

13 Isomerism – Part 2

Name: _____ Class: _____ Date: _____

Vocabulary

Write each word three times.

English	Write it 3 times (English)
isomers	_____ _____ _____
structural isomerism	_____ _____ _____
chain isomerism	_____ _____ _____
positional isomerism	_____ _____ _____
functional-group isomerism	_____ _____ _____
restricted rotation	_____ _____ _____
cis	_____ _____ _____
trans	_____ _____ _____
chiral centre	_____ _____ _____
enantiomers	_____ _____ _____

Recall

From Part 1 you know how to write organic formulas. Here we meet **isomers** – molecules with the **same** molecular formula but a **different** arrangement.

- Same atoms, joined or arranged differently.
- This explains why two compounds can share a formula yet behave differently.

New ideas

Read these first, then do the Practice.

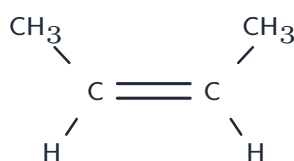
■ 1 Structural isomerism

In **structural isomerism** the atoms are joined in a different **order**. Three kinds:

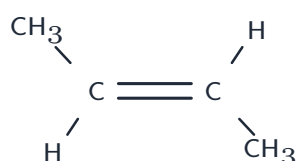
- **chain isomerism** – the carbon chain branches differently (e.g. butane vs 2-methylpropane).
- **positional isomerism** – the functional group is on a different carbon (e.g. propan-1-ol vs propan-2-ol).
- **functional-group isomerism** – the atoms make a different functional group (e.g. an alcohol vs an ether).

■ 2 Cis–trans (geometrical) isomerism

A C=C double bond **cannot rotate** (**restricted rotation**). So groups are fixed on the **same side** (**cis**) or **opposite sides** (**trans**).



cis (same side)



trans (opposite)

■ 3 Optical isomerism

A **chiral centre** is a carbon with **four different** groups. It gives two **mirror-image** forms (**enantiomers**) that cannot be superimposed.



mirror images (enantiomers)

Watch out: cis–trans isomerism needs a C=C (no rotation) *with two different groups on each carbon*; optical isomerism needs a chiral carbon bonded to *four different*

groups.

Practice

Try these in order.

13.1 What are *isomers*? [1]

13.2 Name the three kinds of structural isomerism. [3]

13.3 Why can a C=C double bond not rotate? [1]

13.4 In cis-trans isomerism, what is the difference between the *cis* and *trans* forms? [2]

13.5 What makes a carbon a *chiral centre*? [1]

13.6 What name is given to the two mirror-image forms at a chiral centre? [1]

13.7 Challenge. But-2-ene ($\text{CH}_3\text{CH}=\text{CHCH}_3$) shows cis-trans isomerism, but but-1-ene ($\text{CH}_2=\text{CHCH}_2\text{CH}_3$) does not. Explain why. [2]
