Oil fractions: matching properties to uses

Student activity • observation and reasoning

YEAR 11 / LESSON 74 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

The question

Why do different fractions suit different jobs?

Arrange six refinery fractions and explain their uses through relative boiling range and viscosity. Keep qualitative trends separate from exact composition.

Equipment

- Booklet, pencil, periodic table and optional molecular model kit

Desk activity only; keep small model pieces away from mouths.

Course coverage: Shared core: 4.8–4.10. Fractions and their uses; no fixed carbon-number boundaries are assumed.

Plan, model or apparatus sketch

Draw a labelled structure or model to explain your reasoning for this lesson.

Method and reasoning

Read the whole sequence before starting

YEAR 11 / LESSON 74 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

1. Place refinery gases, gasoline, kerosene, diesel, fuel oil and bitumen in order from generally lower to higher boiling range.

2. Sketch their approximate outlet positions on a column with a hotter base and cooler top.

3. Match cooking/heating, petrol engines, aircraft fuel, diesel engines, industrial/ship fuel and road surfacing to the six fractions.

4. Explain the broad increase in viscosity, darkness and boiling range towards heavier fractions.

5. Compare two written design briefs: a volatile petrol fuel and a durable road binder. Justify why the same fraction is unlikely to fit both.

6. Correct the claim that a fraction is one pure molecule with a single boiling point.

Cleanup

- Return shared equipment and retain corrected reasoning.

Record your evidence

Blank spaces are for your own work

YEAR 11 / LESSON 74 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Reference and task data

Fractions to classify: refinery gases; gasoline; kerosene; diesel; fuel oil; bitumen. General trends towards heavier fractions: darker, more viscous and higher boiling ranges. Actual boundaries vary by crude feed and refinery process. No actual sample or numerical property dataset is supplied.

Task	My structure / working	Reason / correction
Light fractions		
Middle fractions		
Heavy fractions		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

YEAR 11 / LESSON 74 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

1. Order gasoline, bitumen and kerosene by increasing boiling range.

2. Give a use of refinery gases.

3. Match kerosene and diesel to suitable uses.

4. Explain why bitumen can suit road surfacing.

5. Explain why heavier hydrocarbons generally boil at higher temperatures.

6. Why should a fraction be described with a boiling range?