13 Introduction to organic chemistry – Part 1

Name: _____ Class: _____ Date: _____

Vocabulary 词汇

Write each word three times. 把每个单词抄写三遍。

English	中文	Write it 3 times (English)		
hydrocarbons	碳氢化合物			
functional group	官能团			
general	通式			
molecular	分子式			
structural	结构式			
displayed	展开式			
skeletal	骨架式			
homologous series	同系列			
saturated	饱和			
unsaturated	不饱和			
homolytic fission	均裂			
free radicals	自由基			
heterolytic fission	异裂			
ions	离子			

English	中文	Write it 3 times (English)		
nucleophile	亲核试剂			
electrophile	亲电试剂			

Recall

At IGCSE you met **hydrocarbons** 碳氢化合物 and drew molecules like methane. Now we organise organic chemistry — the ways to write a formula, and the **functional group** 官能团 that gives a family its reactions.

- A functional group is the **reactive part** of a molecule.
- Molecules with the same functional group react in the same way.

Nothing here is harder than IGCSE — it just adds the system.

New ideas

Read these first, then do the Practice.

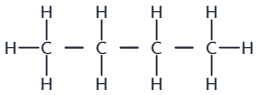
1 Types of formula

Formula	Shows
general 通式	the family pattern, e.g. alkanes C_nH_{2n+2}
molecular 分子式	the actual atoms, e.g. C_4H_{10}
structural 结构式	groups in order, e.g. $CH_3CH_2CH_2CH_3$
displayed 展开式	every atom and bond drawn
skeletal 骨架式	lines only; C at corners, H on C not shown

molecular: C_4H_{10}

structural: $CH_3CH_2CH_2CH_3$

displayed:



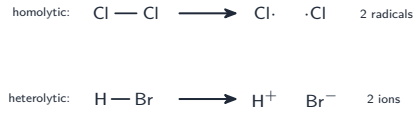
skeletal:

■ 2 Homologous series

A **homologous series** 同系列 is a family with the same functional group and general formula, where each member differs by CH_2. A compound is **saturated** 饱和 (only single C–C bonds) or **unsaturated** 不饱和 (has a C=C).

■ 3 Breaking bonds and attacking species

- **homolytic fission** 均裂 — splits evenly → two **free radicals** 自由基.
- **heterolytic fission** 异裂 — splits unevenly → two **ions** 离子.



- a **nucleophile** 亲核试剂 has a lone pair and attacks a positive (electron-poor) centre.
- an **electrophile** 亲电试剂 is attracted to an electron-rich centre (such as a C=C bond).

Watch out: a nucleophile *donates* a lone pair to an electron-poor ($\delta+$) centre; an electrophile *accepts* electrons from an electron-rich centre. Homolytic fission makes radicals, heterolytic makes ions.

Practice

Try these in order.

13.1 What is a *functional group*? [1]

13.2 Give the general formula of the alkanes. [1]

13.3 Each member of a homologous series differs from the next by what group? [1]

13.4 State the difference between homolytic and heterolytic fission. [2]

13.5 What is a *nucleophile*? [1]

13.6 Draw the skeletal formula of butane, C_4H_{10}. [1]

13.7 Challenge. In a C–Br bond the carbon carries a small positive charge. Explain why, and why this makes the carbon open to attack by a nucleophile. [2]