

4.1 Crude oil alkanes and alkenes

Name: _____ Class: _____ Date: _____

Total: 21 marks

Objective

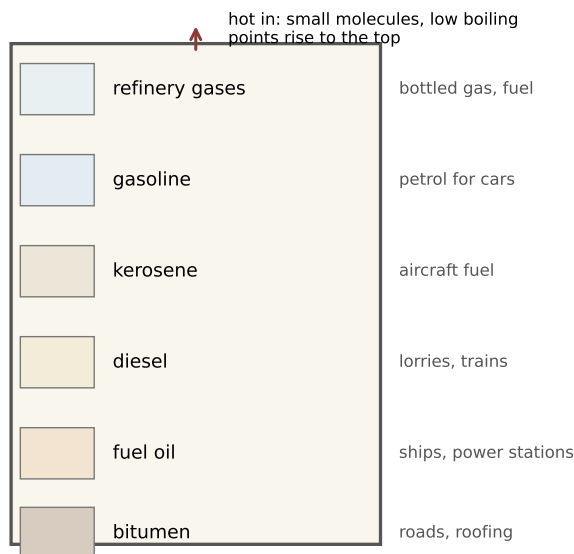
Cover introduction, crude oil, alkanes and alkenes (4.1–4.28): formula types and naming, fractional distillation, combustion and pollution, cracking, alkane substitution and alkene addition with bromine water. Original IGCSE-level practice.

1 Key knowledge and worked examples

■ Families and their formulae

alkanes C_nH_{2n+2} C-C single bonds only	alkenes C_nH_{2n} one C=C double bond	alcohols (C) $C_nH_{2n+1}OH$ -OH group
carboxylic acids (C) $C_nH_{2n+1}COOH$ -COOH group	esters (C) $RCOOR'$ -COO- link	

■ The column and the furnace



Cracking: long alkane $\rightarrow$ alkene + shorter alkane (silica/alumina, 600–700 °C), because long fractions are oversupplied and short ones and alkenes are wanted.

■ Two reaction types

Alkane + halogen, UV: **substitution** (H swapped). Alkene + bromine: **addition** across C=C – bromine water decolourises.

2 Practice

2.1 State the general formulae of alkanes and alkenes. [2]

2.2 Name the fraction used for aircraft fuel and the one used for roads. [2]

2.3 Write the two products of complete combustion of propane. [2]

2.4 Name the two conditions for catalytic cracking, and name the catalyst. [3]

2.5 Give the colour change when ethene is bubbled through bromine water, and the reaction type. [2]

3 Exam-style questions

3.1 Explain how fractional distillation separates crude oil into fractions, referring to boiling points and the column's temperature gradient. [4]

3.2 Explain why carbon monoxide forms in car engines and why it is dangerous. [3]

3.3 Dodecane ($\text{C}_{12}\text{H}_{26}$) cracks into ethene and one other product. Write the equation, and give one reason industry wants more ethene. [3]
