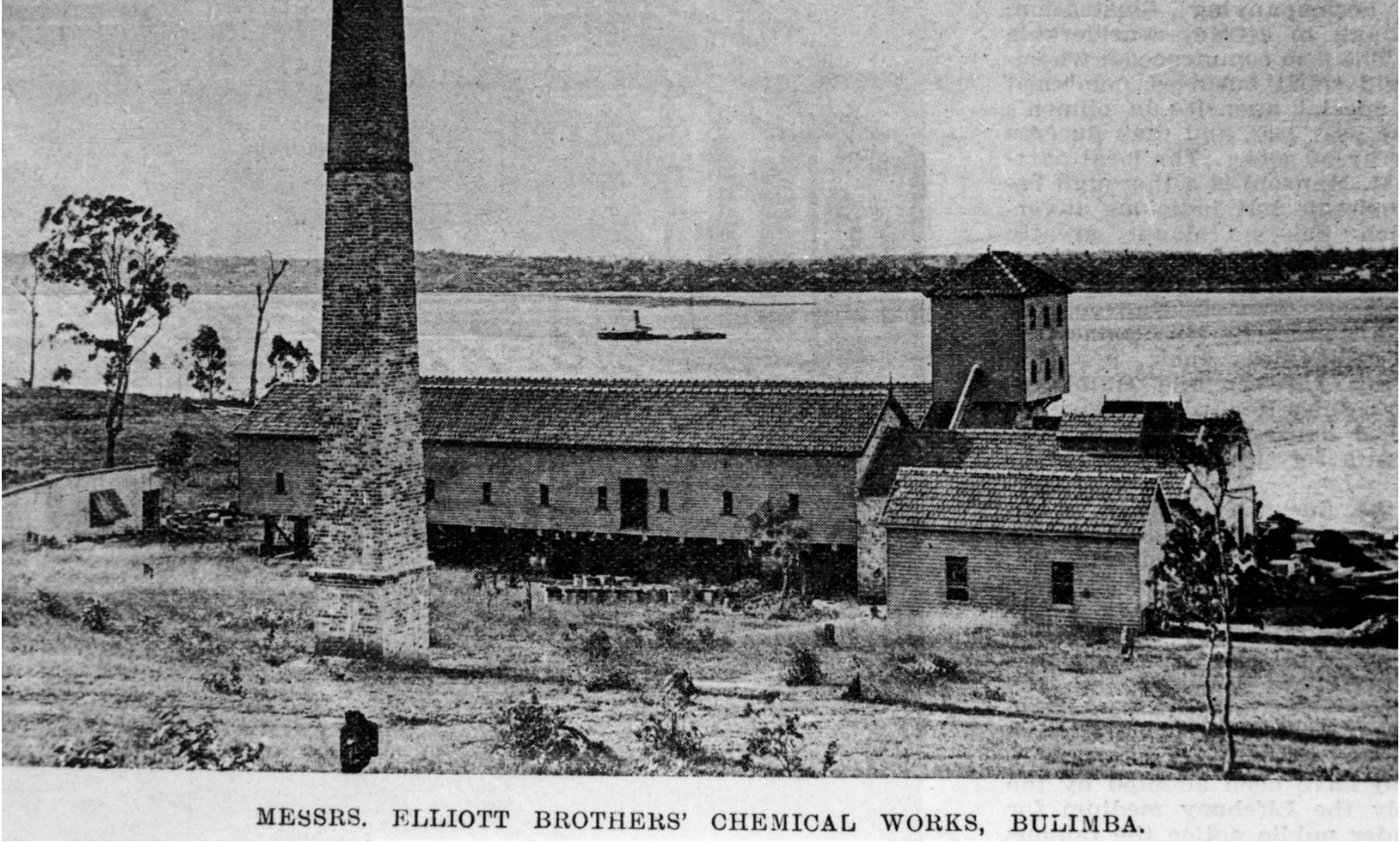

STATE LIBRARY
QUEENSLAND

Year 9
Chemical Sciences

Student research guide

Cover: Elliott Brothers Chemical Works at Bulimba, 1896, State Library of Queensland. Negative number: 177440.

Date prepared: 24 November 2023
Date revised: 04 March 2026

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Teachers can advise students on State Library's resources and encourage their use to help with their studies and research. Students are encouraged to access State Library's resources at school, but not during class time.

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It is also permissible for students to access State Library's online resources at school – but this must not be during class time. An example of permitted use might be where students have a spare period when they work on assignments or homework, and they are accessing databases as private members of State Library. Information about joining State Library is here.

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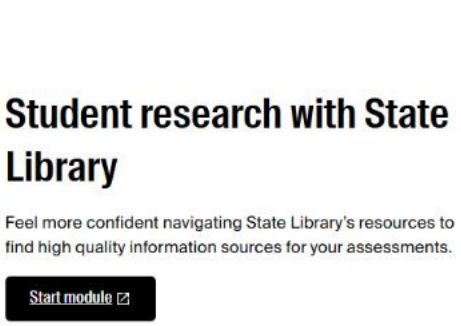
State Library's One Search catalogue is the gateway to an extensive suite of national and international journals, databases, ebooks, encyclopedias, newspaper archives, and collections of thousands of historical images, letters, artworks, diaries, and artefacts to interrogate as sources.

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.
- Complete the Student research with State Library module for a guide to navigating State Library's resources. Or visit the One Search help page for tips & tricks for searching One Search.
- You can search our OneSearch catalogue or begin exploring by clicking on some of the featured items contained in this research guide.



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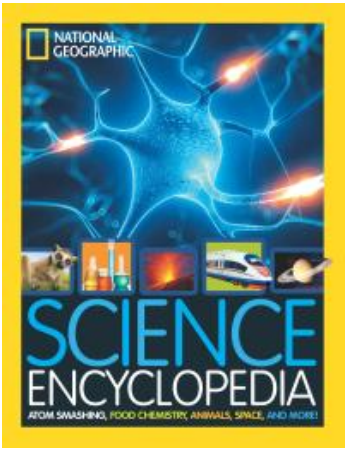
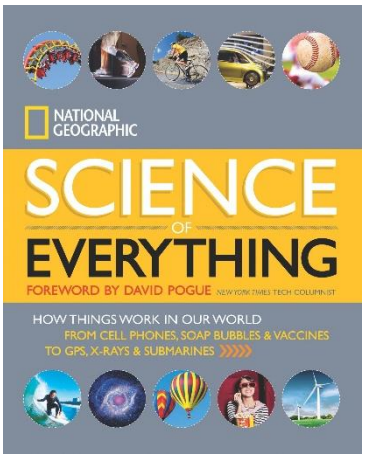
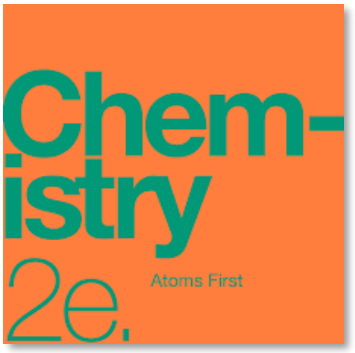






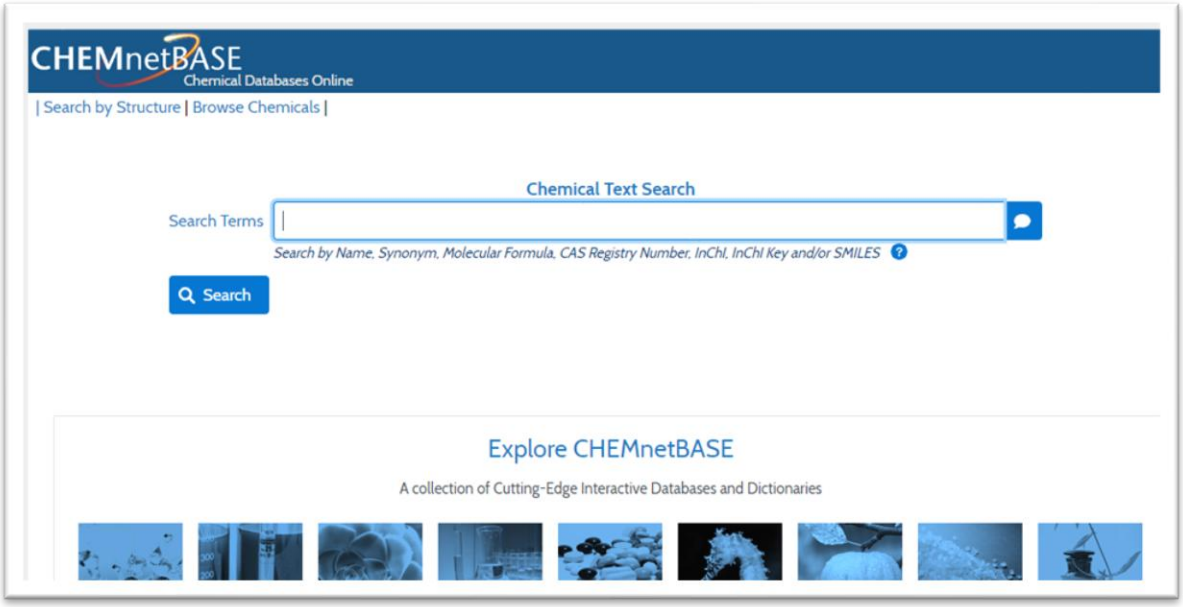
The Atomic Model

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.

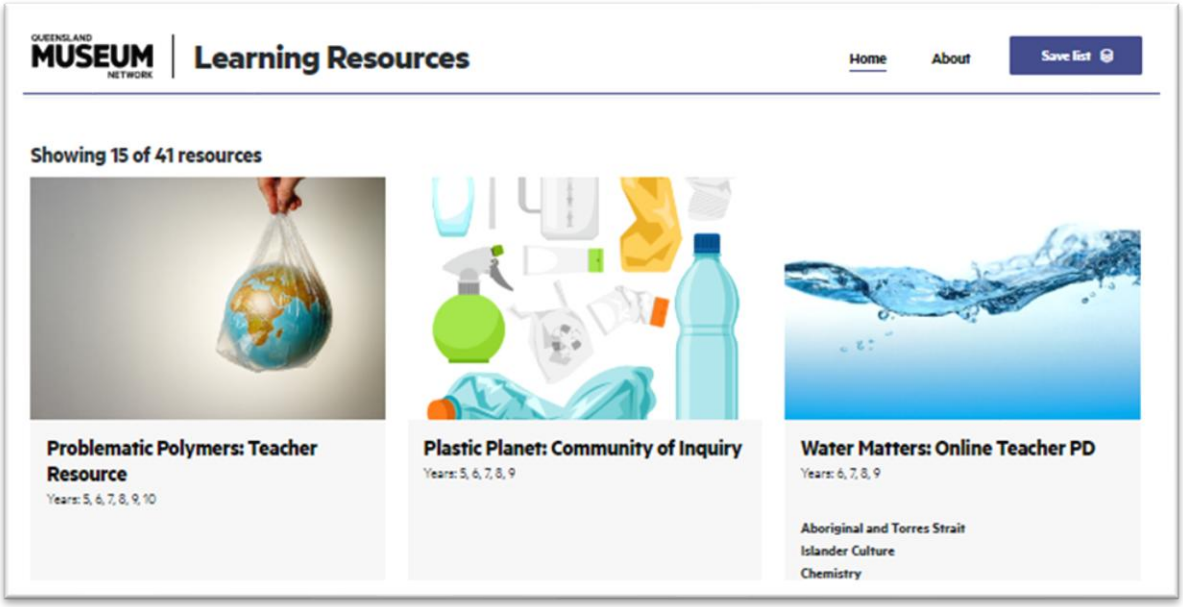
- Comparing the mass and charge of protons, neutrons and electrons.
- Examining how the discovery of electrons, protons and neutrons resulted from experimental evidence and answered questions related to properties and behaviours of atoms.
  - Explaining that differences in the number of neutrons in atoms 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.

Featured databases

CHEMnetBASE provides a comprehensive database of chemicals and their uses, as well as chemical equations and properties.



Queensland Museum provide Learning Resources website students with many activities, fact sheets, images, and videos.



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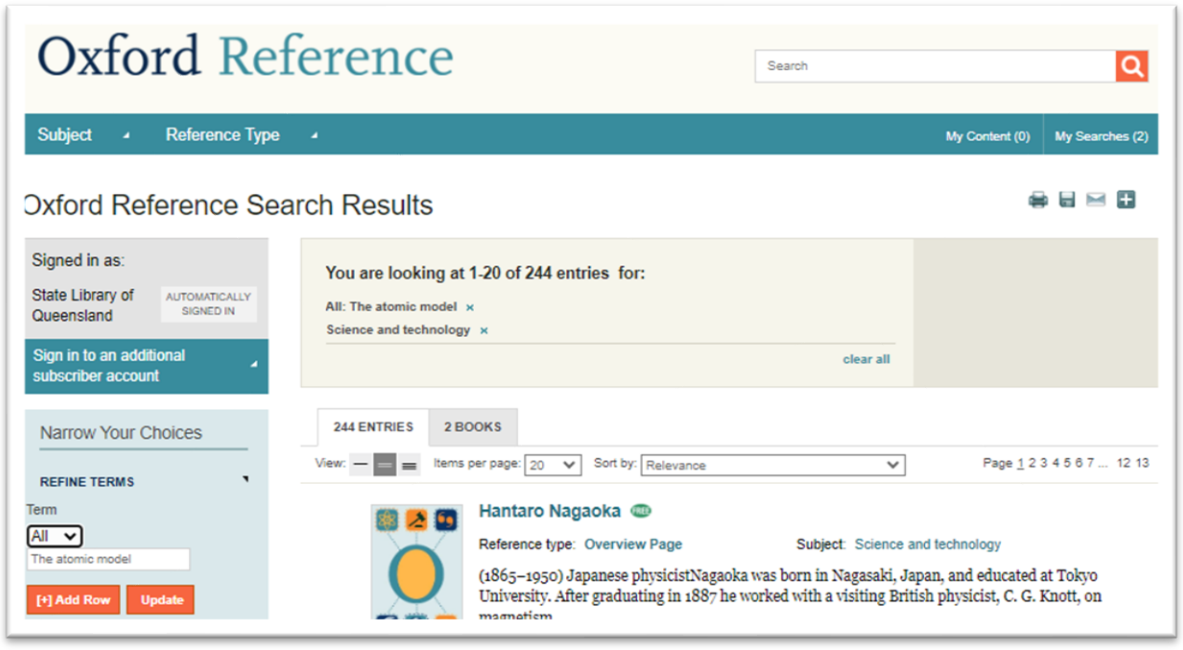

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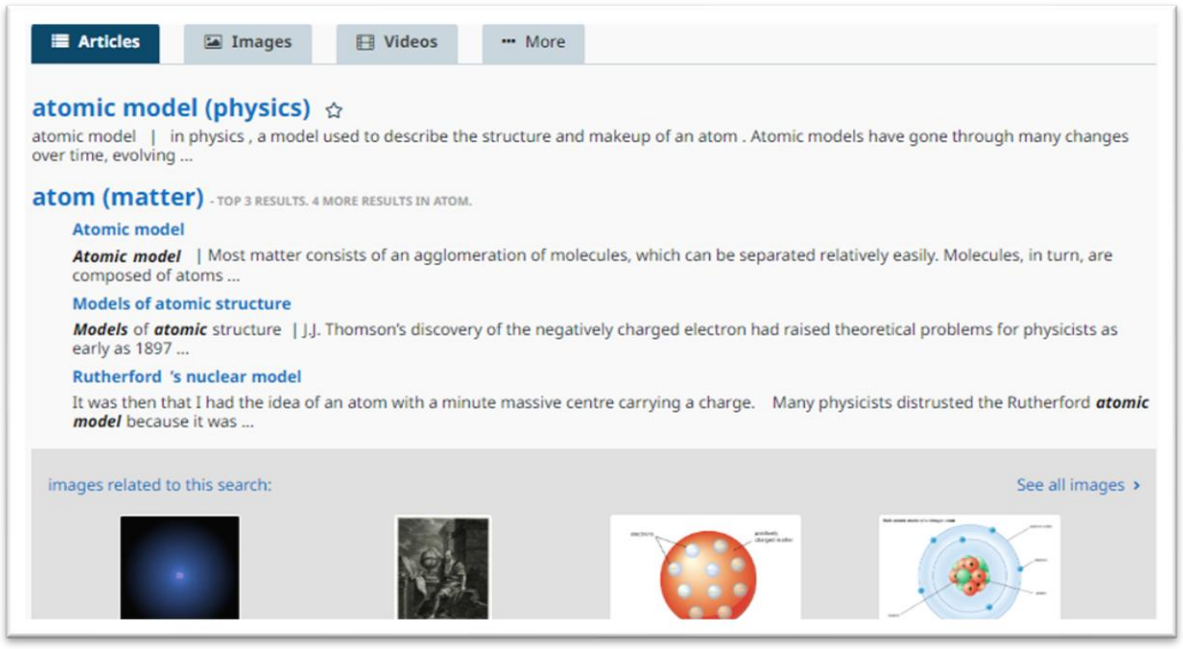

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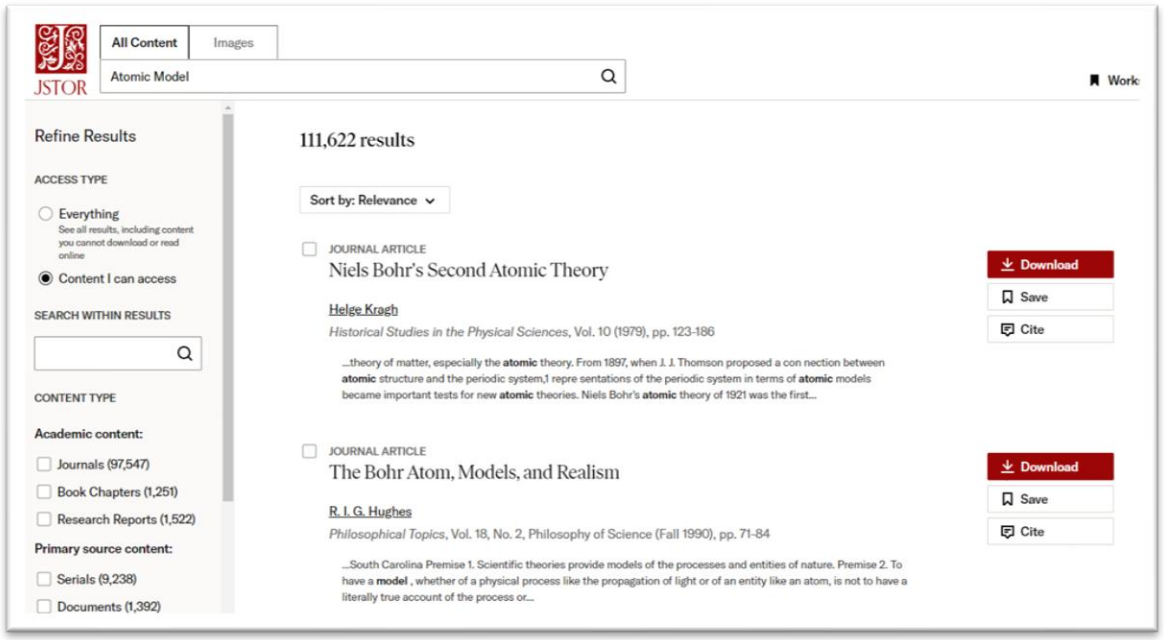

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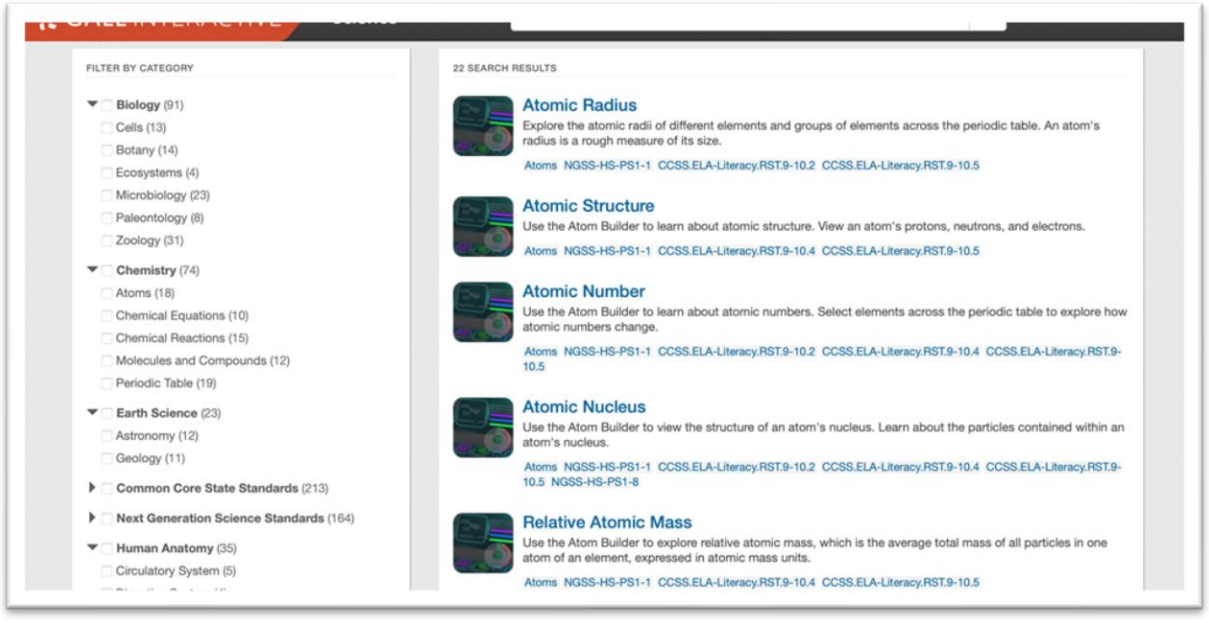

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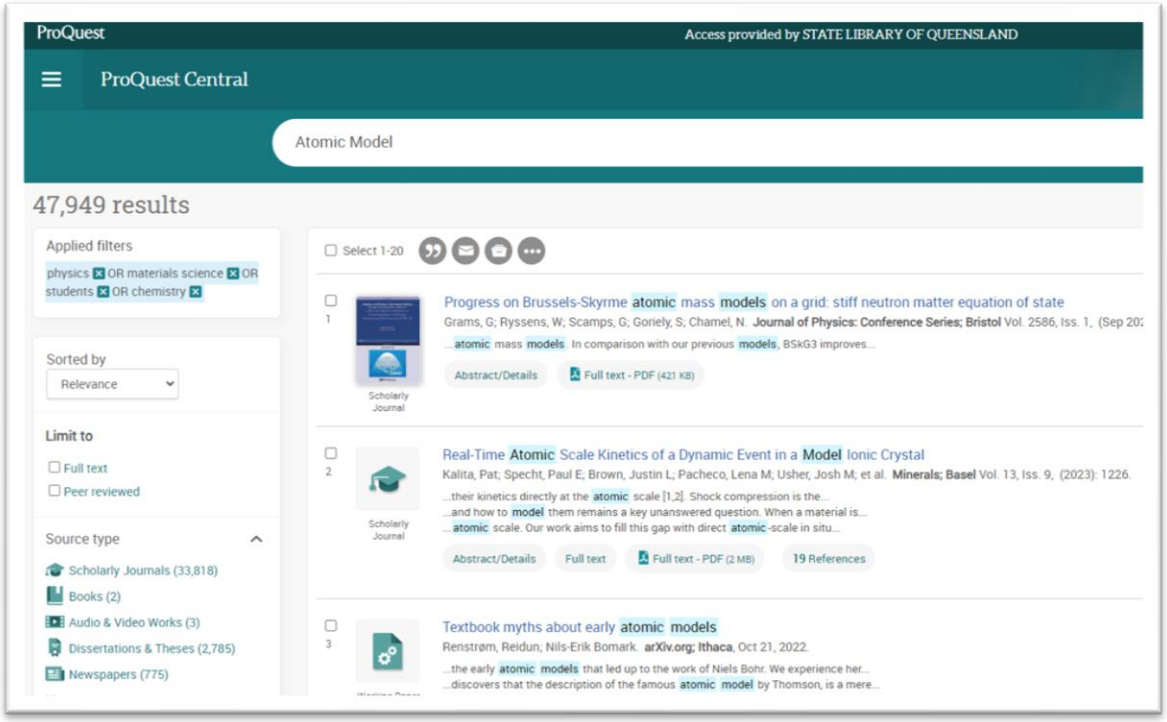

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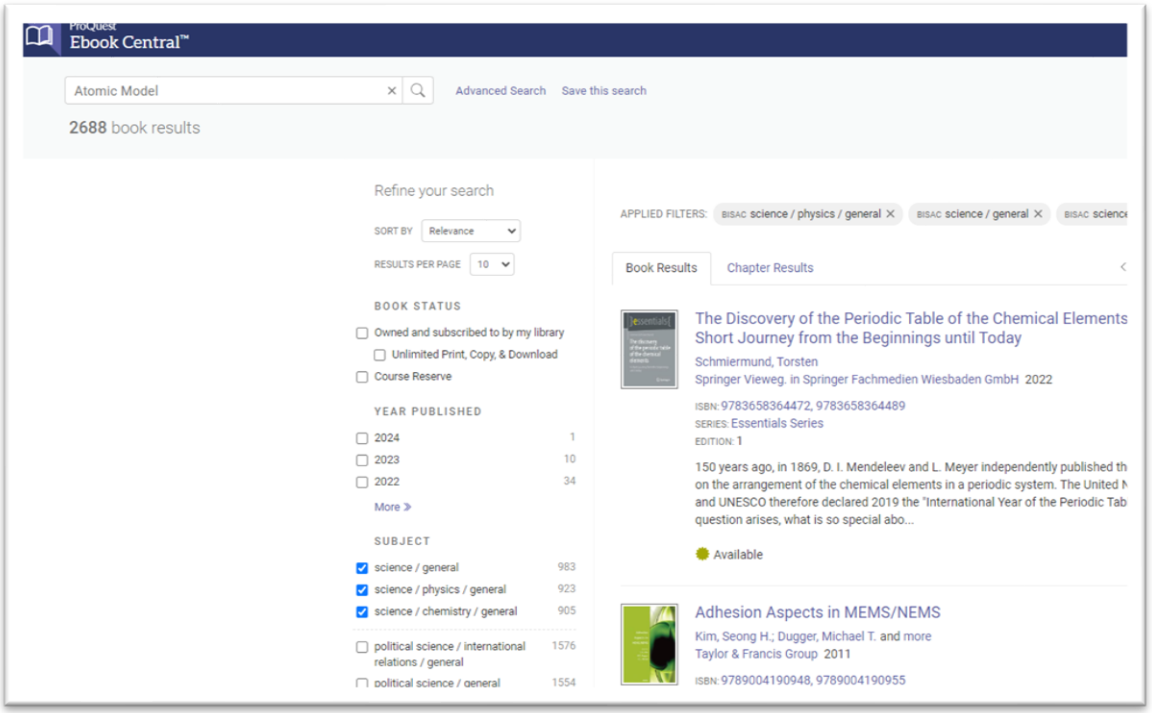

The Law of Conservation of Mass

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.

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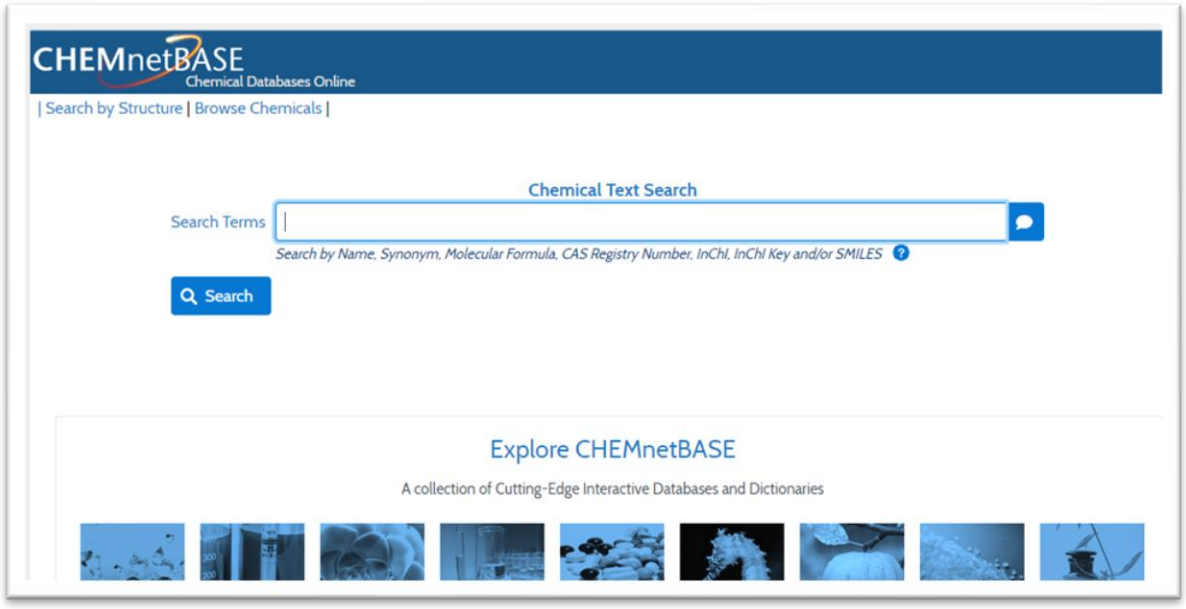

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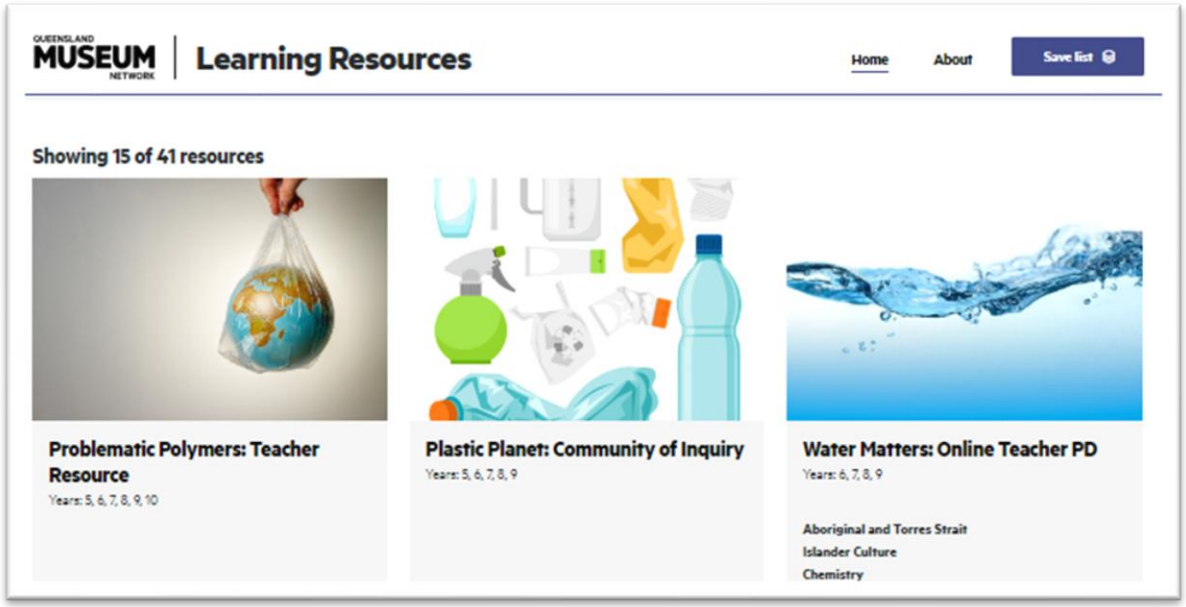

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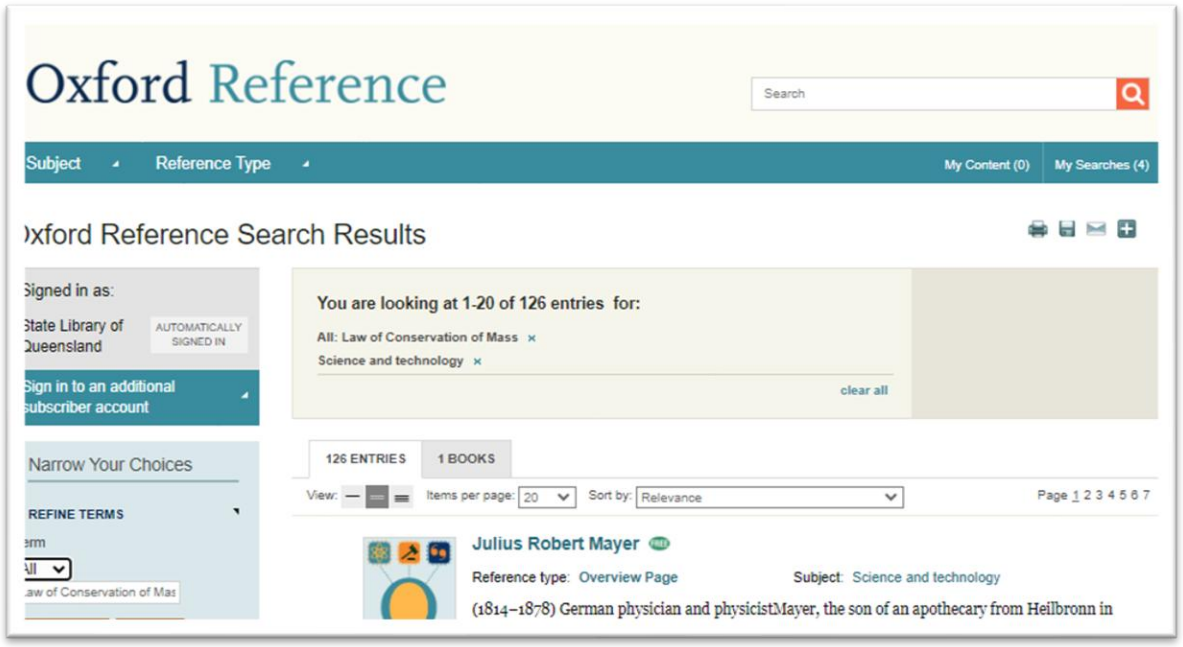

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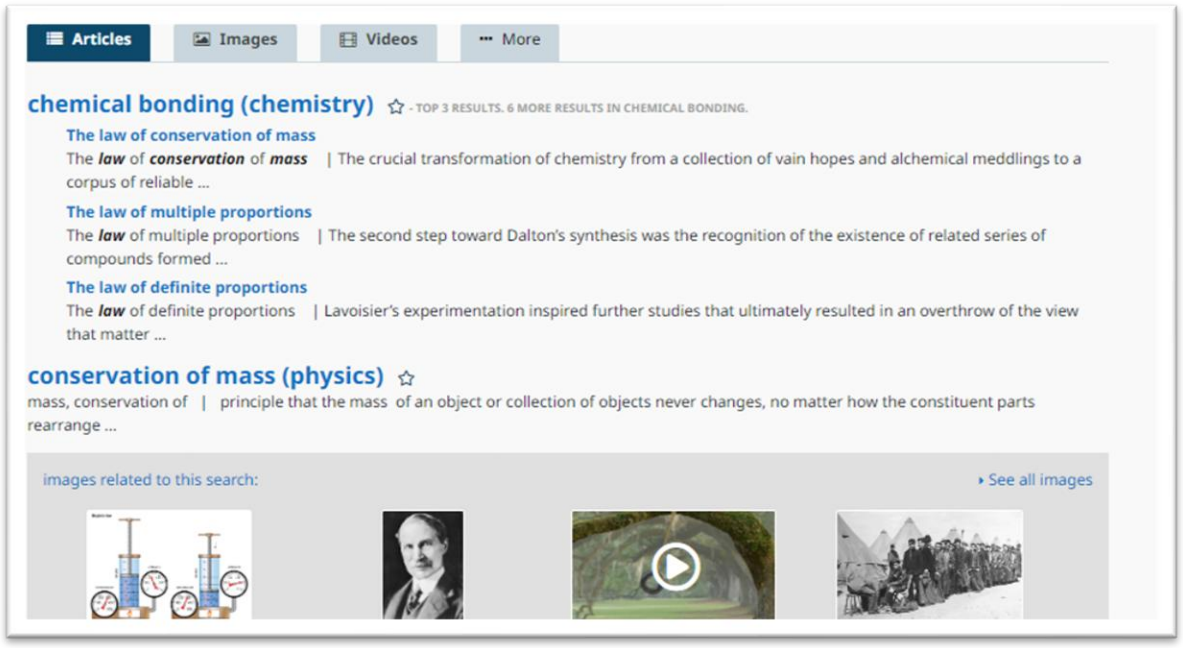

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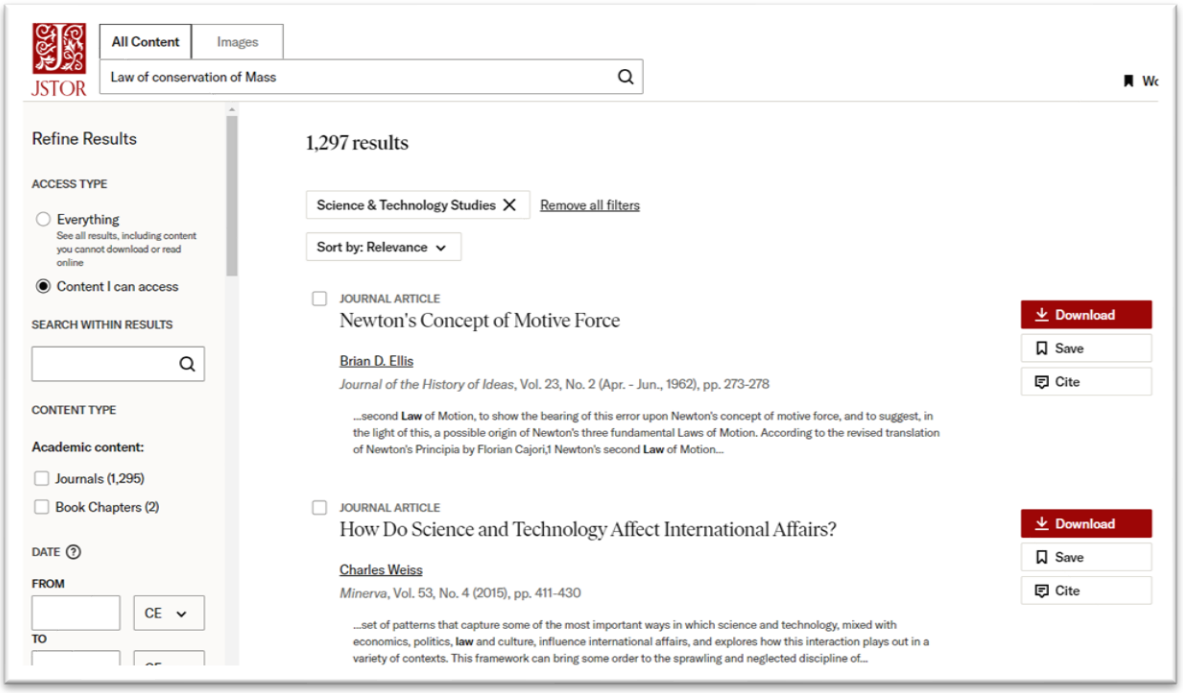

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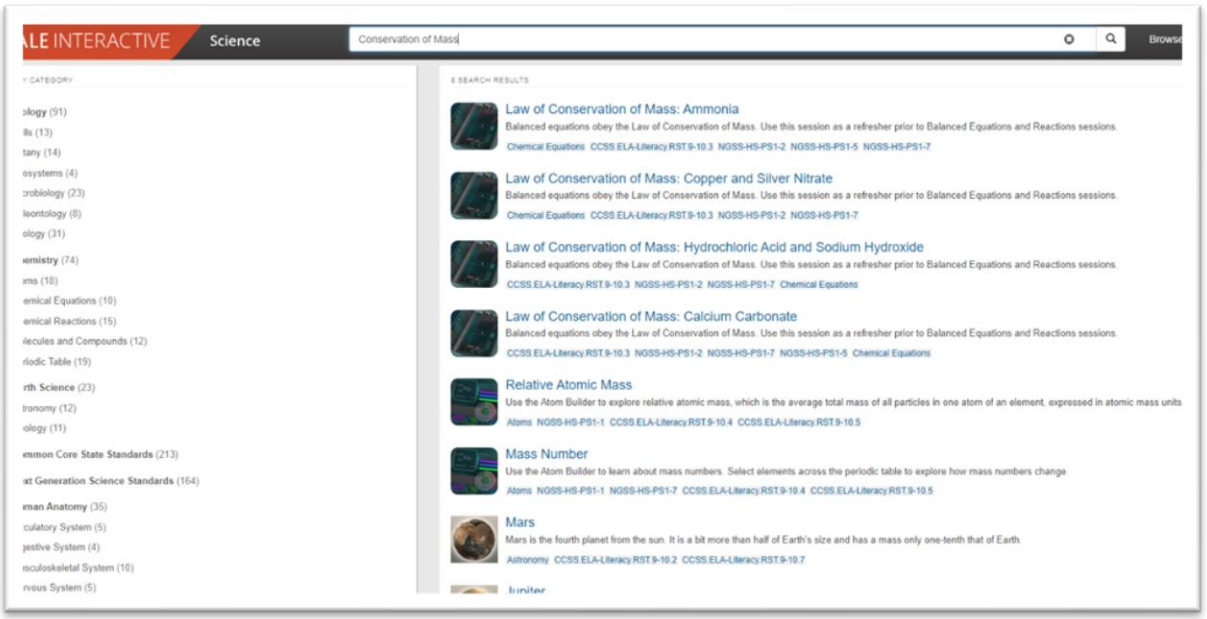

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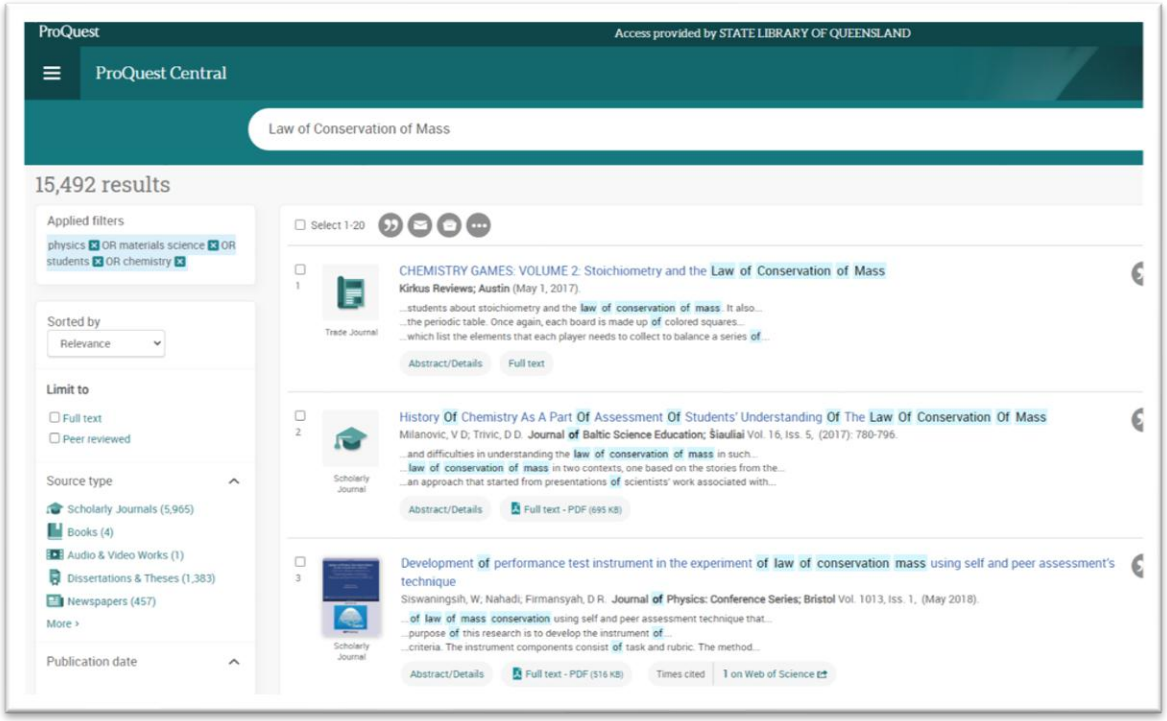

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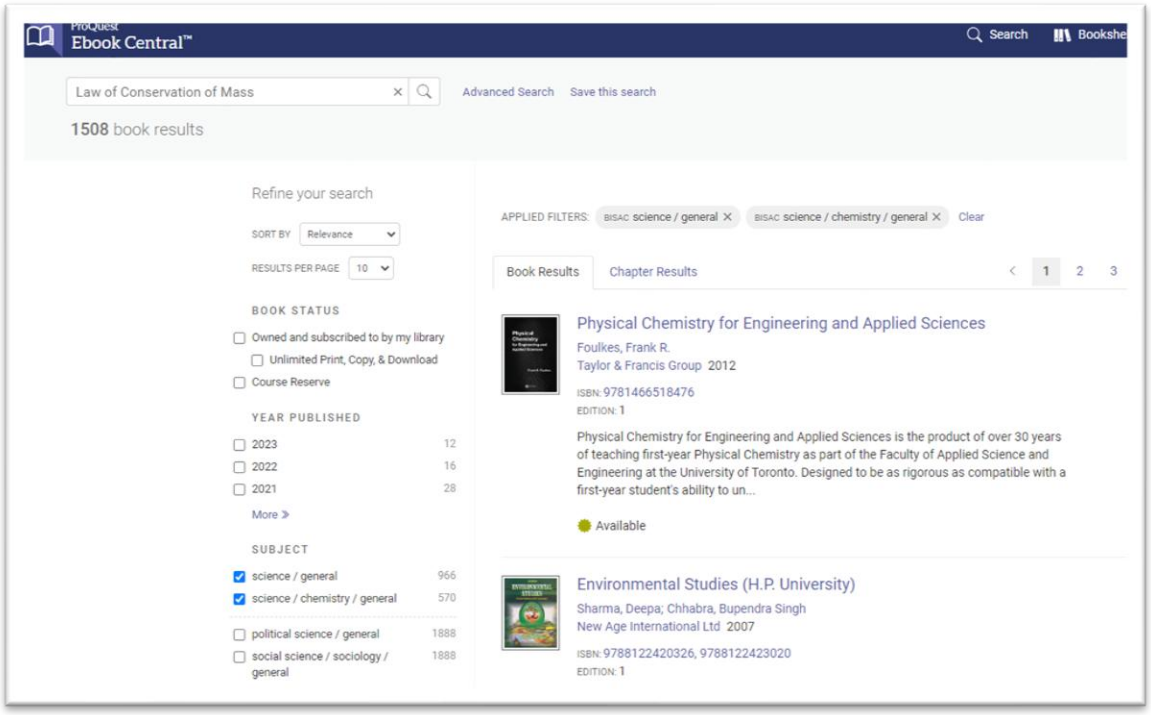
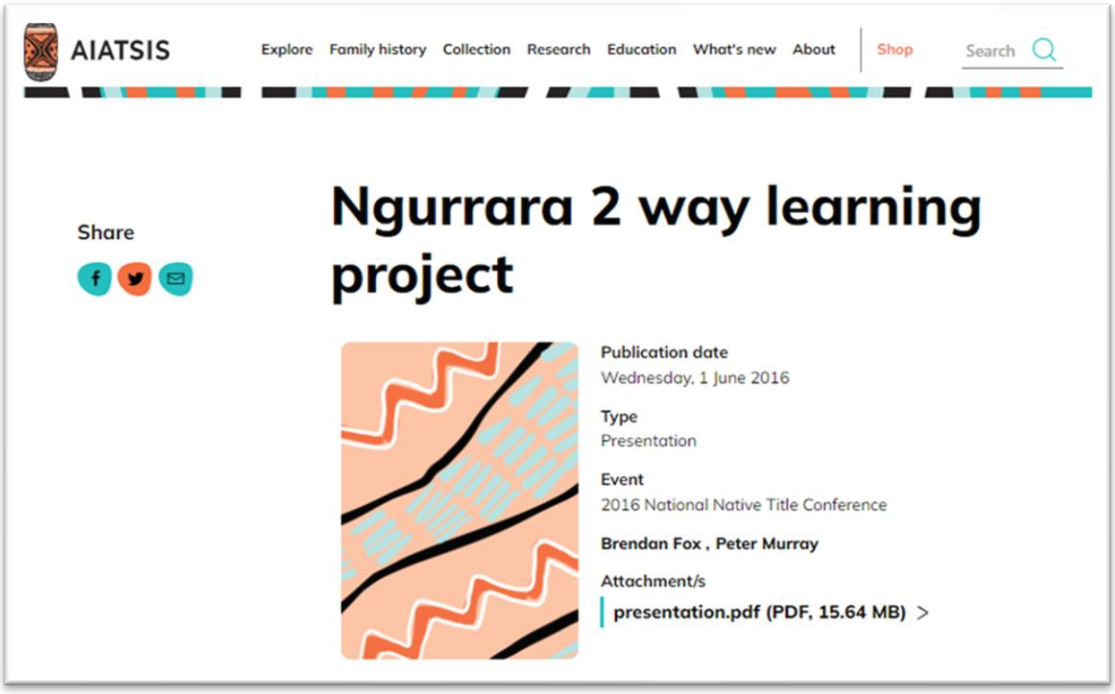


The Australian Institute Aboriginal and Torres Strait Islander Studies is a powerful tool for First Nations reading and research. Their online database and research projects can provide incredible insight into science from the First Nations perspective.



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