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**2.5 ORGANIC CHEMISTRY****AS 90309**

Describe the structural formulae and reactions of compounds containing selected organic functional groups

2.5 1. Naming and writing structural formulae

- naming organic molecules
- organic functional groups: haloalkanes, alkenes, alkynes, alcohols, carboxylic acids, esters
- classifying alcohols and haloalkanes as primary, secondary or tertiary

► (a) Complete the following table to show the structural formula and IUPAC (systematic) name for each of the organic compounds.

	Structural formula	IUPAC name
(i)	$\text{CH}_3\text{—CH}_2\text{—CH}_2\text{—Cl}$	
(ii)	$\text{CH}_3\text{—CH}_2\text{—C}\begin{matrix} \text{O} \\ \parallel \\ \text{O—CH}_3 \end{matrix}$	
(iii)		4-methylpent-2-ene
(iv)		butanoic acid

(b) Identify the organic family (homologous series) for each of the compounds in the table above.

2.5 2. Structural and geometric isomers

- identifying structural and geometric (cis-trans) isomers

- (a) A compound of molecular formula $\text{C}_2\text{H}_2\text{Cl}_2$ can exist as cis-trans (geometrical) isomers. Draw, and name, the cis-trans isomers.
- (b) There is another structural isomer of $\text{C}_2\text{H}_2\text{Cl}_2$ that cannot exist as cis-trans isomers.

Draw the structural formula for this molecule and explain why this molecule cannot exist as cis-trans isomers while the one you have drawn above in (a) can.

2.5 3. Reactions to distinguish between organic compounds

► Chemical tests can be used to distinguish between pairs of compounds.

Identify tests to distinguish between the following pairs of compounds and:

- describe the test to be carried out,
- describe the expected observations for the test used,
- clearly explain how the test results can be used to distinguish between the molecules in each pair of compounds and why the test used is a suitable one.

- Butan-1-ol and but-2-ene
- butanoic acid and methylbutanoate.

2.5 4. Reactions of organic compounds

- addition reactions of alkenes with H_2 / Pt , Cl_2 , Br_2 , $\text{H}_2\text{O} / \text{H}^+$ and HCl
- reactions of alkenes with MnO_4^-
- halogenation of alkanes
- oxidation of primary alcohols to form carboxylic acids
- elimination of water from alcohols
- acid reactions of carboxylic acids

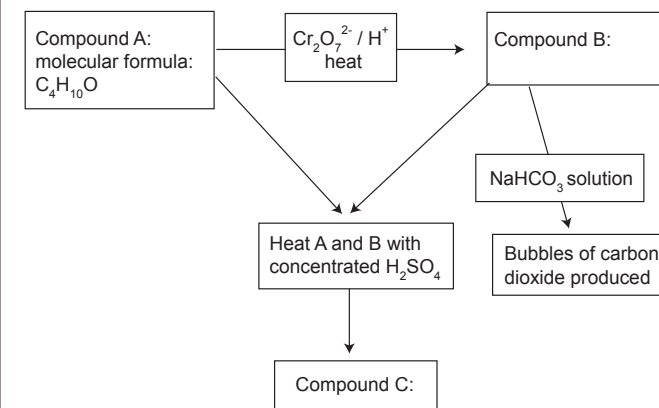
► Complete the following reactions by writing the structural formula of each organic product.

- $\text{CH}_3\text{—CH}_2\text{=OH} \xrightarrow{\text{H}^+ / \text{Cr}_2\text{O}_7^{2-}}$
- $\text{CH}_3\text{—CH=CH}_2 + \text{Cl}_2 \longrightarrow$
- $\text{CH}_3\text{—CH=CH—CH}_2\text{—CH}_3 \xrightarrow{\text{H}^+ / \text{MnO}_4^-}$

2.5 5. Reactions schemes

► The flow diagram shows some reactions involving organic substances.

Complete the diagram by drawing structural formulae for the compounds A, B and C.

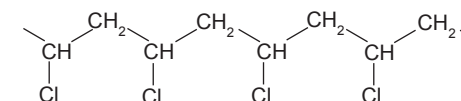
**2.5 6. Reactions involving esters and triglycerides**

- formation of esters from carboxylic acids and alcohols
- hydrolysis of esters

2.5 7. Polymerisation reactions

- polymerisation of alkenes

► The following diagram shows four repeating sections of the polymer commonly known as PVC.



Draw the structural formula for the monomer molecule used to make this polymer.