QER for Schools

QER Science Lesson – Year 12

The process of extraction of oil shale

NOTES

The QER New Fuels Development Centre and oil shale mine at Yarwun near Gladstone is dedicated to the creation of low sulphur oil from shale to produce diesel and jet fuels. Demonstration of the best technology for the extraction of oil from oil shale is integral to this process. In this lesson you will discover the Paraho II process and the many and varied disciplines of science that it draws upon to demonstrate that you really can draw oil from a stone.

In this lesson, students will:

- use a number of resources including a video and PowerPoint presentation to create a step-by-step flow diagram for the Paraho II process of extracting oil from oil shale

LESSON-LEVEL CONTENT DESCRIPTIONS

Queensland Science 21 Syllabus: Year 12

Focus Area: Energy: Energy is the ability to cause a change in an object. When objects interact with each other energy is transferred and/or transformed. Energy is intimately related to the concept of matter; it manifests itself in various forms, and powers life and change at the molecular, everyday and astronomical levels.

Key Concepts: EN1 Forms of energy

Elaborations: Different forms of energy include: Chemical

Possibilities for linking key concepts to scientific priorities: Energy transfers and transformations occur in all contexts, some of which could include:

- power generation (Tech)
- heating and cooling (Env)
- transport and communication (Tech, CfD)

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 the key elements of the processes for extracting oil from oil shale • create a key for a complex flow diagram	• listen • read • view • write • speak • summarise • create print materials • discuss scientific phenomena • document scientific phenomena • use technical terms in a scientific context	• collect data • represent data • interpret data • collect qualitative data

BACKGROUND INFORMATION

The Paraho II process and the various affiliate processes for the treatment of oil and waste products are detailed and complex, and it is recommended that teachers spend some time familiarising themselves with the video, PowerPoint and other resources so as to break down the material according to the level of ability of the class.

PREPARATION LIST

- Source the 3D animation video or the short video from the QER web site: www.qervisitorcentre.com.au –> Turning oil shale into fuel
- Source the PowerPoint Presentation: Paraho Process Presentation

ACTIVITY SEQUENCE

1. Introduce the lesson by distributing the document The Paraho Process – Illustrative process flows to students. Have them affix it to one side of their notebook, with a blank page opposite. Explain that their task throughout each of the activities and inputs during this lesson is to:
   - number each of the stages in the process on the diagram, starting with 1 in the top left and finishing on the bottom left. They should number the stages as sequentially as possible, although not every stage follows linearly, so they should use some discretion with numbering at these points.
   - on the opposite page, for each number on their diagram, write a sentence of explanation of the process that is occurring for each stage.
2. Present the following resources to the class as research to complete this task. Guide them through the more complex elements of the process by stopping and discussing as appropriate to the ability of the class.
   - PowerPoint Presentation: Paraho Process Presentation
   - view the full 3D animation video (source from QRC) or the short video from the QER web site: www.qervisitorcentre.com.au –> Turning oil shale into fuel
3. As a class discussion to reinforce the learning, go around the class and have students successively read out their explanations of each stage in the process.

OPPORTUNITIES FOR CONDUCTING FORMATIVE ASSESSMENT

- Observe student responses in their notebooks as they complete the activity, or collect books to read later

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.

- this activity could be documented electronically, with students adding captions or animations to the flow diagram using appropriate software

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

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