

Topic: Atomic Structure and the Periodic Table

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Issues tackled:

1. Models and analogies – Explaining ionic and covalent bonding.
2. Ideas and evidence – The development of the periodic table.
3. Differentiation and SEN – Models of the atom.

Issue 1: Models and analogies – Explaining ionic and covalent bonding.

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Devise a kinaesthetic (involves movement of the body or 'hands on') activity to demonstrate ionic and covalent bonding.
2. Find and evaluate a computer simulation to illustrate ionic and covalent bonding.

Possible activities during tutorial:

1. Demonstrate how the planned activity would be carried out.
2. Show the simulation on a computer and explain how it might be used in the lesson.

AST Input:

- Check that trainees have a secure understanding of ionic and covalent bonding. Highlight the fact that electrons involved in bonding are from the outermost electron shell.
- Discuss various ways to model and explain bonding, e.g. role play, molymod kits, computer simulations.
- Discuss the strengths, limitations and any misconceptions which may occur as a result of the models.

Reading: Subject knowledge and understanding

GCSE textbooks relating to this subject. For example Ramsden.E.N., (1991), **Chemistry for GCSE**, Blackwell, Oxford.

Subject pedagogy

Mines, G. Particles, in McDuell, B. (Ed), (2003) **Teaching Secondary Chemistry**, John Murray, London.

Useful websites and applications

The Chemistry Set CD ROM has structures of lattices in 3D

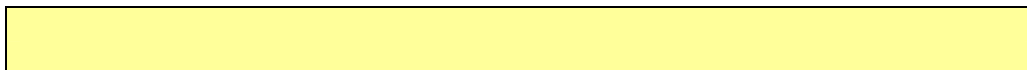
The Multimedia Science School (11-16) CD ROM by New Media has a useful section on ionic and covalent bonding. Info at: www.platolearning.co.uk

Resources:

Tutorial
Computer.
Any molecular modelling kit.

Issue 2: Ideas and evidence – The development of the periodic table.

Prior knowledge and experience:



Possible tasks:

Preparation for tutorial:

1. Research the history of the periodic table, including earlier attempts to put the elements in order.
2. Find a video which covers the development of the periodic table. Consider its suitability and make a list of questions to ask the class.

Possible activities during tutorial:

1. Discuss how previous versions of the periodic table can be used in lessons as an introduction to the present day model.
2. Show a short section of the video. Discuss its merits, limitations and the questions which could be asked.

AST Input:

- Suggest classification of the elements with cards using the Newlands and the Mendeleev system. Discuss the practicalities of distributing the cards.
- Discuss how to make this sort of historical approach seem interesting and relevant to pupils.

Reading: Subject knowledge and understanding

Ainley, D, (1987), **Chemistry in Today's World** (New Edition), Bell & Hyman, London. Chapter on Families of Elements.

Subject pedagogy

Oliver, R. The Periodic Table, In McDuell B (Ed), (2003), **Teaching Secondary Chemistry**, John Murray, London.

Sang, D. et al, (2002), **Teaching Secondary Scientific Enquiry**, John Murray, London.

Useful websites and applications

A historical perspective of the development of the periodic table can be found at www.genesismission.org/educate/scimodule/cosmic/explore_1ST.pdf

This is part of the excellent NASA jet propulsion modules on cosmic chemistry. See <http://www.genesismission.org/educate>

Information on channel 4 television programmes for schools can be found at <http://www.channel4.com/learning>

Information on BBC television for schools can be found from <http://www.bbc.co.uk/schools>

Resources:

Tutorial
Cards of the elements.
A TV and video is also required if task 2 has been selected.

Issue 3: Differentiation and SEN – Models of the atom

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Create two practical models for demonstrating atomic structure. One to be used with high ability pupils and one for less able pupils.
2. Select two different KS4 text books and look at the section on atomic structure. Decide which text is most suitable for less able pupils and decide how it could be used in the lesson.

Possible activities during tutorial:

1. Show the models created. Explain how each is suited to a different group of pupils. Discuss how they would be used in the lesson.
2. Show both texts and explain the selection made. Discuss the advantages and disadvantages of using a text book in a lesson on this topic.

- AST Input:** • Lead a discussion on using different learning styles to differentiate the learning.

Reading: Subject knowledge and understanding

Subject pedagogy

Oliver, R, The Periodic Table, in McDuell, B. (Ed), (2003), **Teaching Secondary Chemistry**, John Murray, London.

Useful websites and applications

<http://www.webelements.com> An interactive periodic table for use with lower ability pupils.

www.creative-chemistry.org.uk/gcse/module8.htm

A variety of worksheets and power point presentations.

Resources: