

STATE LIBRARY<sup>1</sup>  
QUEENSLAND

# Year 9 Chemical Sciences

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

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**Date prepared:** 04 March 2026

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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.

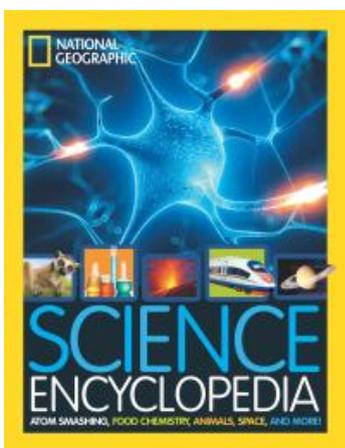
## Before you get started

[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 'CHEMnetBASE' is displayed with the tagline 'Chemical Databases Online'. Below the logo 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 by Name, Synonym, Molecular Formula, CAS Registry Number, InChI, InChI Key and/or SMILES'. Underneath the search area 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 and scientific topics.

[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 title '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'. Three resource cards are visible: 1. 'Problematic Polymers: Teacher Resource' with a thumbnail of a hand holding a plastic bag containing a globe, and 'Years: 5, 6, 7, 8, 9, 10'. 2. 'Plastic Planet: Community of Inquiry' with a thumbnail of various plastic items like bottles and containers, and 'Years: 5, 6, 7, 8, 9'. 3. 'Water Matters: Online Teacher PD' with a thumbnail of water splashing, and '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'. The search results are for 'The atomic model', showing 244 entries and 2 books. The page is signed in as 'State Library of Queensland'. A sidebar on the left allows for refining terms, with 'The atomic model' entered. The main content area shows a result for 'Hantaro Nagaoka', a Japanese physicist (1865-1950) who worked with C. G. Knott. The result includes a small image of a model and a brief biography.

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)'. The page has tabs for 'Articles', 'Images', 'Videos', and 'More'. The search results are for 'atomic model (physics)', with a brief description: '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 ...'. Below this, there are three main results: 'atom (matter)', 'Models of atomic structure', and 'Rutherford's nuclear model'. Each result has a short summary. At the bottom, there is a section for 'images related to this search' with four image thumbnails: a blue glowing sphere, a black and white photo of a person, a red sphere with white dots, and a blue sphere with red and white dots. A 'See all images >' link is also present.

[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 options 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. The first is 'Niels Bohr's Second Atomic Theory' by Helge Kragh, published in *Historical Studies in the Physical Sciences*, Vol. 10 (1979), pp. 123-186. The second is 'The Bohr Atom, Models, and Realism' by R. J. G. Hughes, published in *Philosophical Topics*, Vol. 18, No. 2, Philosophy of Science (Fall 1990), pp. 71-84. Each article has a 'Download' button, a 'Save' button, and a 'Cite' button.

[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), Chemistry (74), Earth Science (23), Common Core State Standards (213), Next Generation Science Standards (164), and Human Anatomy (35). The main results area is titled '22 SEARCH RESULTS' and displays five interactive 3D models related to atomic structure: 'Atomic Radius', 'Atomic Structure', 'Atomic Number', 'Atomic Nucleus', and 'Relative Atomic Mass'. Each model includes a brief description and associated educational standards (e.g., NGSS-HS-PS1-1, CCSS.ELA-Literacy.RST.9-10.2).

[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 "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 OR materials science OR students OR chemistry), "Sorted by" (Relevance), "Limit to" (Full text, Peer reviewed), and "Source type" (Scholarly Journals (33,818), Books (2), Audio & Video Works (3), Dissertations & Theses (2,785), Newspapers (775)). 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. 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 scienc) 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**  
Schliermund, 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' and 'Browse Chemicals'. The main section features a 'Chemical Text Search' box with a search input field and a 'Search' button. Below the search box, there is a list of 'Explore CHEMnetBASE' resources, described as 'A collection of Cutting-Edge Interactive Databases and Dictionaries'. The resources are represented by a row of small thumbnail images.

[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 title 'Learning Resources'. There are navigation links for 'Home', 'About', and 'Save List'. The main content area displays 'Showing 15 of 41 resources'. Three resource cards are visible: 1. 'Problematic Polymers: Teacher Resource' with a thumbnail of a hand holding a plastic bag containing a globe, suitable for Years 5, 6, 7, 8, 9, 10. 2. 'Plastic Planet: Community of Inquiry' with a thumbnail of various plastic items, suitable for Years 5, 6, 7, 8, 9. 3. 'Water Matters: Online Teacher PD' with a thumbnail of water splashing, suitable for Years 6, 7, 8, 9, and covering topics like 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 website interface. 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 main content area is titled 'Oxford Reference Search Results'. On the left, there is a sidebar with 'Signed in as: State Library of Queensland' and 'Narrow Your Choices' section. The main search results 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 subject 'Science and technology'. A brief description follows: '(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 website interface. At the top, there are navigation tabs for 'Articles', 'Images', 'Videos', and 'More'. The main content area is titled 'chemical bonding (chemistry)' with a star icon and the text '- TOP 3 RESULTS. 6 MORE RESULTS IN CHEMICAL BONDING.'. Below this, there are three article snippets: 'The law of conservation of mass', 'The law of multiple proportions', and 'The law of definite proportions'. Each snippet includes a brief description. Below the articles, there is a section titled 'conservation of mass (physics)' with a star icon and a brief description. At the bottom, there is a section titled 'images related to this search:' with a 'See all images' link. The images include a diagram of a balance scale, 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 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 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 (91)", "Chemistry (74)", and "Physics (11)". The main results area shows several interactive sessions, each with a 3D model icon and a brief description. The sessions include: "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 session includes a description of the activity and associated educational 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 '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). Below these are 'Source type' options: Scholarly Journals (5,965), Books (4), Audio & Video Works (1), Dissertations & Theses (1,383), and Newspapers (457). The main results area shows three items:

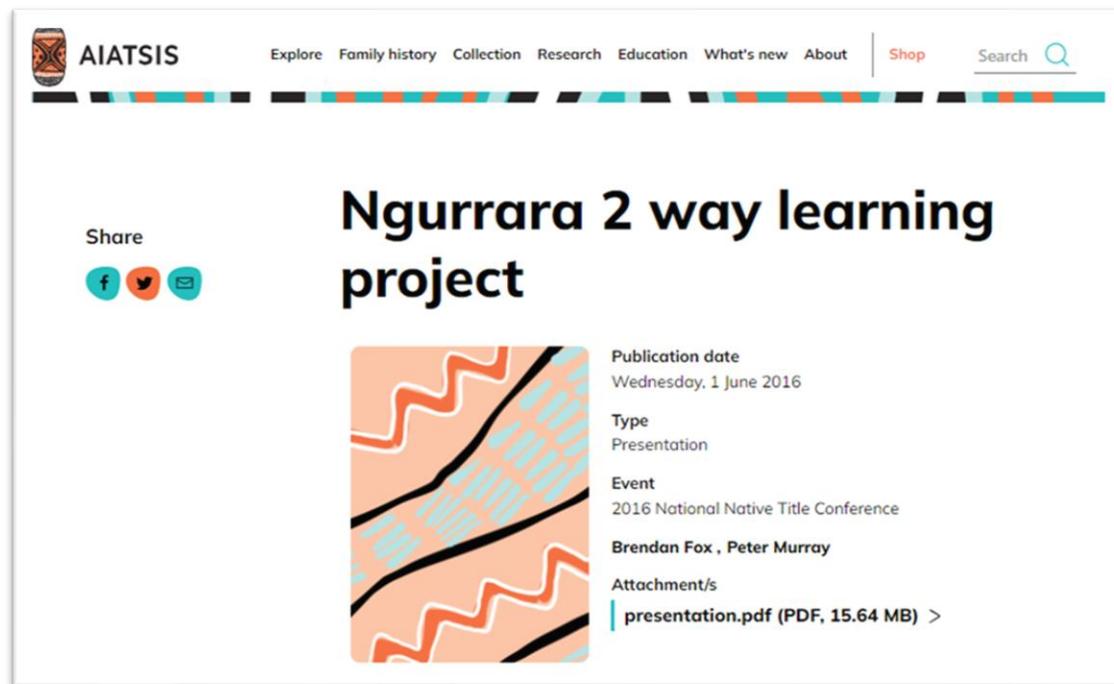
- CHEMISTRY GAMES: VOLUME 2: Stoichiometry and the Law of Conservation of Mass**  
Kirkus Reviews; Austin (May 1, 2017).  
...students about stoichiometry and the law of conservation of mass. It also...  
...the periodic table. Once again, each board is made up of colored squares...  
...which list the 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. 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). 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, 9788122420320  
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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