

11.3 Fuels

Name: _____ Class: _____ Date: _____

Total: 8 marks

KEY WORDS petroleum 石油 • hydrogen 氢气 • fractions 馏分 • hydrocarbon 碳氢化合物
• fractionating column 分馏塔

Objective

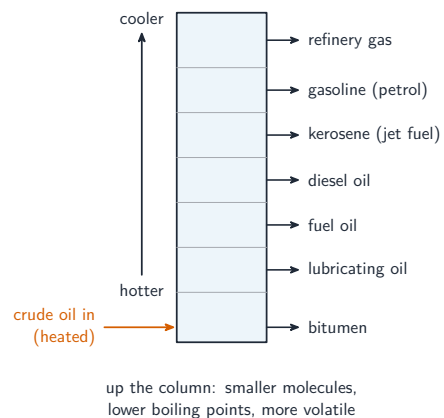
Build the skills to answer exam questions on **fuels** 燃料 — **fossil fuels** 化石燃料, **hydrocarbons** 碳氢化合物, and the **fractional distillation** 分馏 of petroleum.

You must be able to:

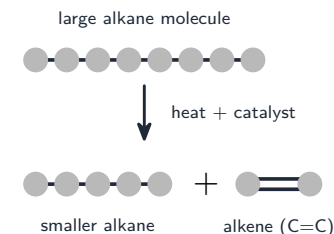
- name the fossil fuels and define a hydrocarbon
- describe fractional distillation and the trends up the column
- match fractions to their uses

1 Worked examples

■ Fractional distillation



Hot at the bottom, cool at the top; each fraction condenses at a different height



Cracking turns long fractions into useful fuels

- going **up** the column: shorter chains, higher volatility, lower boiling point, lower viscosity.
- fractions: refinery gas, gasoline, naphtha, kerosene, diesel, fuel oil, bitumen.

2 Practice

2.1 Define a hydrocarbon. [1]

2.2 Name the fraction used as fuel for cars. [1]

3 Exam-style questions

3.1 Going up the fractionating column, the boiling point of the fractions: [1]

- A increases
- B decreases
- C stays the same
- D increases then decreases

3.2 Petroleum is separated by fractional distillation.

(a) Explain why the different fractions separate. [2]

(b) State one use of bitumen. [1]

3.3 Explain why a fraction near the top of the column flows more easily than one near the bottom. [2]

Solutions

2.1 a compound containing hydrogen and carbon only.

2.2 gasoline / petrol.

3.1 B. Boiling point decreases up the column.

3.2 (a) the fractions have different boiling points; they condense at different heights as the column cools towards the top.

(b) making roads.

3.3 fractions near the top have smaller molecules / lower viscosity; so they flow more easily than the larger molecules near the bottom.