

13.1 Formulas, functional groups and naming of organic compounds

Name: _____ Class: _____ Date: _____

Total: 9 marks

Objective

Build the skills to answer exam questions on **formulas, functional groups and naming** —**hydrocarbons** 碳氢化合物, **functional groups** 官能团, the types of formula, and systematic **nomenclature** 命名法.

You must be able to:

- define hydrocarbon and explain what a functional group is
- interpret and use general, molecular, structural, displayed and skeletal formulas
- name simple organic molecules systematically

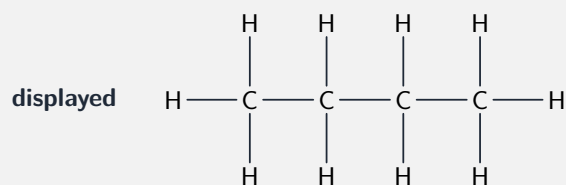
1 Worked examples

■ Functional groups and formulas

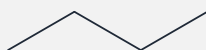
A **hydrocarbon** contains only C and H. A **functional group** is the reactive part that dictates a compound's properties (e.g. -OH in alcohols).

molecular C_4H_{10}

structural $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$

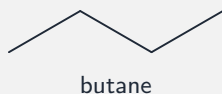


skeletal

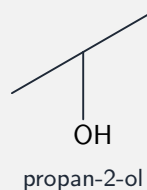
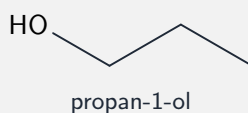


The same molecule shown as molecular, structural, displayed and skeletal formulas

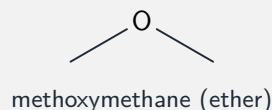
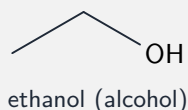
chain



positional



functional



Naming distinguishes structural isomers

- **general** (family pattern, e.g. alkanes C_nH_{2n+2}); **molecular** (C_4H_{10}); **structural** ($CH_3CH_2CH_2CH_3$); **displayed** (every bond drawn); **skeletal** (lines; C at corners).

■ Naming

Stem for carbons (meth/eth/prop/but/pent/hex = 1–6); ending for the functional group; numbers for positions. E.g. $CH_3CH(OH)CH_3$ = propan-2-ol.

2 Practice

2.1 Define the term **hydrocarbon**.

[1]

2.2 Give the molecular formula of the alkane with 5 carbons (using C_nH_{2n+2}).

[1]

3 Exam-style questions

3.1 Which formula shows the simplest whole-number ratio of atoms?

[1]

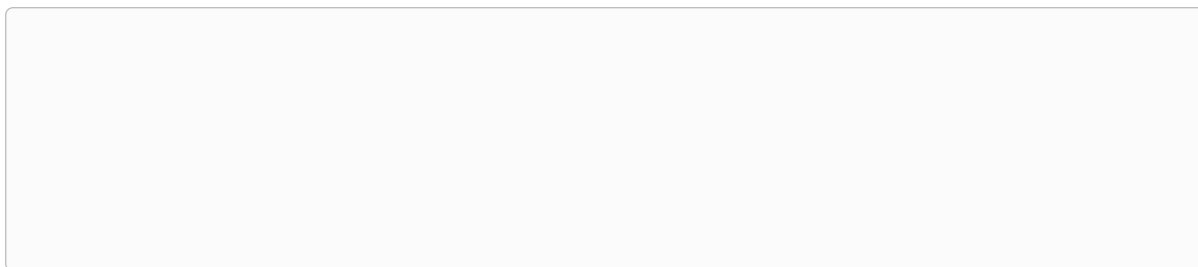
- A molecular
- B empirical

- C displayed
 - D skeletal
-

3.2 What is the name of $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$? [1]

- A propan-1-ol
 - B propan-2-ol
 - C propanal
 - D propanoic acid
-

3.3 (a) Draw the skeletal formula of 2-methylbutane. [2]



(b) Give the structural formula of butan-2-ol. [1]

3.4 Explain why all members of a homologous series have similar chemical properties. [2]

4 Go further

You are now ready for the real exam questions on this subtopic. Open the **13.1 Formulas, functional groups and naming** past-paper sheet in the Library, or try these in **Practice mode**:

- 9701/11 N25 —Q26 (formulas)
- 9701/14 N25 —Q28 (naming)
- 9701/22 N25 —Q3 (organic, structured)

Solutions

2.1 a compound made up of only carbon and hydrogen atoms.

2.2 C_5H_{12} .

3.1 B. The empirical formula is the simplest whole-number ratio.

3.2 A. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ is propan-1-ol.

3.3 (a) a four-carbon zigzag with a methyl branch on the second carbon.

(b) $\text{CH}_3\text{CH}(\text{OH})\text{CH}_2\text{CH}_3$.

3.4 they all have the same functional group, which determines their chemical reactions.