1 **(a)(i)** general molecular formula
same functional group
physical properties show trend — bp increase with n
same chemical properties
common methods of preparation
any **TWO** **[2]**

(ii) $C_8H_{17}OH$ Mass of one mole = 130 (g) **[2]**
if formula correct but mass wrong **[1]**

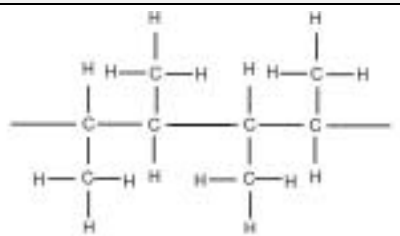
(b) propan-1-ol **or** propan-2-ol **[1]**
corresponding structural formula **[1]**
name and formula must correspond for **[2]** if not **ONLY [1]**

(c)(i) structural formula of isomer **[1]**

(ii) carbon dioxide and water **[1]**
pentene **[1]**
pentanoic acid **[1]**

TOTAL = 10

Question	Answer	Marks
2(a)	buta	**1**
2(b)	compounds: E **and** F; general formula: C_nH_{2n+2}; **OR** compounds: A **and** B; general formula: C_nH_{2n};	**2** 1 1 1 1
2(c)	compounds: E **and** F; explanation: same molecular formula / contain the same number of atoms each element; different structures / different structural formulae / different arrangement of atoms;	**3** 1 2
2(d)	contains a double bond / not all bonds are single bonds; C and H only;	**2** 1 1
2(e)	$C_2H_4 + H_2O \rightarrow C_2H_5OH$; any 2 from: high temperature / 220 °C–350 °C; high pressure / 60 atm–70 atm; phosphoric acid catalyst;	**3** 1 2

Question	Answer	Marks
2(f)	 **M1** correct carbon structure with only single bonds; **M2** continuation bonds;	**2**

3 **(a)** Any **two** from:
yeast / 20–40 °C / anaerobic or without oxygen or without air / (aqueous) solution or water or aqueous [2]

(b) (i) Mr = 180 (1) (30/180) = 0.167 (1) [2]

(ii) 2×0.167 or 2×46 or 0.333 or 92 [1]

$(2 \times 0.167 \times 46) = 15.3(33)$ (g) [1]

(iii) $(2 \times 0.167 \times 24) = 8$ (dm^3) [1

(c) (i) Crude oil / petroleum

(ii) $C_2H_4 + H_2O \rightarrow C_2H_5OH$ / CH_3CH_2OH [

[Total:9]

4 **(a) (i)** measure melting point **NOT** just heating [1]
pure sample would melt at 135 °C [1
OR impure would melt lower than 135 °C

(ii) $C_3H_4O_4$ [1]

(iii) $C_2H_4O_2$ **OR** CH_3COOH [1]
ethanoic **OR** acetic acid [1]
both marks are independent of each other

(iv) ester **NOT** organic, covalent [1]

(b) (i) malonic is a weaker acid/less dissociated
OR sulfuric acid is a stronger acid/more dissociated [1]
NOT sulfuric acid is a strong acid

(ii) add piece of suitable metal, e.g. Mg **ALLOW** A*l*, Ca **NOT** K, Na, Cu [1]

sulfuric acid reacts fast**er OR** malonic reacts slow**er** [1]

OR
as above add a piece of $CaCO_3$, if soluble carbonate then [1] only

OR measure electrical conductivity [1]
sulfuric acid is the bett**er** conductor
OR malonic acid poor**er** conductor [1]
NOT sulfuric acid is a good conductor

(c) (i) sodium malonate **<u>and</u>** water [1]

(ii) $CuSO_4$
H_2O [2]

(iii) $CH_2(COO)_2Mg$
H_2 [2]

(iv) K_2SO_4
CO_2 **and** H_2O **NOT** H_2CO_3 [2]

[Total: 16]