

Topic: Elements, Compounds and Mixtures

Prepared by: Richard Hudson, Simon Beach, Roger Lock and Allan Soares

Issues tackled:

1. **Misconceptions** - Using common errors in the literature to discuss approaches to teaching.
2. **Models and analogies** - To understand the difference between elements, mixtures and compounds.
3. **ICT** - Using ICT in learning about elements, compounds and mixtures.

Issue 1: Misconceptions - Using common errors in the literature to discuss approaches to teaching

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Come to the tutorial with a description of what you understand by the terms 'element', 'compound' and 'mixture'. Be prepared to explain these terms.
2. Using Taber (2002), identify three misconceptions pupils may have about elements, compounds and mixtures. Plan a part of a lesson around one of the misconceptions identified.
3. Identify several misconceptions arising from responses to SATs questions. Plan a part of a lesson around one of the misconceptions identified.

Possible activities during tutorial:

1. Trainees report on the preparation task and mentor extends to include pupils' correct/incorrect ideas/usage of terminology e.g. misuse of 'pure'; compounds contain molecules only; elements contain atoms only.
2. and 3. Trainees present the misconceptions and their ideas. Discuss the teaching approaches that could be used to address these misconceptions.

AST Input:

- Explain ways of eliciting pupils' misconceptions e.g. open ended questions, diagrams – this input could link into tasks for issue 2.
- Play the role of a Key Stage 3 pupil and suggest some common misconceptions. Ask trainees how they would challenge these misconceptions.

Reading:

Subject knowledge and understanding

Any GCSE Chemistry textbook will provide sufficient background knowledge e.g. Ryan, L (2001) **Chemistry for You**. Nelson Thornes, Cheltenham.

Any Key Stage 3 revision guide e.g. Bitesize

www.bbc.co.uk/schools/ks3bitesize/science/chemistry

Subject pedagogy

Taber, K. (2002) **Challenging misconceptions in the classroom?** Royal Society of Chemistry, London.

<http://www.rsc.org>

Then into A-Z contents; Schools and Colleges Service; Teacher Fellow Publications;

Chemical Misconceptions to see how to purchase.

Useful websites and applications:

Some interesting ideas can be found in Appendix 4
Brunel University Chemistry Materials.

Cleminson, A. (ed.) (2003) **Brunel University Chemistry Materials**; [Section 8 Elements, Mixtures and Compounds.](#)

Useful for revision of Key stage 3 chemistry BBC Bitesize at
<http://www.bbc.co.uk/schools/ks3bitesize/science/chemistry>

Resources:

Task 1

Taber, K. (2002) challenging misconceptions in the classroom? Royal Society of Chemistry, London.

<http://www.rsc.org> then into A-Z contents; Schools and Colleges Service; Teacher Fellow Publications; Chemical Misconceptions.

Or visit

<http://www.chemsoc.org/pdf/learnnet> then click on 'miscon2' and then on 'definitions in chemistry' and 'elements, compounds or mixtures'.

Task 2

QCA SATs reports 1999-2003 (includes misconceptions) at
www.qca.org.uk/ages3-14/tests_tasks/2670_6048.html

Issue 2: Models and analogies - To understand the differences between elements, mixtures and compounds

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Produce a model that will help pupils understand the difference between elements, mixtures and compounds. Make it clear to which style of learner your resource is directed.
2. Evaluate a worksheet based on the differences between elements, mixtures and compounds in terms of the model being used.

Possible activities during tutorial:

1. Present the model to your mentor.
2. Discuss the worksheet you have researched.

AST Input:

Provide an evaluation of the trainee model. You can do this in several ways:

- Play the role of a pupil and question the model; or
- Offer your own alternative model and compare and contrast the merits of the two models; or
- Discuss the limitations of the model and improve it.

Reading:

Subject knowledge and understanding

Any GCSE Chemistry textbook will provide you with sufficient background knowledge for teaching at KS3. For example

Hill, G. (1986) **Chemistry Counts**. Hodder and Stoughton, London.

Ryan, L (2001) **Chemistry for You**. Nelson Thornes, Cheltenham.

Subject pedagogy

For research on models in science teaching:

<http://www.chemsoc.org/pdf/learnnet/miscon3/evidence.pdf>

Read this for general advice on what modelling is and how it can be used.

Useful websites and applications:

Resources:

Task 1

<http://www.chemsoc.org/pdf/learnnet/miscon3/evidence.pdf>

Task 2

Any appropriate worksheet taken from the departmental scheme of work.

Issue 3: ICT - Using ICT in learning about elements, compounds and mixtures

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Look at a commercial CD-ROM dealing with elements, compounds and mixtures to evaluate how it might be used to teach these ideas.
2. Develop a PowerPoint presentation designed to teach about elements, compounds and mixtures.

Possible activities during tutorial:

1. Present relevant aspects of the CD-ROM where the mentor plays the part of a pupil. Analyse the strengths and limitations of using this aspect of ICT.
2. Present the PowerPoint to the mentor.

AST Input:

- Discuss possible improvements and strengths of the PowerPoint presentation.
- Present other ways of teaching this topic using ICT.

Reading:

Subject knowledge and understanding

Subject pedagogy

Frost, R. (1996), **The IT in Secondary Science Book**. Association for Science Education, Hatfield.

Useful websites and applications:

Resources:

Task 1

Any appropriate CD-ROM can be used for task 1. An example of an appropriate CD-ROM is Elements, Compounds and Mixtures available from Multimedia Science School, New Media.

<http://www.new-media.co.uk>