# AS91165

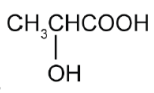
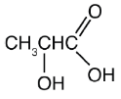
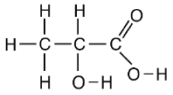
## Demonstrate understanding of the properties of selected organic compounds

## 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. $CH_2O$
  - molecular - formula of the actual molecule e.g. $C_3H_6O_3$
  - structural formulae - shows how atoms are connected. It may be drawn in different ways
    - condensed
      - e.g.  or 
    - expanded
      - e.g. 
- ❑ 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
      - $H_2$/Pt - hydrogenation
      - $Cl_2$, $Br_2$ - halogenation
      - $H_2O/H^+$ (conc. $H_2SO_4/H_2O$) - hydration
      - hydrogen halides e.g. HCl & HBr (including identification of major and minor products on addition to asymmetric alkenes) - hydrohalogenation
      - polymerisation
    - oxidation of alkenes with $MnO_4^-$ and $H^+/ MnO_4^-$
  - **alkynes**

- **haloalkanes**
  - classification of haloalkanes as primary, secondary or tertiary
  - substitution reactions of haloalkanes with
    - ammonia
    - aqueous potassium hydroxide
  - elimination of (including identification of major and minor products for asymmetric reactants) hydrogen halides from haloalkanes – with alcoholic potassium hydroxide
- **primary amines**
  - acid–base reactions of amines.
- **alcohols**
  - classification of alcohols as primary, secondary or tertiary
  - substitution reactions of alcohols with hydrogen halides, $PCl_3$, $PCl_5$, $SOCl_2$
  - oxidation of primary alcohols to form carboxylic acids with $MnO_4^-/H^+$ or $Cr_2O_7^{2-}/H^+$
  - elimination of (including identification of major and minor products for asymmetric reactants) water from alcohols
- **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 for simple organic conversions of the above
- ❑ identification 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
    - rotation of the atoms about the axis of the carbon to carbon double bond is restricted
    - have two different groups attached to each end of the double bond
- ❑ physical properties of the selected organic compounds
  - solubility
  - melting and boiling points