

# Functional groups: classification of organic compounds · supported focus

International Baccalaureate · IB Diploma · Chemistry · HL

## Scope and prerequisites

Supported HL focus. First assessment 2025; current brief acquired; full Chemistry guide not acquired. Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

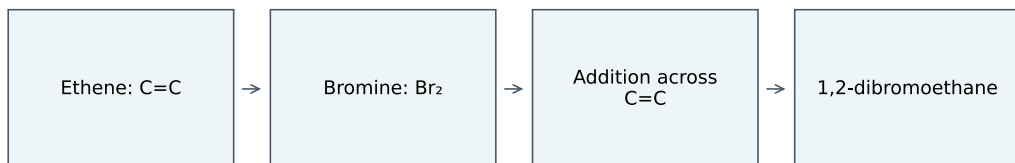
## Organic structures and reaction pathways

### ■ What would explain this observation?

- Two compounds can have the same molecular formula but different structures. Their **functional groups** help predict which reactions they undergo.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

### ■ Build the model

- A homologous series shares a functional group and general formula. Structural **isomers** share a molecular formula but differ in atom connections. Alkenes contain a carbon-carbon double bond.
- functional group: An atom group determining characteristic reactions; isomer : A compound sharing a formula but differing in structure.



### ■ Choose evidence that can test it

- Distinguish addition, substitution, oxidation and polymerization by tracing bonds before and after reaction. Conditions and reagents belong to the reaction arrow; they are not interchangeable labels.
- Draw displayed or structural formulae with the correct number of bonds at each carbon. Use a carbon count to check a proposed synthesis. At advanced level, track reagents and conditions through multistep routes.

### ■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: ethene adds bromine across its double bond. The two-carbon skeleton stays intact and each carbon gains one bromine atom, giving 1,2-dibromoethane. One mole of ethene reacts with one mole of bromine in this addition reaction.

### Example:

How many moles of bromine react completely with 0.15 mol ethene? Use the same sequence: known quantities → model → relation → substitution → unit and interpretation.

### ■ Check the conclusion and its limits

- Bromine decolourization provides evidence of unsaturation in an appropriate test. It is not proof that an unknown sample is specifically ethene.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

### Warn:

Compounds with the same molecular formula always have identical properties. This claim is false: Bromine decolourization provides evidence of unsaturation in an appropriate test. It is not proof that an unknown sample is specifically ethene.

### Key:

Organic structures and reaction pathways: Distinguish addition, substitution, oxidation and polymerization by tracing bonds before and after reaction. Conditions and reagents belong to the reaction arrow; they are not interchangeable labels.