

**AS90698 Version 2**  
**Describe aspects of organic chemistry**  
**Level 3 Credits 5**

This achievement standard involves describing the structure, physical properties, and reactions of organic compounds.

Knowledge of principles of organic chemistry covered in AS 90309 will be assumed.

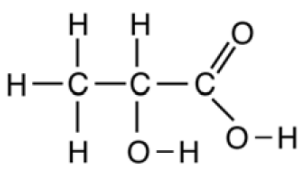
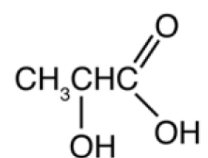
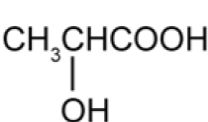
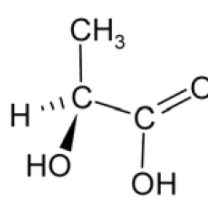
Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
Describe aspects of organic chemistry.	Explain and apply aspects of organic chemistry.	Discuss aspects of organic chemistry.

Aspects of organic chemistry includes:

- types of formulae
  - empirical
  - molecular
  - structural
- structures of organic compounds including
  - constitutional isomers (same molecular formula but a different structural formula) &
  - enantiomers

Structures may be drawn – e.g. 2-hydroxypropanoic acid / lactic acid

All atoms and bonds shown	Condensed structural formula		Stereochemistry (3D)
	Bonds to hydrogen not shown OR only bonds to substituents shown	Structure reduced to one line	
	 OR 	$\text{CH}_3\text{CH}(\text{OH})\text{COOH}$	

- naming of organic compounds using IUPAC conventions, limited to those compounds containing no more than eight carbons (you will be given full credit for alternative naming if an unambiguous structure is implied).

- physical properties of organic compounds
  - solubility
  - melting point & boiling point
  - rotation of plane-polarised light
- reactions of organic compounds
  - **acid-base**; reactions of carboxylic acids
    - amines
    - carboxylate
    - alkyl ammonium salts
  - **oxidation**; is limited to reactions using the following reagents:
    - $\text{MnO}_4^-/\text{H}^+$ , warm
    - $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ , warm
    - Tollens' (silver mirror test):  $\text{Ag}^+/\text{NH}_3$  warm
    - Fehling's and Benedict's:  $\text{Cu}^{2+}$ , warm
  - **elimination**; is limited to reactions using the following reagents:
    - KOH in alcohol\* (\*favours elimination instead of substitution)
    - concentrated  $\text{H}_2\text{SO}_4$  : dehydration
  - **substitution reactions**; including esterification, hydrolysis, and polymerisation; limited to reactions using the following reagents: concentrated HCl, HBr,  $\text{SOCl}_2$ ,  $\text{PCl}_3$ ,  $\text{PCl}_5$ , NaOH, KOH (in alcohol or aqueous solution),  $\text{NH}_3$ , primary amines, primary alcohols/ $\text{H}^+$ , primary alcohols,  $\text{H}_2\text{O}/\text{H}^+$ ,  $\text{H}_2\text{O}/\text{OH}^-$ 
    - esterification
    - hydrolysis – acid hydrolysis  $\text{H}_2\text{O}/\text{H}^+$ , alkaline hydrolysis  $\text{H}_2\text{O}/\text{OH}^-$
    - polymerisation limited to formation of
      - polyesters
      - polyamides including proteins (names of amino acids not needed)

Organic compounds are limited to those containing one or more of the following functional groups:

- |                                     |  |  |
|-------------------------------------|--|--|
| <input type="checkbox"/> alkene     | <input type="checkbox"/> aldehyde        | <input type="checkbox"/> acyl chloride (acid chloride) |
| <input type="checkbox"/> haloalkane | <input type="checkbox"/> ketone          | <input type="checkbox"/> amide                         |
| <input type="checkbox"/> amine      | <input type="checkbox"/> ester           |  |
| <input type="checkbox"/> alcohol    | <input type="checkbox"/> carboxylic acid |  |

### Terms

*Describe* involves identifying, naming, drawing, giving characteristics of, giving an account of, and/or defining.

*Explain and apply* involves describing as well as giving reasons for, making links between chemical concepts and/or observations.

*Discuss* involves showing understanding by analysing, interpreting, justifying, relating, evaluating, and/or comparing and contrasting.