



Structure and bonding 4: Molecules by design

Components

	NAME	DESCRIPTION	AUDIENCE
	<i>Molecules by design</i> teachers guide	This shows how knowledge of the structure, bonding and consequent properties of materials may be used in a variety of research contexts.	teachers
	<i>Life from fire</i> fact sheet	This describes the search for a compound in smoke that promotes germination of seeds.	students
	<i>Engineering biomaterials</i> fact sheet	This explains how and why synthetic biomaterials are increasingly used in medicine.	students
	<i>The IDEAL house</i> fact sheet	This explains the innovative use of semiconductors as sensing devices.	students
	<i>Mesoporous silica capsules</i> fact sheet	This explains the steps involved in development of nano-scale delivery devices.	students

Purpose

To introduce students to current research projects at The University of Western Australia where they can apply their understanding of chemical bonding.

Outcomes

Students:

- apply their knowledge of chemical bonding to products and procedures, and
- describe the relationship between the properties and uses of covalent molecular, covalent network and metallic bonding.

Activity summary

ACTIVITY	POSSIBLE STRATEGY
Students read the fact sheets.	small group or individual
Students prepare retrieval charts or make posters.	small group or individual

Technical requirements

The teachers guide and fact sheets require Adobe Reader (version 5 or later), which is a free download from www.adobe.com.

Teacher notes

This activity could be completed as a jigsaw activity where students work in groups of four, one member assigned to read one fact sheet. The 'experts' from each group meet to discuss their findings and complete the section of a retrieval chart appropriate to their fact sheet. 'Experts' then report back to their original group and presents their findings to the other members.

Alternatively, fact sheets could be used as an individual or group activity where students analyse and evaluate information, then produce an informative poster. This is frequently done by scientists when presenting research at conferences.

A retrieval chart for use with these fact sheets could take the following form:

TOPIC	AIM OF RESEARCH	TYPE OF BONDING INVOLVED	USEFUL PROPERTIES OF THESE BONDS	OTHER CHEMISTRY INVOLVED
<i>Life from fire</i>				
<i>Engineering biomaterials</i>				
<i>IDEAL house</i>				
<i>Mesoporous silica capsules</i>				

Associated SPICE resources

Structure and bonding 4: Molecules by design may be used in conjunction with related SPICE resources to address the broader topic of structure and bonding.

DESCRIPTION	LEARNING PURPOSE
<i>Structure and bonding</i> This learning pathway shows how a number of SPICE resources can be combined to teach the topic of structure and bonding.	
<i>Structure and bonding 1: Molecular structures</i> A short video and worksheet that introduce the concept of structure and bonding by looking at how silica capsules may be used in drug delivery.	Engage
<i>Structure and bonding 2: Exploring conductivity</i> Students perform experiments to examine the conductivity of a range of materials, and sort them into groups.	Explore
<i>Structure and bonding 3: Chemical bonds</i> Students learn about types of bonding by working through a learning object and worksheet.	Explain
<i>Structure and bonding 4: Molecules by design</i> Students learn about different applications of bonding through a series of fact sheets on current research at The University of Western Australia.	Elaborate

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