Crude oil timeline

Specification references

* C10.1.1 Using the Earth’s resources and sustainable development
* WS 3.2

Aims

In this activity you will make a timeline that shows how humans have exploited crude oil.

Learning outcomes

After completing this activity, you should be able to:

* list some human uses of the Earth’s resources
* state an example of a natural product that is supplemented or replaced by agricultural or synthetic products
* explain the use of natural, sustainable, and finite resources
* interpret information from different formats including graphs, charts, tables, and prose
* understand data and interpret information using orders of magnitude to compare
* explain the role of chemistry in improving agricultural and industrial processes
* draw conclusions consistent with information provided from graphs, charts, tables, and prose and evaluate the validity of the data
* construct a timeline for crude oil.

Setting the scene

* Currently the whole population of the Earth uses roughly 100 million barrels of crude oil per day and 2500 million cubic metres of petroleum gas each day.
* It took millions of years for crude oil to form but man will probably use up the world’s resources within the next 50−100 years.
* Currently 90% of the crude oil that comes out the ground is burned as fuel. The other 10% is used to make petrochemicals, such as plastics (polymers), medicines, paints, detergents, and dyes.
* The composition of crude oil varies worldwide. It is a mixture of mainly hydrocarbons. However, it has small amounts of other organic molecules containing oxygen, sulfur, and nitrogen, and even very small traces of metallic elements.

Task

Using information from the Internet construct a crude oil timeline. It may be helpful to think about and try to answer these questions:

* How was crude oil formed?
* When was it first used by man?
* When was the first oil-well drilled?
* When was crude oil first refined?
* When was crude oil first broken down into fractions?
* What caused large-scale expansion of the oil industry?
* When was the first synthetic polymer produced from crude oil?
* When was the first synthetic fibre produced from crude oil?
* When did fracking begin?
* How long are the world’s reserves of crude oil likely to last?

Questions

1 Crude oil is mixture of hydrocarbons and these are separated by fractional distillation.

 a Name the five main fractions produced from crude oil.

 (*5 marks*)

 b Identify one use for each of these fractions.

 (*5 marks*)

2 State three examples of finite resources used by the chemical industry.

 (*3 marks*)

3 Name two synthetic polymers that can be used instead of natural fibres like cotton and silk.

 (*2 marks*)

Student follow-up

1 Distinguish between a natural and synthetic resource. Give examples to illustrate the difference.

 (*2 marks*)

2 Ethene can be made from the lighter fractions of crude oil. It is used to make polymers like poly(ethene). Ethene can also be made by dehydrating ethanol. Explain why the first method is ‘unsustainable’ but the second method is a ‘renewable resource’.

 (*3 marks*)

3 Use the Internet to find out more about the recently developed process for oil and gas extraction called **hydraulic fracturing** (fracking). Find out when fracking is used and how it works.

 (*4 marks*)