

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: $\begin{array}{ccccccc} & H & & H & & H & & H \\ & | & & | & & | & & | \\ H & - C & - & C & - & C & - & C - H \\ & | & & | & & | & & | \\ & H & & H & & H & & H \end{array}$

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 $\text{C}=\text{C}$).

■ 3 Breaking bonds and attacking species

- **homolytic fission** 均裂 — splits evenly $\rightarrow$ two **free radicals** 自由基.
- **heterolytic fission** 异裂 — splits unevenly $\rightarrow$ 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 $\text{C}=\text{C}$ 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]
