.
- 3) To refine these results, select "**adsorption**" from the Properties list on the left-hand side. To do this, you can scroll through the list or type "**adsorption**" under the Properties box. This will produce a single result.
- 4) Click to open to see an overview of the available content with a brief description of the data range.
- 5) Select the second result from the table. Click **View** to access the data for CsX (FAU zeolite) Adsorbent, this opens an image that shows the adsorption isotherm of 1,1,1,2-tetrafluoroethane on CsX.

The screenshot shows the Springer Materials website interface. At the top, there is a search bar with the text "e.g. GaAs, benzene, Cd-Te, band gap" and a search icon. Below the search bar are links for "Elements search", "Corrosion search", and "Explore new MaterialsHub Beta". A notification banner reads "Sneak a peek at the new battery materials data collection." Below this, a section titled "Adsorption for 1,1,1,2-tetrafluoro-ethane on available adsorbents" displays "12 Result(s)". A table lists the results:

Adsorbate	Adsorbent	Number of isotherms	Minimum value	Maximum value	
1,1,1,2-tetrafluoroethane (R-134a)	Chemviron Carbon (activated carbon)	5	1.4211 mol kg <sup>-1</sup>	3.6166 mol kg <sup>-1</sup>	<a href="#">View</a>
1,1,1,2-tetrafluoroethane (R-134a)	CsX (FAU zeolite)	1	1.763 mol kg <sup>-1</sup>	4.457 mol kg <sup>-1</sup>	<a href="#">View</a>
1,1,1,2-tetrafluoroethane (R-134a)	CsY (FAU zeolite)	2	0.128 mol kg <sup>-1</sup>	5.04 mol kg <sup>-1</sup>	<a href="#">View</a>
1,1,1,2-tetrafluoroethane (R-134a)	Fluka Carbon (activated carbon)	5	1.1957 mol kg <sup>-1</sup>	5.7238 mol kg <sup>-1</sup>	<a href="#">View</a>

- 6) The final graph shows both sets of isotherms. Clicking on any one of the data points in the diagram opens a pop-up window providing the exact numbers for this given data point.
- 7) Below the diagram, is a data table showing the same data in tabular form.
- 8) For each data point in the table, the original reference is provided. Clicking on the Reference and Compilation names provides details.
- 9) The panel on the right-hand side of the interactive graph allows for manipulation of data. Refining adsorption, system pressure and/or temperature automatically adjusts the graphical representation of data as well as the data table.



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## How to run a basic corrosion search

**Example:** to the beginning of the sentence. Find the Corrosion Rate/Rating of 303 Stainless Steel (= material) in Seawater (= property)

- 1) Go to [materials.springer.com](https://materials.springer.com)

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e.g. GaAs, benzene, Cd-Te, band gap

Springer Nature Affiliates

Elements search **Corrosion search** Explore new MaterialsHub Beta

Sneak a peek at the new battery materials data collection.

Browse by collection

- Landolt-Bornstein
- Inorganic Solid Phases

**The research solution for identifying material properties**  
Fast and reliable insights accelerating materials science research

SpringerMaterials provides curated data and advanced functionalities to support research in materials science, physics, chemistry, engineering, and other related fields.

- 2) Select '*Corrosion search*' at the top of the page.
- 3) Type in "*303 Stainless steel*" for material and "*Seawater*" for environment and hit enter.  
Note: as you start typing your search the material and environments will appear below and can be chosen to add to the search.

### Corrosion Search

Find out a corrosion rate and its relevant details by entering a material and/or environment into the search box below.

material: 303 stainless steel x Seawater

seawater (Seawater) as an environment

727 results

- 4) This generates a list of all corrosion data available for this material and environment under various conditions.

### Corrosion Search

Find out a corrosion rate and its relevant details by entering a material and/or environment into the search box below.

material: 303 stainless steel x environment: Seawater x Enter material and/or environment

2 results

Material	Environment	Rating	Show all details
303 stainless steel	Seawater	C (Questionable) 0.5 - 1.25 mm/year	More details
303 stainless steel	Seawater	A (Resistant) ≤ 0.125 mm/year	More details

Download this table (CSV format, UTF-8 encoded)

1 of 1

5) Click on "**More details**" for more details about experimental conditions

Material	Environment	Rating	Hide all details
303 stainless steel	Seawater	C (Questionable) 0.5 - 1.25 mm/year	
<b>Condition:</b>	<b>Temperature:</b> Boiling	<b>Duration:</b>	
		<b>Localised attack:</b> pitting	
<b>UNS No:</b> S30300	<b>Reference:</b> Chemical Resistance of REMANIT Stainless Steels, Thyssen Edeltstahlwerke AG, March 1989		<a href="#">^ Less details</a>
303 stainless steel	Seawater	A (Resistant) ≤ 0.125 mm/year	
<b>Condition:</b>	<b>Temperature:</b> 20 °C	<b>Duration:</b>	
		<b>Localised attack:</b> pitting	
<b>UNS No:</b> S30300	<b>Reference:</b> Chemical Resistance of REMANIT Stainless Steels, Thyssen Edeltstahlwerke AG, March 1989		<a href="#">^ Less details</a>

Download this table (CSV format, UTF-8 encoded) 1 of 1

## Questions

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If you have questions related to product performance, please reach out to the SpringerMaterials product team:

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