



University Learning in Schools

Chemistry

**The Engineer's Guide to
Cleaning Up an Oil Company's
Mess**

Module Rationale



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Module Rationale

Title of Module: The Engineer’s Guide to Cleaning Up an Oil Company’s Mess
Teacher/researcher pair: Shivashkar Singh/Matthew Dudson-Green

Module Rationale	
Why did you chose your particular theme (consider: inspiration, ambition, creativity, new ways of thinking, pragmatism, tailoring research to exam requirements)?	Water research is a prominent topic, and treating water pollution is a contemporary challenge. Vast amounts of oily waste are produced during crude oil extraction, and this is a concern for environments into which it is released. This course will explore innovative means of treating oily waste by introducing pupils to process engineering concepts.
What did you hope to achieve? (i.e. what was your over-arching objective?)	To introduce pupils to the concept of process engineering and to get them to understand that a process needs to be economically feasible and still achieve the treatment requirements. The pupils will learn that having one of these options is unsustainable.
How did you decide on the time frame for your module? (To fit to a half-term? To fit with an assessment cycle? Based module on x number of lessons of y length over z number of weeks)	The lesson is based on 6 lessons over 2 weeks to fit in with the teaching schedule for the existing crude oil module in the school.

Overview of Module What are the components?	
Lesson plans/rationale	There will be 5 teaching lessons, and one presentation lesson. Lessons 1 and 2 will teach the pupils about the fundamentals of crude oil and its extraction. Lessons 3,4 and 5 will introduce pupils to concepts of process engineering. Lesson 6 is a presentation lesson where pupils will present their work in the form of a powerpoint and poster
Presentations	Pupils will be required to make a 10-minute powerpoint presentation of their answer to the final assignment, and will have to condense their solution into poster form.
Resources required for pupils (books, lab equipment, computer facilities, etc.)	Pupils will need books to take notes, as well as computer facilities to design their powerpoint presentation.
Resources provided in lessons by teacher (text extracts, images, journal articles, etc.)	Teachers will provide the workbook to supplement the powerpoint slides and to assist pupils with the homework.

Unit overview			
Individual Lesson Objectives, Key Questions and Key Concepts & Terminology NB - This will be your final scheme of work (in medium-term plan form). By using this table, your scheme of work will fit into the proforma for dissemination.			
Lesson	Objective	Key Question(s)	Key Concepts & Terminology
1	To introduce pupils to crude oil To talk about its uses and how it is extracted	What is crude oil? What are hydrocarbons? What do we use crude oil and its products for?	Crude oil Hydrocarbons Fractional distillation
2	To introduce pupils to the concept of the chemistry of hydrocarbons	What is the chemical structure of hydrocarbons? How do we separate a mixture of hydrocarbons?	Intermolecular forces Fractional distillation
3	To introduce pupils to the waste products produced by crude oil refining To introduce pupils to techniques of treating petroleum waste water	What types of waste products are produced from crude oil refining? What are the consequences of not treating this waste? How do we treat this waste?	Petroleum waste water Microbial treatment Clarification Advanced oxidation Chemical oxygen demand
4	To show pupils a means of depicting chemical processes on paper To make pupils understand the components that makes up a chemical process.	How do we depict an idea of a chemical process on paper? How do we depict the process of refining crude oil on paper? How do we depict the process of treating waste water on paper?	Block flow diagrams Units Streams

5	To introduce pupils to techniques in determining if a chemical process is feasible	What do we need to consider when determining how effective a process is? How do we calculate the cost of a chemical process?	Capital costs Operational costs
6	To give pupils the opportunity to present their work in the form of a poster and a presentation	-	-

Evaluation

*What is the impact of the module? Consider the impact, if any, that planning, teaching and assessing the module has made on both **pupil** and **teacher** in each category:*

Impact	On pupil	On teacher
Subject skills learned		
New conceptual understanding or new ways of thinking		

Reflection		
Stop	Start	Carry on
What should be excised or not repeated?	What should teachers add to the module next time it is taught?	What aspects worked well and should definitely be repeated next time the module is taught?