14.3 Homologous series

01. 0620_s15_qp_31 Q: 4

The alcohols form a homologous series.

(a) (i) Give **three** characteristics which all members of a homologous series share.

.....

.....

.....

..... [3]

(ii) Give the name of the third member of this series.

name ..... [1]

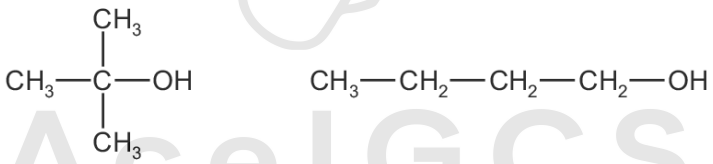
(iii) Deduce the molecular formula of the alcohol whose M_r = 158. Show your working.

.....

.....

..... [2]

(b) Explain why the following two alcohols are isomers.



.....

..... [2]

(c) This question is based on typical reactions of butan-1-ol.

(i) When butan-1-ol, $CH_3–CH_2–CH_2–CH_2–OH$, is passed over the catalyst silicon(IV) oxide, water is lost.

Deduce the name and the structural formula of the organic product in this reaction.

name .....

structural formula

[2]

(ii) Suggest the name of the ester formed from butanol and ethanoic acid.

..... [1]

(iii) Butan-1-ol is oxidised by acidified potassium manganate(VII).

Deduce the name and the structural formula of the organic product in this reaction.

name .....

structural formula

[2]

[Total: 13]

01. 0620_s15_ms_31 Q: 4

(a)(i)	*Any **three** from:* same general formula; contain the same functional group; consecutive members differ by CH_2; common methods of preparation; same or similar chemical properties; physical properties vary in a predictable manner / show trends / show a gradual change / an example of a physical variation e.g. mpt, bpt volatility viscosity;	3	**I** different physical properties / physical properties change / an unqualified or slight change **R** same or similar physical properties
(a)(ii)	propanol / propan-1-ol / propan-2-ol;	1	
(a)(iii)	if molecular formula is given as $C_{10}H_{22}O$ award 2 marks if not, look for evidence of some correct working for one mark 158 – 17 = 141 **OR** 12n + 2n + 1 = 141 **OR** n = 10	2	**A** $C_{10}H_{21}OH$ for two marks **A** (10 × 12) + (22 × 1) + 16 = 158 for one (working) mark
(b)	they have the same molecular formula ($C_4H_{10}O$); different structures;	2	**A** same number of each type of atom **I** same number of atoms **A** different structural formula or different arrangement of atoms

(c)(i)	M1 butene or but-1-ene; M2 structural formula of but-1-ene;	2	M1 and M2 are independent **A** but-2-ene for M1 Minimum acceptable structure is $CH_3CH_2CH=CH_2$ Double bond must be shown **R** structure of but-2-ene for M2
(c)(ii)	butyl ethanoate;	1	**A** butanyl **R** ethenoate and ethanoic
(c)(iii)	butanoic acid; structural formula of butanoic acid;	2	**A** butyric acid Minimum acceptable structure is $CH_3CH_2CH_2CO_2H$ **A** $CH_3CH_2CH_2COOH$ with C–HO connectivity in acid group