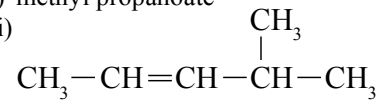
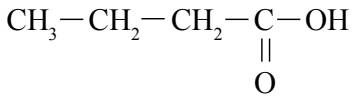
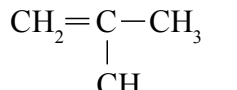
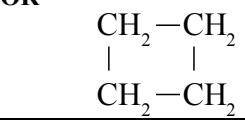
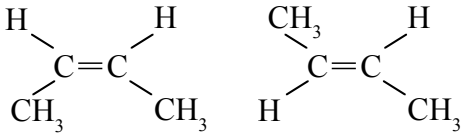
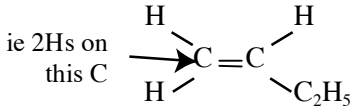
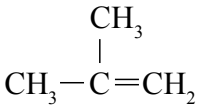
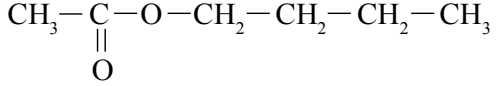
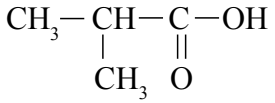
Assessment Schedule – 2005

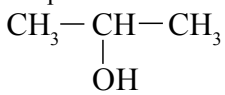
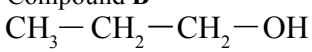
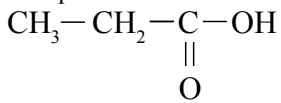
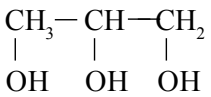
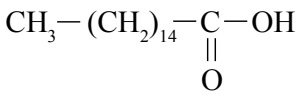
Chemistry: Describe the structural formulae and reactions of compounds containing selected organic functional groups (90309)

Judgement Statement

Q	Evidence	Achievement	Achievement with Merit	Achievement with Excellence
1(a)	(i) 1–chloropropane (ii) methyl propanoate (iii)  (iv) 	Three correct.	All correct, showing understanding of use of numbers to indicate position of groups in organic molecules.	
1(b)	(i) haloalkane (ii) ester (iii) alkene (iv) carboxylic acid	Three correct.		
2(a)	(i) Acidified potassium dichromate. (ii) Propan–1–ol will turn $Cr_2O_7^{2-}$ from orange to green. Remains orange with propanoic acid. **OR** (i) Acidified potassium permanganate. (ii) Propan–1–ol will turn MnO_4^- from purple to colourless. Remains purple with propanoic acid. **OR** Other suitable test and related observations. Eg wet blue litmus/ aqueous CO_3^{2-}/Mg.	Test described.	Test described and distinguishing observations given.	

2(b)	Hex−1−ene will react immediately with Br_2 and the Br_2 will change from orange to colourless. Hexane will react slowly in the presence of UV light and the orange Br_2 will gradually fade, eventually becoming colourless. Hex−1−ene is unsaturated due to the C=C and undergoes an addition reaction, forming 1,2–dibromohexane. $CH_2CHCH_2CH_2CH_2CH_3 + Br_2 \rightarrow CH_2BrCHBrCH_2CH_2CH_2CH_3$ Hexane is saturated as all C−C bonds are single and undergoes a substitution reaction forming a bromohexane (eg 1−bromohexane) and HBr. Eg $CH_3CH_2CH_2CH_2CH_2CH_3 + Br_2 \rightarrow CH_2BrCH\ CH_2CH_2CH_2CH_3 + HBr$	States that alkenes/hexene will decolourise Br_2 whereas alkanes/hexane won't. **OR** States that alkenes/hexene will react quickly with Br_2 whereas alkanes/hexane will react slowly.	Observations correct for both compounds, and a partial explanation given.	Observations correct, with a clear distinction between the two compounds. A full explanation given, showing understanding of addition and substitution reactions that occur.
3(a)	 methylpropene **OR**  cyclobutane	Structure and name correct for one isomer.		

3(b)	*Cis–trans* isomers occur in molecules where a C=C double bond prevents rotation around the C atoms. Also each carbon at the double bond has two different groups or atoms attached to it so that two different arrangements are possible. But–2–ene can have *cis* and *trans* forms as shown:  *cis*–but–2–ene *trans*–but–2–ene But–1–ene cannot exist as *cis–trans* forms since the groups or atoms attached to the carbon atoms forming the double bond are not different. 	One form of but–2–ene shown and named. (cis or trans) **OR** Both isomers of but-2-ene drawn. **OR** Indicates double bond necessary for *cis–trans* isomers linked to lack of rotation. **OR** Describes but-2-ene as having different atoms / groups on the carbons and but-1-ene does not / two atoms / hydrogens the same.	Both forms of but–2–ene drawn and a limited discussion that includes reference to lack of rotation **or** different groups on each carbon atom.	Full discussion that includes reference to lack of rotation **and** different groups correctly drawn **and** labelled structural formulae for the *cis–trans* isomers.
4(a)	(i) primary (ii) secondary (iii) primary (iv) tertiary	Three correct.		
4(b)	(i)  (ii)  (iii) 	Two products correctly identified.	All equations correct.	

4(c)	MnO_4^- / H^+ Purple to colourless.	Reagent and observation correct.		
5	Compound **A**  propan−2−ol Compound **B**  propan−1−ol Compound **C**  propanoic acid Reagent **D** $Cr_2O_7^{2-}$ / H^+ **OR** MnO_4^- / H^+ Reagent **E** NaOH	Name and structure of one product identified. **OR** Two correct structures **OR** Two correct names.	Structures of compounds B and C plus one reagent identified.	All correct − structures of organic compounds, names and reagents.
6(a)	glycerol  palmitic acid 	Either product identified.	Both products correct.	
6(b)	In acid conditions the products are glycerol and palmitic acid. In basic conditions the sodium salt of the acid is formed rather than the acid molecule.	Glycerol/alcohol in both reactions **OR** Both products correct in one reaction **OR** Palmitic acid/carboxylic acid forms in acid and the salt/carboxylate ion forms in base.	Recognises products under both conditions.	

Judgement Statement

Achievement	Achievement with Merit	Achievement with Excellence
SIX opportunities answered at Achievement level or higher. 6 × A	EIGHT opportunities answered with FOUR at Merit level or higher. 4 × M *plus* 4 × A	NINE opportunities answered with TWO at Excellence level and THREE more at Merit level or higher. 2 × E *plus* 3 × M *plus* 4 × A