QER Science Lesson – Year 8
Dehydration of oil shale

NOTES

Oil shale is composed of between 17 and 25% water and before the oil can be extracted, this moisture needs to be removed. At the QER New Fuels Development Centre, the oil shale passes through a drying plant, like an enormous pizza oven, in which hot air is blown over it at 200 degrees Celsius. In this lesson, you will conduct an experiment to reproduce this process and determine just how much water a rock can hold.

In this lesson, students will:

- conduct an experiment to determine the water content in oil shale.

LESSON-LEVEL CONTENT DESCRIPTIONS

The Australian Curriculum: Year 8

Science Understanding

Chemical sciences: The properties of the different states of matter can be explained in terms of the motion and arrangement of particles (ACSSU151)

Elaborations:

- linking the energy of particles to temperature changes

Chemical change involves substances reacting to form new substances (ACSSU225)

Elaborations:

- identifying the differences between chemical and physical changes

Year 8 achievement standard

By the end of Year 8 students investigate questions to reach conclusions consistent with scientific knowledge. They describe how science inquiry contributes to an understanding of the world. Students measure and control variables, present data and findings that support their conclusions, and describe

how improvements to methods could improve the quality of their results. Students compare physical and chemical changes and describe differences between substances using the particle theory. They describe examples of how different forms of energy cause change in simple systems. They describe a situation where scientific knowledge has been used to solve a real-world problem and demonstrate an awareness of how the application of science can affect people in different ways.

LESSON OUTCOMES

The assessment focus of this lesson is formative: The classroom activities provide an opportunity for students to generate evidence with which the teacher can establish the student's progress towards understanding the concepts that are being developed in this lesson.

Science Outcomes	Literacy Outcomes	Numeracy Outcomes
Students may/should be able to:		
• explain loss of mass through evaporation • measure mass using laboratory balances • explain the value of a larger sample of data in reducing potential for error	• listen • read • view • write • speak • create print materials • discuss scientific phenomena • document scientific phenomena • hypothesise about speculative ideas • use technical terms in a scientific context	• measure practically • collect data • represent data • interpret data • measure using formal units • consider uncertainty and reliability in measurement • collect quantitative data • analyse data • analyse data statistically • calculate percentage

BACKGROUND INFORMATION

Students should have a background knowledge of:

- evaporation
- calculation of percentage

PREPARATION LIST

- copy or provide online access to the Oresome Resources Oil Shale Fact Sheet http://www.oresomeresources.com/resources_view/resource/fact_sheet_oil_shale
- source a bag of oil shale from the QER mine
- assemble other equipment for the experiment:
- laboratory balance
- domestic oven
- oven trays
- oven gloves
- copy and circulate the activity Dehydration of oil shale experiment

ACTIVITY SEQUENCE

1. Introduce the lesson by giving each student a sample of oil shale. Let them handle it and get a feel for this soft rock with an oily texture.

NOTES

2. Complete the experiment Dehydration of oil shale.

3. While students are waiting for their shale in the oven, work through a brief overview of oil shale using the Oresome Resources Oil Shale Fact Sheet http://www.oresomeresources.com/resources_view/resource/fact_sheet_oil_shale

4. When students come to question four in the experiment (recording results for the class), this might be best managed with a table on the board for them to each write their results into before copying the table into their books.

5. Students write a full experimental report.

NOTES

OPPORTUNITIES FOR CONDUCTING FORMATIVE ASSESSMENT

- Marking of experimental investigation reports.

LINKS TO OTHER LEARNING AREAS

The following suggested activities may be used to provide a link between the content of this unit and that of other learning areas, in particular those related to Mathematics, English and ICT.

- Use of spreadsheets or graphics calculators to tabulate class results and calculate differences, percentages and totals.

ADDITIONAL RESOURCES

- www.qervisitorcentre.com.au – Extensive overview of QER New Fuels Development Centre, including video snippets, animations, graphs, maps and explanations relating to:
  - Australia's fuel challenge
  - QER and sustainability
  - benefits for Australians
  - turning oil shale into fuel
- Oil Shale fact sheet www.oresomeresources.com/resources_view/resource/fact_sheet_oil_shale