

The **topics** and **types of questions** examined in this Achievement Standard. Use this sheet to plan and organise your study so that you cover everything that is required.

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## 3.5 ORGANIC CHEMISTRY

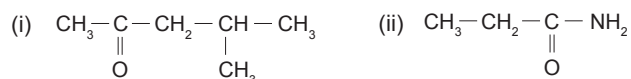
AS 90698

Describe aspects of organic chemistry

## 3.5 1. Structure and properties

- organic functional groups: alkene, haloalkane, amine, alcohol, aldehyde, ketone, ester, carboxylic acid, acyl chloride, amide.
- naming organic compounds (limited to those compounds containing no more than eight carbon atoms)

▶ Give the systematic IUPAC names for the following molecules



- structures of organic compounds including constitutional isomers and enantiomers

▶ Draw the structural formula of each of the organic compounds below:

- 2-amino-2,3-dimethyl butane
- 2-chloro pentanal
- An acid chloride with 4 carbon atoms
- An amino acid with 3 carbon atoms

▶ An alcohol ( $\text{C}_4\text{H}_{10}\text{O}$ ) can exist as optical isomers (enantiomers).

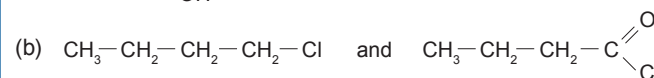
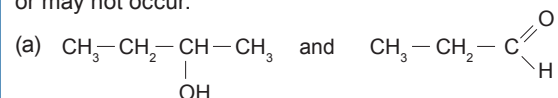
Draw three-dimensional structures that show the relationship between the two enantiomers.

- physical properties of organic compounds limited to solubility, melting point, boiling point, rotation of plane-polarised light.

▶ Explain what physical property would allow two enantiomers to be distinguished.

## 3.5 2. Reactions to distinguish between organic compounds

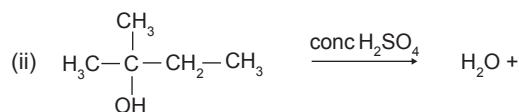
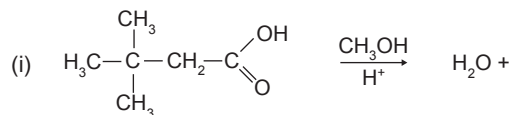
▶ Describe a chemical test that would distinguish between each of the following pairs of substances. For each test, identify the reagents used, and link the observations to any reactions that may or may not occur.



## 3.5 3. Reactions of organic compounds

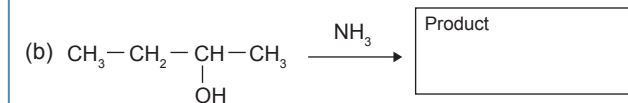
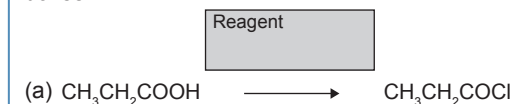
- acid-base reactions: carboxylic acids, amines, carboxylate and alkylammonium salts
- oxidation reactions: using reagents:  $\text{MnO}_4^-/\text{H}^+$ ,  $\text{Cr}_2\text{O}_7^{2-}/\text{H}^+$ , Tollen's, Fehling's and Benedict's.
- elimination reactions: using reagents: KOH in alcohol and concentrated  $\text{H}_2\text{SO}_4$
- substitution reactions using 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,  $\text{H}_2\text{O}/\text{H}^+$ ,  $\text{H}_2\text{O}/\text{OH}^-$

▶ (a) The following reactions involve the loss of water. Clearly show the structure of one major organic product of each of these reactions.



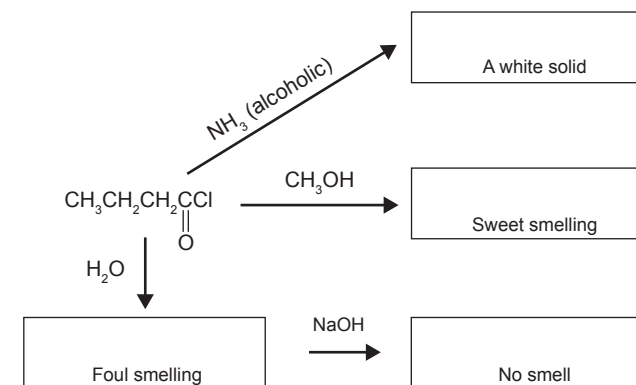
(b) Identify the type of reaction that is occurring in each case above:

▶ Complete each of the equations below by writing the organic product in the blank boxes and the reagent needed in the shaded boxes.



## 3.5 4. Reaction schemes

▶ (a) Complete the following flow diagram by writing the structural formula for the organic product of each reaction.



(b) Write the name of the sweet smelling product.

## 3.5 5. Polymerisation

- formation of polyesters and polyamides including proteins