

Topic: Energy Transfer in Reactions

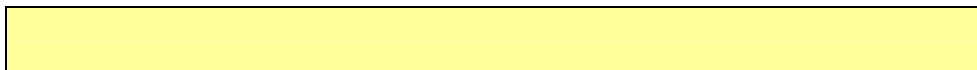
Prepared by: John Booth and Kristin Bunting.

Issues tackled:

1. Key ideas, use of language and terminology - Developing a glossary of key words.
2. Practical work - A selection of experiments to study energy changes in reactions.
3. Investigative skills – Neutralisation.
4. Applications, relevance and cross-curricular issues - Uses of endothermic and exothermic reactions.

Issue 1: Key ideas, use of language and terminology – Developing a glossary of key words.

Trainees have already covered on their PGCE course:



Tasks for trainees:

Preparation for tutorial:

1. Make a list of the key words for this topic and develop a matching exercise.
2. Make a list of the key words for this topic and develop a question loop.

Possible activities during tutorial:

- 1 and 2. Create a glossary for the key words. Consider suitable definitions to give to more and less able pupils
- 1 and 2 Exchange the prepared resources and see if the trainees can accurately complete the task developed by their colleague.

Mentor Input:

- Agree key words then work together on the glossary to ensure words are appropriate and the language used is accessible to all.
- Suggest that inaccuracies exist in the resources developed to explore trainee confidence in subject knowledge.

Reading: Subject knowledge and understanding

Ryan, L. (2002) **Chemistry for You**, Nelson Thornes, Cheltenham.
Chapter 15.

Ramsden, E., (1992), **Chemistry for GCSE**, Prentice Hall, Harlow.

Hill, G. (2002), **Chemistry Counts**, Hodder, London.

Subject pedagogy

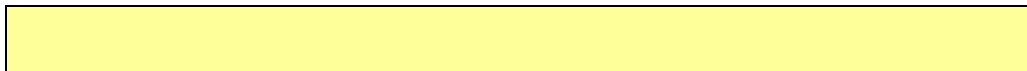
Useful websites and applications

There is some good, factual information at www.gcsescience.com Follow links to GCSE chemistry, Contents and then Rates of Reaction.

Resources: For task 1, 2 and tutorial
Syllabus.
School scheme of work.
GCSE text books.

Issue 2: Practical work – A selection of experiments to study energy changes in reactions.

Trainees have already covered on their PGCE course:



Tasks for trainees:

Preparation for tutorial:

1. Read chapter 15 from Chemistry for You, focussing on the practical activities. (15.1 to 15.6). Make a list of those you would like to offer as class practicals and demonstrations. N.B the experiment headings are listed in the resources below.
2. Discuss with the technician the feasibility of these practicals.

Possible activities during tutorial:

1. and 2. Discuss the selection of practical activities for the topic.

Mentor Input:

- Set up and trial together some of the chosen activities.
- Look at equipment lists and discuss risk analyses.
- Work together to produce a pupil worksheet to support a practical task.

Reading: Subject knowledge and understanding

Subject pedagogy

Use the school Scheme of work.

Ryan, L., (2002), **Chemistry for You Support Pack**, Nelson Thornes, Cheltenham. Pages 210, 211, Experiments 15.1 – 15.6.

Useful websites and applications

Resources: For **tasks 1 and 2**

Access to Chemistry for You is essential and to the supporting worksheets is highly desirable.

For the **tutorial**

The mentor or trainee will need to select experiments to trial from the list below:

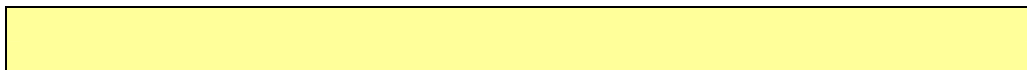
- 15.1 Products of combustion.
- 15.2 Effect of SO₂ on plants.
- 15.3 Exothermic reaction and Temperature sensor.
- 15.4 Endothermic reaction and Temperature sensor.
- 15.5 Study of reactions to decide exo/endothermic.
- 15.6 Deciding the ideal fuel.

Hazcards and pages from the CLEAPSS folder appropriate to the experiments.

Suggested chemicals for experiment 15.3 are; sodium hydroxide and hydrochloric acid, sodium hydrogen carbonate and citric acid, copper sulphate solution and magnesium powder, dilute hydrochloric acid and magnesium ribbon.

Issue 3: Investigative skills - Neutralisation

Trainees have already covered on their PGCE course:



Tasks for trainees:

Preparation for tutorial:

The suggested activity is to measure the effect on the temperature change (dependant variable) when the concentration of the acid or alkali (independent variable) is changed.

1. Familiarise yourself with the Planning, Obtaining evidence, Analysing and Evaluating mark descriptors in the GCSE syllabus. Read and bring to the tutorial any departmental *pro formas* for coursework write up.
2. Research the theory of neutralisation reactions and of energy changes involved in making and breaking bonds. Consider at what level the pupils in your class may be able to make use of this theory.

Possible activities during tutorial:

1. Discuss the planned investigation and decide whether it should be for assessment of all or some of the criteria.
2. Agree on the appropriate knowledge and understanding needed to justify a prediction and explain the results in this investigation.

Mentor Input:

- Trial the experiment, include selection of appropriate quantities and concentrations of the solutions to be offered. Write an equipment list.
- Agree upon the management of the activity.
- Discuss safety and produce a risk analysis.

Reading: Subject knowledge and understanding

GCSE Coursework mark descriptors.

A Level Textbooks to cover; Theory of Neutralisation and bonding, energy-level diagrams, calculating delta H.

Subject pedagogy

Sang, D and Wood-Robinson, V., (2002), **Teaching Secondary Scientific Enquiry**, John Murray, London.

Useful websites and applications

The examination board websites all offer coursework guidelines and exemplar work.

Resources: **Tutorial**

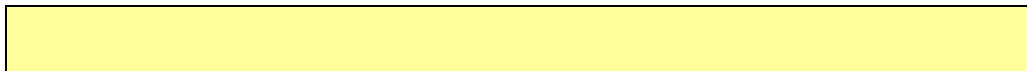
Hazcards, CLEAPSS CD ROM or folder.

Practical equipment to include.

Reagents, safety equipment, volumetrics, temperature probe or thermometer.

Issue 4: Applications, relevance and cross-curricular issues - Uses of endothermic and exothermic reactions.

Trainees have already covered on their PGCE course:



Tasks for trainees:

Preparation for tutorial:

1. Research some applications of endothermic reactions.
2. Research some applications of exothermic reactions.

Possible activities during tutorial:

- 1 and 2 Discuss these applications and their potential relevance to pupils.

Mentor Input:

- Emphasise how these examples could engage pupils.
- Suggest examples of applications and discuss how they might enhance pupil learning.

Reading: Subject knowledge and understanding

Subject pedagogy

Useful websites and applications

There is a lot of potentially useful information on the RSC web site at www.chemsoc.org
Click on learning resources then search for endothermic or exothermic reactions.

This site gives some examples of endothermic and exothermic reactions:
www.gcsescience.com - follow GCSE Chemistry, Energy.

Resources: