Worksheet: Alkanes & Crude Oil

ChemistrySheets

Specification: GCSE Chemistry (AQA 5.7.1 / Edexcel SC20)

Core Concepts: Alkanes are saturated hydrocarbons (C_nH_{2n+2}). Crude oil is a finite mixture of hydrocarbons. Fractional distillation separates crude oil into fractions based on boiling points. Properties of fractions (boiling point, viscosity, flammability) vary with chain length and determine their uses.

Section A: Key Terms & Concepts

1. The diagram below shows a fractional distillation column used to separate crude oil. Label the parts indicated by the arrows, including the temperature gradient and the names of the fractions collected at different levels.

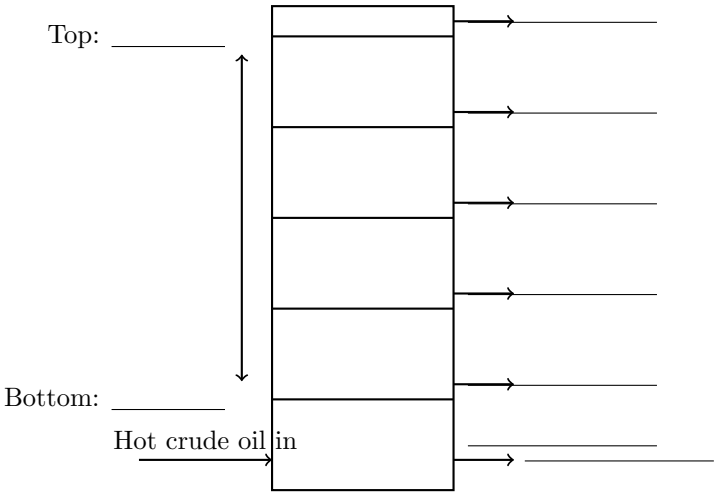

Figure 1: Fractional Distillation Column

2. Complete the following sentences using the most appropriate scientific terms.

a) Alkanes are _____ hydrocarbons, meaning they only contain _____ carbon-carbon bonds.

b) Crude oil is a _____ resource and a _____ of many different hydrocarbons.

c) As the chain length of an alkane increases, its boiling point _____, its viscosity _____, and its flammability _____.

Section B: Core Concepts & Explanations

1.

a) What is an alkane? State the general formula for alkanes.

b) Describe the trend in boiling points of alkanes as their carbon chain length increases, and explain why this trend occurs.

c) Explain why crude oil needs to be separated by fractional distillation before it can be used.

d) Describe the process of fractional distillation of crude oil within the fractionating column.

Section C: Exam Application & Extended Writing

1. The table below shows some fractions obtained from crude oil and their typical uses.

Fraction	Boiling Point Range (°C)	Typical Uses
Refinery gases	< 25	LPG, chemical feedstock
Gasoline (petrol)	25 – 100	Fuel for cars
Naphtha	100 – 150	Chemical feedstock
Kerosene (paraffin)	150 – 200	Jet fuel, heating oil
Diesel (gas oil)	200 – 300	Fuel for diesel engines
Fuel oil	300 – 370	Fuel for ships, power stations
Bitumen	> 370	Road surfacing, roofing

a) Using the information in the table, identify the fraction with the lowest boiling point and explain why it is collected at the top of the fractionating column.

b) Explain how the properties of different fractions obtained from crude oil relate to their uses. Refer to boiling point, viscosity, and flammability in your answer. (6 marks)