Topic: Useful Products from Organic Sources

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Issues tackled:

1. **Key ideas, use of language and terminology - Defining and demonstrating some key terms.**
2. **Models and analogies – Making models of hydrocarbons**.
3. **Practical work – Health and safety issues and possible activities.**
4. **Applications, relevance and cross-curricular issues - Links with the geography and technology curricula.**

Issue 1: Key ideas, use of language and terminology – Defining and demonstrating some key terms.

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Find out the meaning of the following words; volatility, viscosity, flammable, inflammable, distillation (simple and fractional) and saturated in the context of this topic.
2. Prepare a card loop or other activity for pupils to revise the meanings of the words in task 1 at the end of the topic.

Possible activities during tutorial:

1. Trainees explain the meanings of the words and how they think it would be best to define them for pupils.
2. Demonstrate the key word revision activity.

AST Input:

- Discuss the use of language in the topic and the loose language used.
- Discuss ways of demonstrating the above concepts.
- Demonstrate the lighting of fractions to show flammability.
- Demonstrate coating of tubes with fractions for viscosity.
- Discuss where simple distillation is used as opposed to fractional distillation.

Reading:

Subject knowledge and understanding

Science dictionary to look up the key words.
Any Key Stage 4 text which covers this topic.

Subject pedagogy

Useful websites and applications

http://www.dictionary.co.uk/ - an online dictionary.

Resources:

Tutorial

Equipment for demonstrations of flammability and viscosity.

Issue 2: Models and analogies – Making models of hydrocarbons.

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:
1. Research structure of hydrocarbons and patterns of the structures.
2. Find the modelling kits that are available to show hydrocarbon molecules and build some examples. Think about other ways of modelling polymerisation.

Possible activities during tutorial:
1. Go through the structure and properties of the hydrocarbons on the syllabus. Discuss methods to help pupils remember the essential information.
2. Present a few models of molecules. Discuss the use of the models and their limitations. Discuss other ideas to model polymerisations.

AST Input:
- Reinforce the knowledge of the structures of alkanes, alkenes and polymers.
- Show trainees how the modelling kits can be used to model the structures.
- Discuss the use of role-play to demonstrate polymerisation. Discuss the idea's strength and limitations.

Reading:

Subject knowledge and understanding

Any KS4 text, such as Ryan, L., (2001), **Chemistry for you**, Nelson Thornes, Cheltenham.

Subject pedagogy

Ryan.L. (2001) **Chemistry for You Support Pack**, Nelson Thornes, Cheltenham.
Pages 158 The Alkane family.
Page 162 Monomers and polymers.
Page 163 Explaining polymerisation.

Useful websites and applications

Resources: **Task 2** and the **tutorial**
Molecule modelling kits.

Issue 3: Practical work – Health and safety issues and possible activities.

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Pick a practical activity to show fractional distillation, cracking, polymerisation (making nylon) or combustion of fuels. Look at the Hazcards for the chemicals involved. Produce a risk assessment for the practical.
2. Design a worksheet to accompany a practical activity described in the scheme of work.

Possible activities during tutorial:

1. Demonstrate the practical while talking through the possible risks and any precautions which should be taken.
2. Present the worksheet, and discuss its value to support the lesson.

AST Input:

- Talk through (and possibly demonstrate) all the practical activities with the trainees, include health and safety and risk assessments.
  The practicals depend on the school scheme of work, but are likely to include fractional distillation, cracking, polymerisation (making Nylon) and combustion of fuels (alkanes).
- Discuss demonstration difficulties particularly with using a fume hood.

Reading:

Subject knowledge and understanding

Ryan, L. (2005) **Chemistry for You**, Nelson Thornes, Cheltenham.
Other GCSE textbooks.

Subject pedagogy

DfEE, **Safety in Science Education,** Chapter 4 Risk Assessments.
CLEAPSS folders pages
Fractional distillation page 1307 and 741.
Cracking page 1308.
Making nylon page 1341.

HAZCARDS
Cracking 45.
Burning hydrocarbons 45.
Fractional distillation 45.
Making Nylon 3, 41, 100, 103.
Crude oil 45.

Useful websites and applications

Resources:

Task 1
Equipment for experimental demonstrations as described.

Task 2
It is useful to read Ryan, L. (2005), **Chemistry for You – Teacher Pack**, Nelson Thornes, Cheltenham before attempting this task.

Issue 4: Applications, relevance and cross-curricular Issues – Links with the geography and technology curricula.

Prior knowledge and experience:

Possible tasks:

Preparation for tutorial:

1. Look at how the PSHE and geography department teach fossil fuels (crude oil) and their effects. How could this be related to the science curriculum? Produce a list of similarities and differences between the departments.
2. Visit the design and technology department to see how they teach plastics. How could this be related to the science curriculum? Produce a list of similarities and differences between the departments.

Possible activities during tutorial:

1. and 2. Report back the findings from discussions with other departments. Discuss how these links can be used in the lessons.

AST Input:

- Discuss the possible environmental issues associated with crude oil and its products. Give examples of lessons which allow pupils to consider and discuss these issues.

Reading:

Subject knowledge and understanding

Geography, PSHE and Design technology curricula can be found at www.nc.uk.net

Salter's GCSE Science year 11, page 43 – 62; Making use of oil.

Ryan, L. (2001) **Chemistry for you support pack**, Nelson Thornes, Cheltenham.

Appropriate video and any support pack available at the school.

Subject pedagogy

McDuell.B (Ed), (2000), **Teaching Secondary Chemistry,** ASE/John Murray, London.

Useful websites and applications

There are many available websites to look at environmental impacts of crude oil and its products e.g.
http://www.archive.official-documents.co.uk/document/seeec/impact/seeec-1.htm

Resources: