 Chemistry Module 3: Reactive Chemistry

Reactive chemistry[[1]](#footnote-1)

The following sample unit of work references content descriptors which are aimed at meeting the cross-curricular priority of Aboriginal and Torres Strait Islander Histories and Cultures.

Inquiry question: What are the products of a chemical reaction?

Outcomes

A student:

* CH11-10 - Explores the many different types of chemical reaction, in particular, the reactivity of metals, and the factors that affect the rate of chemical reactions

Content Descriptor

Students:

* Investigate the chemical processes that occur when Aboriginal and Torres Strait Islander Peoples detoxify poisonous food items.

Teaching and learning activities

Key inquiry question

* What are some examples of poisonous plants in Australia?

1. Poisonous Plants in Australia

Task

* Outline the reasons for some plants having these highly developed poisonous components (why do some plants produce substances that are toxic to other organisms?):
  + [Mode of action and toxicology of plant toxins and poisonous plants](https://www.researchgate.net/publication/279671686_Mode_of_action_and_toxicology_of_plant_toxins_and_poisonous_plants)
* Describe some examples of poisonous Australian plants, including the chemical constituents that are responsible for their toxicity:
  + [Australia's most poisonous plants](http://www.australiangeographic.com.au/topics/science-environment/2012/07/australias-most-poisonous-plants/)
  + [Little shop of horrors: the Australian plants that can kill you](http://theconversation.com/little-shop-of-horrors-the-australian-plants-that-can-kill-you-50842)
  + [Poisonous or harmful plants](https://www.poisonsinfo.nsw.gov.au/Factsheets/Poisonous-Plants-Factsheet.aspx)
  + [Australian Native Poisonous Plants](http://anpsa.org.au/APOL7/sep97-4.html)
  + [Australian Weeds and Livestock](http://www.weeds.mangrovemountain.net/data.html)
  + Talalaj, Janusz Joseph. 2008, Poisonous plants in Australia/Janusz Talalaj Echidna Press North Adelaide, S. Aust
  + Everist, S., 1981. Poisonous plants in Australia. London: Angus & Robertson Publishers.

2 Plant use by Aboriginal and Torres Strait Islander peoples

Task

* Outline some of the uses that Aboriginal and Torres Strait Islander Peoples had for various plant species:
  + [Aboriginal Plant Use](http://www.anbg.gov.au/gardens/visiting/exploring/aboriginal-trail/)
  + [Aboriginal Plant Use - NSW Southern Tablelands](http://www.anbg.gov.au/apu/)
  + [Wiradjuri Plant Use in the Murrumbidgee Catchment](http://archive.lls.nsw.gov.au/__data/assets/pdf_file/0009/495261/archive-wiradjuri-plant-use.pdf)

Key inquiry question

* How did Aboriginal and Torres Strait Islander peoples treat poisonous plant materials?

1. Plant treatments used by Aboriginal and Torres Strait Islander Peoples

Task

* Outline the chemical basis of methods used by Aboriginal and Torres Strait Islander Peoples in order to reduce or eliminate the toxicity of the plant materials they were using:
  + Cooking - thermal decomposition of substances (practical using green Copper (II) Carbonate decomposition to black Copper (II) oxide). Some toxic compounds are sensitive to heat and will decompose into less toxic products, or the heat will facilitate the breakdown of plant membranes to enable further treatment.
  + Grinding - surface area and reaction rate (practical using the timed reaction of Magnesium ribbon of various sizes and Hydrochloric acid). Breaking down of plant membranes which contain toxic components to enable the decomposition and extraction of these compounds.
  + Leaching - solubility of mixture components (practical using Sodium Chloride and Silica with water to isolate the mixture components). Some toxic compounds are soluble in water and will leave the plant materials over time while submerged.
* Prepare a report that outlines the chemistry of the methods used to reduce the toxicity of the following plants
  + Castanospermum australe (Moreton Bay Chestnut or Blackbean). The main toxic substance in the Moreton Bay chestnut is [Castanospermine](http://molview.org/?cid=54445).
  + Pteridium Esculentum (Bracken). The major toxins in Bracken include [Prunasin](http://molview.org/?cid=119033), [Ptaquiloside](http://molview.org/?cid=13962857) and [Shikimic acid](http://molview.org/?cid=8742).

References

The following publications may be useful for this task.

Renwick, Cath. & Wreck Bay Community. 2000, Geebungs and snake whistles: Koori people and plants of Wreck Bay/Wreck Bay Community and Cath Renwick Aboriginal Studies Press [Canberra]

Packer, J, Harrington, D, Jamie, J, Brouwer, N, Gaikwad, J, Vemulpad, S & Yaegl, CE 2011, Yaegl: medicinal and plant resources handbook. 1st ed, Macquarie University Lighthouse Press, North Ryde, NSW.

Stewart, Kathy. & Percival, Bob. & Royal Botanic Gardens (Sydney, N.S.W.). & Environmental Trust (N.S.W.). 1997, Bush foods of New South Wales: a botanic record and an Aboriginal oral history/Kathy Stewart, Bob Percival Royal Botanic Gardens Sydney, Sydney.

1. This document references the [Chemistry Stage 6 Syllabus](https://syllabus.nesa.nsw.edu.au/chemistry-stage6/) © 2017 [NSW Education Standards Authority (NESA)](http://syllabus.nesa.nsw.edu.au/copyright/) for and on behalf of the Crown in right of the State of New South Wales. [↑](#footnote-ref-1)