# GCSE Combined Science: Crude Oil, Hydrocarbons & Alkanes

AQA Specification 5.7.1.1

Name: _____ Class: _____ Date: _____

## Part 1: Key Terminology

Match the terms with their definitions.

| | | |
|---|---|---|
| **1.** | Crude Oil | A. Molecules containing only hydrogen and carbon |
| **2.** | Hydrocarbon | B. Finite resource from ancient biomass |
| **3.** | Alkane | C. Series of compounds with same general formula |
| **4.** | Homologous Series | D. Saturated hydrocarbon with single bonds |
| **5.** | Finite Resource | E. Ancient microscopic marine organisms |
| **6.** | Plankton | F. Resource that will eventually run out |

**Answers:** 1. _ , 2. _ , 3. _ , 4. _ , 5. _ , 6. _

## Part 2: Gap Fill

Complete using words from the box.

> **Word Bank:** alkanes, biomass, carbon, crude, finite, hydrocarbons, hydrogen, methane, mixture, plankton

1. _____ oil is a _____ resource found in rocks.
2. It was formed from ancient _____ mainly consisting of _____.
3. Crude oil is a _____ of many different compounds.
4. Most compounds in crude oil are _____, containing only _____ and _____ atoms.
5. Most hydrocarbons in crude oil are _____.
6. The first member of the alkane series is _____.

## Part 3: Multiple Choice

Circle the correct answer for each question.

**1. What is the general formula for alkanes?**
A. CnH2n
B. CnH2n+2
C. CnH2n-2
D. CnHn

**2. Which is NOT an alkane?**
A. Methane
B. Ethene
C. Propane
D. Butane

**3. What elements are in hydrocarbons?**
A. Hydrogen and oxygen
B. Carbon and oxygen
C. Hydrogen and carbon
D. Carbon and nitrogen

**4. Why is crude oil a finite resource?**
A. It can be easily replaced
B. It forms quickly
C. It will eventually run out
D. It is unlimited

# GCSE Combined Science: Crude Oil, Hydrocarbons & Alkanes

AQA Specification 5.7.1.1 - Continued

## Part 4: Alkane Formulae

1. Write the molecular formula for methane:

2. Write the molecular formula for propane:

3. Use the general formula to find the formula for heptane (7 carbon atoms):

4. Identify which of these is an alkane: $CH_4$, $C_2H_4$, $C_3H_8$, $C_4H_8$

## Part 5: Challenge Question **(6 marks)**

Crude oil is an essential resource in modern society but has significant environmental impacts.

• Explain what crude oil is and how it was formed. **(2 marks)**

• Describe why most compounds in crude oil are classified as hydrocarbons and what makes alkanes a homologous series. **(2 marks)**

• Using the general formula, calculate the molecular formula for an alkane with 10 carbon atoms. **(2 marks)**

# GCSE Combined Science: Crude Oil, Hydrocarbons & Alkanes - ANSWER SHEET

AQA Specification 5.7.1.1

**FOR TEACHER USE ONLY**

## Part 1: Key Terminology

1. Crude Oil → B. Finite resource from ancient biomass
2. Hydrocarbon → A. Molecules containing only hydrogen and carbon
3. Alkane → D. Saturated hydrocarbon with single bonds
4. Homologous Series → C. Series of compounds with same general formula
5. Finite Resource → F. Resource that will eventually run out
6. Plankton → E. Ancient microscopic marine organisms

## Part 2: Gap Fill

1. **Crude** oil is a **finite** resource found in rocks.
2. It was formed from ancient **biomass** mainly consisting of **plankton**.
3. Crude oil is a **mixture** of many different compounds.
4. Most compounds in crude oil are **hydrocarbons**, containing only **carbon** and **hydrogen** atoms.
5. Most hydrocarbons in crude oil are **alkanes**.
6. The first member of the alkane series is **methane**.

## Part 3: Multiple Choice

1. B. $C_nH_{2n+2}$

*General formula for alkanes*

2. B. Ethene

*Ethene is an alkene, not an alkane*

3. C. Hydrogen and carbon

*Hydrocarbons contain only H and C*

4. C. It will eventually run out

*Finite resources are limited and non-renewable*

# GCSE Combined Science: Crude Oil, Hydrocarbons & Alkanes - ANSWER SHEET

AQA Specification 5.7.1.1 - Continued

## Part 4: Alkane Formulae

1. Methane: $CH_4$ **(1 mark)**

2. Propane: $C_3H_8$ **(1 mark)**

3. Heptane: $C_7H_{16}$ **(1 mark)**

*Using CnH2n+2: 2×7+2 = 16 hydrogen atoms*

4. Alkanes: $CH_4$ and $C_3H_8$ **(1 mark)**

*$C_2H_4$ and $C_4H_8$ are alkenes (follow CnH2n)*

## Part 5: Challenge Question **(6 marks)**

• Crude oil is a finite resource found in sedimentary rock formations. It was formed over millions of years from the remains of ancient marine plankton that were buried under layers of sediment and subjected to heat and pressure. **(2 marks)**

*1 mark for finite resource, 1 mark for plankton origin*

• Most crude oil compounds are hydrocarbons because they contain only hydrogen and carbon atoms. Alkanes form a homologous series because they follow the same general formula (CnH2n+2) and have similar chemical properties, with each member differing by a $-CH_2-$ group. **(2 marks)**

*1 mark for H and C only, 1 mark for same general formula*

• For an alkane with 10 carbon atoms: $C_{10}H_{22}$ **(2 marks)**

*Using CnH2n+2: 2×10+2 = 22 hydrogen atoms*

***Total marks: 20** - Part 1 (6) + Part 2 (6) + Part 3 (4) + Part 4 (4) + Part 5 (6) = **26 marks total***

## Additional Marking Guidance

- Accept equivalent wording for all answers
- For formulae, accept written form (e.g., "C10H22") or properly formatted
- Key concepts: finite resource, hydrocarbon definition, alkane general formula
- Award partial marks for correct understanding even if terminology is imperfect