**teacher guide**

**Nuclear reactions 7:**

**Radioisotopes in research**

# Components

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|  | NAME | DESCRIPTION | AUDIENCE |
|  | *Radioisotopes in research*teachers guide | The guide describes how this resource can be used to illustrate use of radioisotopes in research. | teachers |
|  | *Super-sensitive plants*fact sheet | Phosphorus-33 is used to investigate why some native plants are super-sensitive to phosphate. | students |
|  | *Protein pathways*fact sheet | Phosphorus-32 is used to investigate the processes involved in protein phosphorylation. | students |
|  | *Dynamic dunnarts*fact sheet | Rubidium-86 is used to measure the field metabolic rate of a small nocturnal marsupial. | students |
|  | *Tough teeth*fact sheet | Iron-55 is used to investigate how chitons (marine molluscs) incorporate magnetite into their teeth. | students |

Purpose

To enable students to develop their understanding of applications of radioisotopes in scientific research.

# Outcomes

Students:

* explain how radioisotopes can be used safely in research; and
* describe a variety of different ways in which radioisotopes are used in different situations.

# Activity summary

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| ACTIVITY | POSSIBLE STRATEGY |
| Students use the jigsaw strategy to share concepts from four fact sheets. Working in four groups (each with a different fact sheet), students first summarise information before a spokesperson for each group delivers salient points to students from the other groups. | Jigsaw strategy with four groups based upon four fact sheets |
| Students develop a placemat to highlight the main ideas from the four examples or they submit four quiz questions (with answers) to be used in a class quiz about radioisotopes in research. | Placemat in groups or quiz |

Technical requirements

The teacher guide and fact sheets require Adobe Reader (version 5 or later), which is a free download from [www.adobe.com.](http://www.adobe.com/)

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banner image: ‘Americium container in a smoke detector’ by Whitepaw. PD. en.wikipedia.org/wiki/File:Americium-241.jpg

# Associated SPICE resources

SPICE resources and copyright

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*Nuclear reactions 7: Radioisotopes in research* may be used in conjunction with related SPICE resources to address the broader topic of nuclear physics.

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| DESCRIPTION | LEARNING PURPOSE |
| *Nuclear reactions*This learning pathway shows how a number of SPICE resources can be combined to teach the topic of ionising radiation and nuclear reactions. |  |
| *Nuclear reactions 1: Mines to medicine*Students express their opinions on a moral issue after viewing a film of demonstrators at a uranium mine and after a medical physicist explains why nuclear medicine is so important to diagnostic and therapeutic procedures. | **Engage** |
| *Nuclear reactions 2: Nuclear radiation*Students investigate types and properties of radiation with particular attention to penetrative characteristics. | **Explore 1** |
| *Nuclear reactions 3: Nuclear decay*Students manipulate variables in an interactive simulation to investigate connections between decay and half-life. An alternative procedure using dice is provided. | **Explore 2** |
| *Nuclear reactions 4: Decay chains*In three separate interactive simulations, students experience modelling as an alternative way of exploring nuclear decay and half-life. | **Explore 3** |
| *Nuclear reactions 5: Fission and fusion*Worked examples explain how to calculate mass defect and binding energy for fission and fusion reactions. The experimental ITER fusion reactor is also discussed. | **Explain** |
| *Nuclear reactions 6: Nuclear medicine*Students explore applications of radioisotopes in medicine. | **Elaborate 1** |
| *Nuclear reactions 7: Radioisotopes in research*Fact sheets illustrate the use of radioisotopes in research being undertaken at The University of Western Australia. | **Elaborate 2** |