QC4 – Optical Isomerism

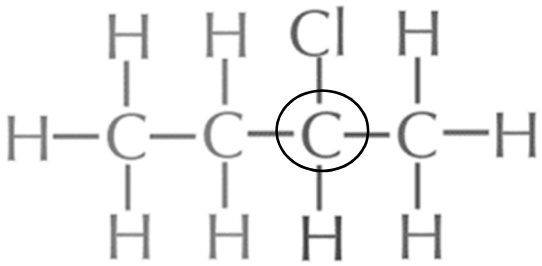
1. What is optical isomerism?

A form of isomerism which occurs when two molecules are **non-superimposable mirror images** of each other.

2. Explain what is meant by the term ‘chiral’.

Chiral refers to any structure which is **non-superimposable on its mirror image**. A carbon atom which has 4 different groups will be chiral.

3. Identify the chiral carbon atom and name this molecule.



Name: **2-chlorobutane**

4. What is a racemic mixture?

A **50:50 mixture** of two enantiomers.

5. Explain why a racemic mixture is not ‘optically active’.

Each enantiomer in a racemic mixture rotates the plane of polarised light in the **opposite direction**. In a racemic mixture, there is an **equal amount** of each enantiomer, and therefore the effects **cancel each other out**. This means that racemates are **optically inactive**.

6. Optical isomers can be **distinguished** because they can **rotate plane-polarised** light in **opposite** directions.

7. Draw the enantiomer of the following molecule.