

## AS91165

### Demonstrate understanding of the properties of selected organic compounds

#### Level 2 4 Credits

This achievement standard involves demonstrating understanding of the properties of selected organic compounds.

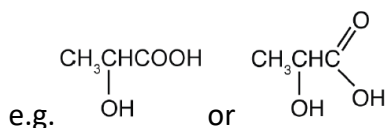
Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the properties of selected organic compounds.	Demonstrate in-depth understanding of the properties of selected organic compounds.	Demonstrate comprehensive understanding of the properties of selected organic compounds.

This AS involves selected organic compounds containing no more than eight carbons in the longest chain.

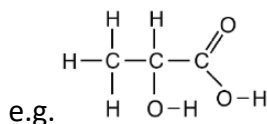
naming of organic molecules according to IUPAC convention.

formulae

- empirical - stoichiometric proportions of atoms only e.g. CH<sub>2</sub>O
- molecular - formula of the actual molecule e.g. C<sub>3</sub>H<sub>6</sub>O<sub>3</sub>
- structural formulae - shows how atoms are connected. It may be drawn in different ways
  - condensed



- expanded



selected organic compounds – homologous series - their functional groups and reactions

- **alkanes**
  - halogenation - substitution reactions of alkanes with halogens (limited to monosubstitution)
- **alkenes**
  - addition reactions of alkenes with
    - H<sub>2</sub>/Pt - hydrogenation (or H<sub>2</sub>/Ni)
    - Cl<sub>2</sub>, Br<sub>2</sub> - halogenation
    - H<sub>2</sub>O/H<sup>+</sup> (conc. H<sub>2</sub>SO<sub>4</sub>/H<sub>2</sub>O) – hydration (including identification of major and minor products on addition to asymmetric alkenes - Markovnikov's Rule)
    - hydrogen halides e.g. HCl & HBr – hydrohalogenation (including identification of major and minor products on addition to asymmetric alkenes - Markovnikov's Rule)
    - polymerisation
  - oxidation of alkenes with MnO<sub>4</sub><sup>-</sup> and H<sup>+</sup>/ MnO<sub>4</sub><sup>-</sup>
- **alkynes**

- **haloalkanes**
  - classification of haloalkanes as primary, secondary or tertiary
  - substitution reactions of haloalkanes with
    - ammonia
    - aqueous potassium hydroxide
  - elimination of hydrogen halides from haloalkanes – with alcoholic potassium hydroxide (including identification of major and minor products for asymmetric reactants - Saytzeff's rule)
- **primary amines**
  - acid–base reactions of amines
- **alcohols**
  - classification of alcohols as primary, secondary or tertiary
  - substitution reactions of alcohols with hydrogen halides,  $\text{PCl}_3$ ,  $\text{PCl}_5$ ,  $\text{SOCl}_2$
  - oxidation of primary alcohols to form carboxylic acids with  $\text{MnO}_4^-/\text{H}^+$ , heat or with  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ , heat
  - elimination of water from alcohols (including identification of major and minor products for asymmetric reactants - Saytzeff's rule)
- **carboxylic acids**
  - acid–base reactions of carboxylic acids
- identification of “unlabelled samples” of the above through reaction with common reagents and indicators
- completion of flow charts/reaction schemes for simple organic conversions of the above
- identification and explanation of types of reactions; addition, elimination, substitution, oxidation
- isomerism
  - **constitutional** (structural - same molecular formula – type and number of atoms - but different connectivity)
    - different carbon skeleton
    - different position of functional group
    - different functional group e.g. cycloalkane & alkene
  - **geometric** (cis and trans) isomers – alkenes only
    - rotation of the atoms about the axis of the carbon to carbon double bond is restricted
    - requirement to have two different atoms/groups attached to each end of the double bond
- physical properties of the selected organic compounds
  - solubility in water
    - depending on functional group
    - depending on the size of the molecule
  - melting and boiling points