

STATE LIBRARY
OF QUEENSLAND

Year 9 Chemical Sciences

Cover: Selection of databases available through State Library, 2023.

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Date prepared: 23 November 2023

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This research guide is designed for individual use by students.

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Overview

As Queensland's leading research library, State Library is a great place to find information to complete your research-based assessments.

State Library's One Search catalogue is the gateway to an extensive suite of national and international journals, databases, eBooks, encyclopedias, newspaper archives, and collections of thousands of historical images, letters, artworks, diaries, and artefacts to interrogate as sources.

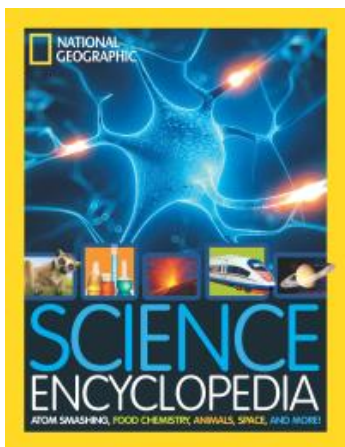
Before you get started

[Become a member](#) of State Library of Queensland (it's free!).

Once you have joined State Library, [log in](#) to your account in One Search so you can use the links in this research guide to access the featured collection items.

You can search our [OneSearch catalogue](#) or begin exploring by clicking on some of the featured items contained in this research guide.

E-Books



The Atomic Model

Explain how the model of the atom changed following the discovery of electrons, protons and neutrons and describe how natural radioactive decay results in stable atoms.

- Comparing the mass and charge of protons, neutrons and electrons.
- Examining how the discovery of electrons, protons and neutrons resulted from experimental evidence and answered questions related to properties and behaviours of atoms .
- Explaining that differences in the number of neutrons in atoms of the same element results in isotopes and that naturally occurring isotopes of some elements are unstable.
- Describing in simple terms how different unstable isotopes decay such as radon-222 releasing an alpha particle, iodine-131 releasing a beta particle and cobalt-60 releasing gamma radiation to form stable atoms.
- Defining half-life, examining the timescales of decay of different elements such as carbon-14 and uranium-238 and simulating or using digital simulations to examine radioactive decay including half-life.
- Investigating how radiocarbon and other dating methods have been used to establish that First Peoples of Australia have been present on the Australian continent for more than 60,000 years.
- Identifying where applications of radioactivity are used in medicine and industry such as diagnosing and treating cancer and checking for faults in materials used in aircraft and spacecraft.
- Discussing how mass and energy are connected at all scales and energy conversion processes within atomic nuclei.

[CHEMnetBASE](#) provides a comprehensive database of chemicals and their uses, as well as chemical equations and properties.

The screenshot shows the CHEMnetBASE website. At the top, the logo reads "CHEMnetBASE Chemical Databases Online". Below the logo are navigation links: "Search by Structure" and "Browse Chemicals". The main section is titled "Chemical Text Search" and features a search bar with the placeholder text "Search Terms". Below the search bar is a "Search" button. A note below the search bar states: "Search by Name, Synonym, Molecular Formula, CAS Registry Number, InChI, InChI Key and/or SMILES". Below the search section is a section titled "Explore CHEMnetBASE" with the subtitle "A collection of Cutting-Edge Interactive Databases and Dictionaries". This section contains a row of nine small thumbnail images representing various chemical databases.

[Queensland Museum](#) provide Learning Resources website students with many activities, fact sheets, images, and videos.

The screenshot shows the Queensland Museum Learning Resources website. The header includes the "QUEENSLAND MUSEUM NETWORK" logo and the text "Learning Resources". On the right side of the header are links for "Home", "About", and a "Save List" button. Below the header, it says "Showing 15 of 41 resources". There are three resource cards displayed. The first card is titled "Problematic Polymers: Teacher Resource" and is for "Years: 5, 6, 7, 8, 9, 10". The second card is titled "Plastic Planet: Community of Inquiry" and is for "Years: 5, 6, 7, 8, 9". The third card is titled "Water Matters: Online Teacher PD" and is for "Years: 6, 7, 8, 9". Below the title of the third card are the topics: "Aboriginal and Torres Strait Islander Culture" and "Chemistry".

[Oxford Reference](#) spans 25 different subject areas, bringing together 2 million digitised entries across Oxford University Press's dictionaries, companions, and encyclopedias.

The screenshot shows the Oxford Reference search results page. At the top, the 'Oxford Reference' logo is on the left, and a search bar is on the right. Below the logo, there are navigation tabs for 'Subject' and 'Reference Type'. The page title is 'Oxford Reference Search Results'. On the left, there is a sidebar with 'Signed in as: State Library of Queensland' and a 'Narrow Your Choices' section with 'REFINE TERMS' and a 'Term' dropdown set to 'All'. The main content area shows 'You are looking at 1-20 of 244 entries for: All: The atomic model x Science and technology x'. Below this, there are filters for '244 ENTRIES' and '2 BOOKS', and a 'View' section with 'Items per page: 20' and 'Sort by: Relevance'. The first result is for 'Hantaro Nagaoka', with a reference type of 'Overview Page' and a subject of 'Science and technology'. A small image of a blue and yellow atom model is shown next to the text: '(1865–1950) Japanese physicist Nagaoka was born in Nagasaki, Japan, and educated at Tokyo University. After graduating in 1887 he worked with a visiting British physicist, C. G. Knott, on mathematics'.

The [Britannica Library](#) has articles, images and more, with a selection of resources especially for teenagers.

The screenshot shows the Britannica Library search results page for 'atomic model (physics)'. At the top, there are navigation tabs for 'Articles', 'Images', 'Videos', and 'More'. The main heading is 'atomic model (physics)'. Below this, there is a brief definition: 'atomic model | in physics, a model used to describe the structure and makeup of an atom. Atomic models have gone through many changes over time, evolving ...'. The page lists 'atom (matter)' as the top 3 results, with 4 more results in 'ATOM'. The first result is 'Atomic model', followed by 'Models of atomic structure' and 'Rutherford's nuclear model'. The 'Rutherford's nuclear model' result includes a snippet: 'It was then that I had the idea of an atom with a minute massive centre carrying a charge. Many physicists distrusted the Rutherford atomic model because it was ...'. At the bottom, there is a section for 'images related to this search:' with a 'See all images >' link. Four image thumbnails are shown: a blue and white abstract image, a black and white image of a person, a red and white atom model, and a blue and white atom model.

[JSTOR](#) provides access to more than 12 million scholarly journal articles and eBooks, and is especially good for primary sources.

The screenshot shows the JSTOR search results page for the query "Atomic Model". The page displays 111,622 results. On the left, there is a "Refine Results" sidebar with filters for "ACCESS TYPE" (Everything, Content I can access), "SEARCH WITHIN RESULTS", and "CONTENT TYPE" (Academic content: Journals, Book Chapters, Research Reports; Primary source content: Serials, Documents). The main results area shows two journal articles:

- Niels Bohr's Second Atomic Theory** by Helge Kragh, *Historical Studies in the Physical Sciences*, Vol. 10 (1979), pp. 123-186. Abstract: "...theory of matter, especially the **atomic** theory. From 1897, when J. J. Thomson proposed a connection between **atomic** structure and the periodic system, representations of the periodic system in terms of **atomic** models became important tests for new **atomic** theories. Niels Bohr's **atomic** theory of 1921 was the first..."
- The Bohr Atom, Models, and Realism** by R. J. G. Hughes, *Philosophical Topics*, Vol. 18, No. 2, Philosophy of Science (Fall 1990), pp. 71-84. Abstract: "...South Carolina Premise 1. Scientific theories provide models of the processes and entities of nature. Premise 2. To have a **model**, whether of a physical process like the propagation of light or of an entity like an atom, is not to have a literally true account of the process or..."

Each result includes a "Download" button and "Save" and "Cite" options.

[Gale Interactive: Science](#) provides a comprehensive view of the most-studied science subjects. Authoritative, high-quality digital content is paired with interactive 3D models.

The screenshot shows the Gale Interactive: Science search results page. The left sidebar is titled "FILTER BY CATEGORY" and lists various science subjects with their respective result counts:

- Biology (91)
 - Cells (13)
 - Botany (14)
 - Ecosystems (4)
 - Microbiology (23)
 - Paleontology (8)
 - Zoology (31)
- Chemistry (74)
 - Atoms (18)
 - Chemical Equations (10)
 - Chemical Reactions (15)
 - Molecules and Compounds (12)
 - Periodic Table (19)
- Earth Science (23)
 - Astronomy (12)
 - Geology (11)
- Common Core State Standards (213)
- Next Generation Science Standards (164)
- Human Anatomy (35)
 - Circulatory System (5)

The main results area is titled "22 SEARCH RESULTS" and displays five interactive 3D models:

- Atomic Radius**: Explore the atomic radii of different elements and groups of elements across the periodic table. An atom's radius is a rough measure of its size. Atoms NGSS-HS-PS1-1 CCSS.ELA-Literacy.RST.9-10.2 CCSS.ELA-Literacy.RST.9-10.5
- Atomic Structure**: Use the Atom Builder to learn about atomic structure. View an atom's protons, neutrons, and electrons. Atoms NGSS-HS-PS1-1 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.RST.9-10.5
- Atomic Number**: Use the Atom Builder to learn about atomic numbers. Select elements across the periodic table to explore how atomic numbers change. Atoms NGSS-HS-PS1-1 CCSS.ELA-Literacy.RST.9-10.2 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.RST.9-10.5
- Atomic Nucleus**: Use the Atom Builder to view the structure of an atom's nucleus. Learn about the particles contained within an atom's nucleus. Atoms NGSS-HS-PS1-1 CCSS.ELA-Literacy.RST.9-10.2 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.RST.9-10.5 NGSS-HS-PS1-8
- Relative Atomic Mass**: Use the Atom Builder to explore relative atomic mass, which is the average total mass of all particles in one atom of an element, expressed in atomic mass units. Atoms NGSS-HS-PS1-1 CCSS.ELA-Literacy.RST.9-10.4 CCSS.ELA-Literacy.RST.9-10.5

[ProQuest Central](#) brings together 47 databases across 175 subject areas, providing easy intuitive access to an incredibly broad and comprehensive range of content.

The screenshot shows the ProQuest Central interface. At the top, it says "ProQuest Central" and "Access provided by STATE LIBRARY OF QUEENSLAND". The search term "Atomic Model" is entered in the search bar. Below the search bar, it displays "47,949 results". On the left side, there are filters for "Applied filters" (physics, materials science, students, chemistry), "Sorted by" (Relevance), "Limit to" (Full text, Peer reviewed), and "Source type" (Scholarly Journals, Books, Audio & Video Works, Dissertations & Theses, Newspapers). The main results area shows three items:

- Progress on Brussels-Skyrme atomic mass models on a grid: stiff neutron matter equation of state**
Grams, G; Ryssens, W; Scamps, G; Goriely, S; Chamel, N. *Journal of Physics: Conference Series; Bristol* Vol. 2586, Iss. 1, (Sep 20: ...atomic mass models. In comparison with our previous models, BSkg3 improves...
Abstract/Details Full text - PDF (421 KB)
- Real-Time Atomic Scale Kinetics of a Dynamic Event in a Model Ionic Crystal**
Kalita, Pat; Specht, Paul E; Brown, Justin L; Pacheco, Lena M; Usher, Josh M; et al. *Minerals; Basel* Vol. 13, Iss. 9, (2023): 1226.
...their kinetics directly at the atomic scale [1,2]. Shock compression is the...
...and how to model them remains a key unanswered question. When a material is...
...atomic scale. Our work aims to fill this gap with direct atomic-scale in situ...
Abstract/Details Full text Full text - PDF (2 MB) 19 References
- Textbook myths about early atomic models**
Renström, Reidun; Nils-Erik Bomark. *arXiv.org; Ithaca*, Oct 21, 2022.
...the early atomic models that led up to the work of Niels Bohr. We experience her...
...discovers that the description of the famous atomic model by Thomson, is a mere...

[ProQuest Ebook Central](#) Compiles a library of topic specific ebooks for you to access free through your SLQ membership.

The screenshot shows the ProQuest Ebook Central interface. At the top, it says "ProQuest Ebook Central™". The search term "Atomic Model" is entered in the search bar. Below the search bar, it displays "2688 book results". On the left side, there are filters for "Refine your search" (Sort by: Relevance, Results per page: 10), "BOOK STATUS" (Owned and subscribed to by my library, Unlimited Print, Copy, & Download, Course Reserve), "YEAR PUBLISHED" (2024: 1, 2023: 10, 2022: 34), and "SUBJECT" (science / general: 983, science / physics / general: 923, science / chemistry / general: 905, political science / international relations / general: 1576, political science / general: 1554). On the right side, there are "APPLIED FILTERS" (BISAC science / physics / general, BISAC science / general, BISAC science) and "Book Results" (Chapter Results). The main results area shows two items:

- The Discovery of the Periodic Table of the Chemical Elements Short Journey from the Beginnings until Today**
Schmiermund, Torsten
Springer Vieweg, in Springer Fachmedien Wiesbaden GmbH 2022
ISBN: 9783658364472, 9783658364489
SERIES: Essentials Series
EDITION: 1
150 years ago, in 1869, D. I. Mendeleev and L. Meyer independently published th on the arrangement of the chemical elements in a periodic system. The United N and UNESCO therefore declared 2019 the "International Year of the Periodic Tab question arises, what is so special abo...
Available
- Adhesion Aspects in MEMS/NEMS**
Kim, Seong H.; Dugger, Michael T. and more
Taylor & Francis Group 2011
ISBN: 9789004190948, 9789004190955

The Law of Conservation of Mass

Model the rearrangement of atoms in chemical reactions using a range of representations, including word and simple balanced chemical equations, and use these to demonstrate the law of conservation of mass.

- Identifying reactants and products in chemical reactions.
- Using models and representations to show the rearrangement of atoms in chemical reactions.
- Investigating chemical reactions in closed and open systems and relating data obtained to the law of conservation of mass.
- Writing symbolic equations that are easy to balance and explaining, using the law of conservation of mass, and atoms, the rationale for balancing chemical equations.
- Investigating why most elements are not found in their elemental state and processes which are used to obtain the element.
- Predicting how ideas of green chemistry such as minimising the amount of unusable waste products, energy use and using more environmentally friendly chemical processes will affect the environment.

[CHEMnetBASE](#) provides a comprehensive database of chemicals and their uses, as well as chemical equations and properties.

The screenshot shows the CHEMnetBASE website. At the top, the logo 'CHEMnetBASE' is displayed with the tagline 'Chemical Databases Online'. Below the logo, there are navigation links: '| Search by Structure | Browse Chemicals |'. The main section features a 'Chemical Text Search' box with a search input field and a 'Search' button. Below the search box, it says 'Search Terms' and 'Search by Name, Synonym, Molecular Formula, CAS Registry Number, InChI, InChI Key and/or SMILES'. Underneath the search section, there is a section titled 'Explore CHEMnetBASE' with the subtitle 'A collection of Cutting-Edge Interactive Databases and Dictionaries'. This section contains a row of nine small thumbnail images representing various chemical databases and resources.

[Queensland Museum](#) provide Learning Resources website students with many activities, fact sheets, images, and videos.

The screenshot shows the Queensland Museum Learning Resources website. At the top left, the logo 'QUEENSLAND MUSEUM NETWORK' is visible, followed by the title 'Learning Resources'. On the top right, there are navigation links: 'Home', 'About', and 'Save List'. Below the header, it says 'Showing 15 of 41 resources'. The main content area displays three resource cards. The first card is titled 'Problematic Polymers: Teacher Resource' and is for 'Years: 5, 6, 7, 8, 9, 10'. The second card is titled 'Plastic Planet: Community of Inquiry' and is for 'Years: 5, 6, 7, 8, 9'. The third card is titled 'Water Matters: Online Teacher PD' and is for 'Years: 6, 7, 8, 9'. Below the third card, it lists 'Aboriginal and Torres Strait Islander Culture' and 'Chemistry'.

[Oxford Reference](#) spans 25 different subject areas, bringing together 2 million digitised entries across Oxford University Press's dictionaries, companions, and encyclopedias.

The screenshot shows the Oxford Reference search results page. At the top, the 'Oxford Reference' logo is on the left, and a search bar is on the right. Below the logo, there are navigation tabs for 'Subject' and 'Reference Type', and links for 'My Content (0)' and 'My Searches (4)'. The main heading is 'Oxford Reference Search Results'. On the left, there is a sidebar with 'Signed in as: State Library of Queensland' and a 'Narrow Your Choices' section. The main content area shows 'You are looking at 1-20 of 126 entries for: All: Law of Conservation of Mass x Science and technology x'. Below this, there are filters for '126 ENTRIES' and '1 BOOKS', and a 'View' section with 'Items per page: 20' and 'Sort by: Relevance'. The first result is for 'Julius Robert Mayer', with a reference type of 'Overview Page' and a subject of 'Science and technology'. The description reads: '(1814–1878) German physician and physicist. Mayer, the son of an apothecary from Heilbronn in'.

The [Britannica Library](#) has articles, images and more, with a selection of resources especially for teenagers.

The screenshot shows the Britannica Library search results page. At the top, there are navigation tabs for 'Articles', 'Images', 'Videos', and 'More'. The main heading is 'chemical bonding (chemistry)'. Below this, there are three articles listed: 'The law of conservation of mass', 'The law of multiple proportions', and 'The law of definite proportions'. Each article has a brief description. Below the articles, there is a section for 'conservation of mass (physics)' with a brief description. At the bottom, there is a section for 'images related to this search:' with four image thumbnails: a diagram of a chemical experiment, a portrait of a man, a video player, and a historical photograph of a group of people.

[JSTOR](#) provides access to more than 12 million scholarly journal articles and eBooks, and is especially good for primary sources.

The screenshot shows the JSTOR search results page for the query "Law of conservation of Mass". The page displays 1,297 results. On the left, there is a "Refine Results" sidebar with filters for "ACCESS TYPE" (Everything, Content I can access), "SEARCH WITHIN RESULTS", and "CONTENT TYPE" (Academic content: Journals (1,295), Book Chapters (2)). The main results area shows two journal articles. The first article is "Newton's Concept of Motive Force" by Brian D. Ellis, published in *Journal of the History of Ideas*, Vol. 23, No. 2 (Apr. - Jun., 1962), pp. 273-278. The second article is "How Do Science and Technology Affect International Affairs?" by Charles Weiss, published in *Minerva*, Vol. 53, No. 4 (2015), pp. 411-430. Each article has buttons for "Download", "Save", and "Cite".

[Gale Interactive: Science](#) provides a comprehensive view of the most-studied science subjects. Authoritative, high-quality digital content is paired with interactive 3D models.

The screenshot shows the Gale Interactive Science search results page for the query "Conservation of Mass". The page displays 8 search results. On the left, there is a "CATEGORY" sidebar with various science topics and their counts, such as "Biology (51)", "Chemistry (74)", and "Physics (11)". The main results area shows several interactive 3D models related to the Law of Conservation of Mass, including "Law of Conservation of Mass: Ammonia", "Law of Conservation of Mass: Copper and Silver Nitrate", "Law of Conservation of Mass: Hydrochloric Acid and Sodium Hydroxide", "Law of Conservation of Mass: Calcium Carbonate", "Relative Atomic Mass", "Mass Number", and "Mars". Each result includes a brief description and relevant standards.

[ProQuest Central](#) brings together 47 databases across 175 subject areas, providing easy intuitive access to an incredibly broad and comprehensive range of content.

The screenshot shows the ProQuest Central interface. At the top, it says 'ProQuest Central' and 'Access provided by STATE LIBRARY OF QUEENSLAND'. The search term 'Law of Conservation of Mass' is entered in the search bar. Below the search bar, it displays '15,492 results'. On the left side, there are filters for 'Applied filters' (physics OR materials science OR students OR chemistry), 'Sorted by' (Relevance), and 'Limit to' (Full text, Peer reviewed). Under 'Source type', there are options for Scholarly Journals (5,965), Books (4), Audio & Video Works (1), Dissertations & Theses (1,383), and Newspapers (457). The main results area shows three items:

- CHEMISTRY GAMES: VOLUME 2: Stoichiometry and the Law of Conservation of Mass**
Kirkus Reviews; Austin (May 1, 2017).
...students about stoichiometry and the law of conservation of mass. It also...
...the periodic table. Once again, each board is made up of colored squares...
...which list the elements that each player needs to collect to balance a series of...
- History Of Chemistry As A Part Of Assessment Of Students' Understanding Of The Law Of Conservation Of Mass**
Milanovic, V D; Trivic, D D. *Journal of Baltic Science Education*; Siauliai Vol. 16, Iss. 5, (2017): 780-796.
...and difficulties in understanding the law of conservation of mass in such...
...law of conservation of mass in two contexts, one based on the stories from the...
...an approach that started from presentations of scientists' work associated with...
- Development of performance test instrument in the experiment of law of conservation mass using self and peer assessment's technique**
Siswaningsih, W, Nahadi, Firmansyah, D R. *Journal of Physics: Conference Series*; Bristol Vol. 1013, Iss. 1, (May 2018).
...of law of mass conservation using self and peer assessment technique that...
...purpose of this research is to develop the instrument of...
...criteria. The instrument components consist of task and rubric. The method...

[ProQuest Ebook Central](#) Compiles a library of topic specific ebooks for you to access free through your SLQ membership.

The screenshot shows the ProQuest Ebook Central interface. At the top, it says 'ProQuest Ebook Central™'. The search term 'Law of Conservation of Mass' is entered in the search bar. Below the search bar, it displays '1508 book results'. On the left side, there are filters for 'Refine your search' (Sort by: Relevance, Results per page: 10), 'BOOK STATUS' (Owned and subscribed to by my library, Unlimited Print, Copy, & Download, Course Reserve), 'YEAR PUBLISHED' (2023: 12, 2022: 16, 2021: 28), and 'SUBJECT' (science / general: 966, science / chemistry / general: 570, political science / general: 1888, social science / sociology / general: 1888). On the right side, there are 'APPLIED FILTERS' (BISAC science / general X, BISAC science / chemistry / general X) and 'Book Results' (Chapter Results). The main results area shows two books:

- Physical Chemistry for Engineering and Applied Sciences**
Foulkes, Frank R.
Taylor & Francis Group 2012
ISBN: 9781466518476
EDITION: 1
Physical Chemistry for Engineering and Applied Sciences is the product of over 30 years of teaching first-year Physical Chemistry as part of the Faculty of Applied Science and Engineering at the University of Toronto. Designed to be as rigorous as compatible with a first-year student's ability to un...
Available
- Environmental Studies (H.P. University)**
Sharma, Deepa; Chhabra, Bupendra Singh
New Age International Ltd 2007
ISBN: 9788122420326, 9788122423020
EDITION: 1

The [Australian Institute Aboriginal and Torres Strait Islander Studies](#) is a powerful tool for First Nations reading and research. Their online database and research projects can provide incredible insight into science from the First Nations perspective.

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Ngurrara 2 way learning project

Publication date
Wednesday, 1 June 2016

Type
Presentation

Event
2016 National Native Title Conference

Brendan Fox , Peter Murray

Attachment/s
[presentation.pdf \(PDF, 15.64 MB\) >](#)

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