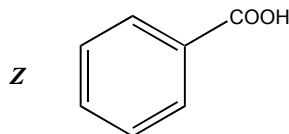
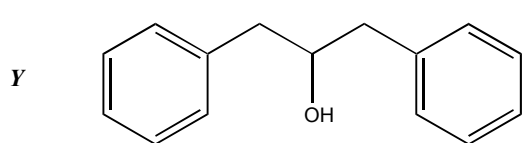
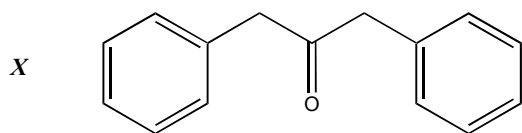
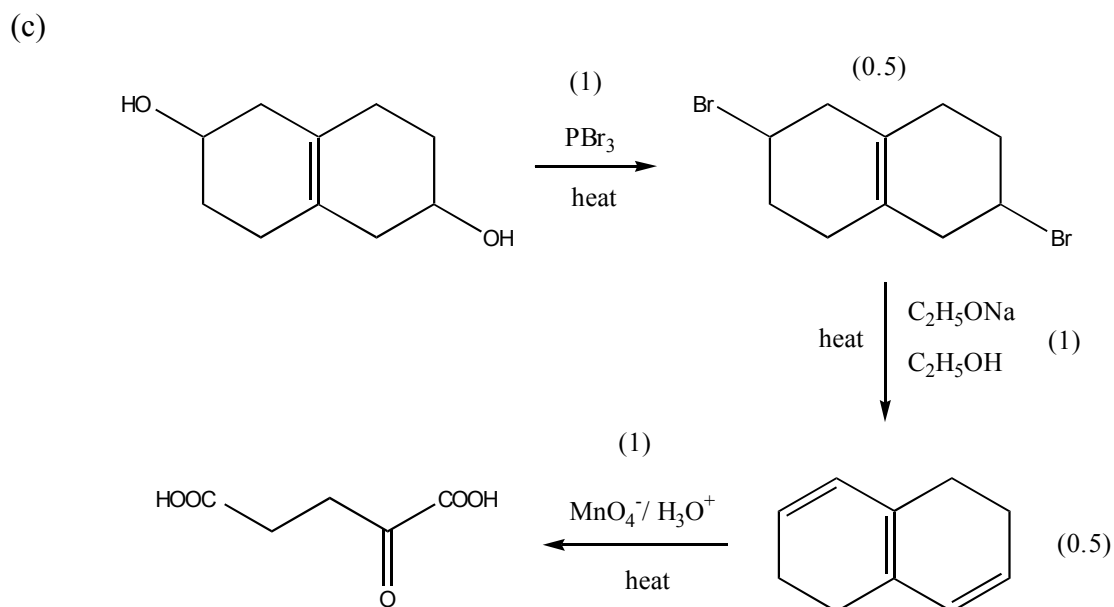
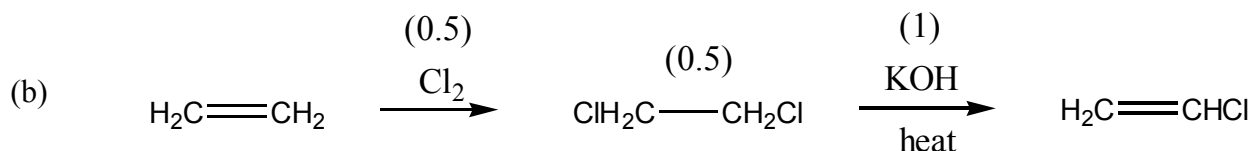
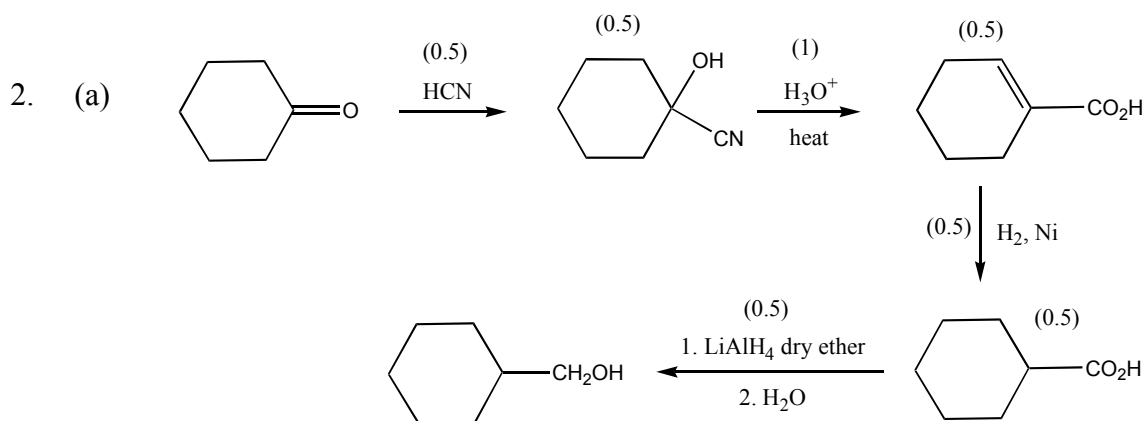


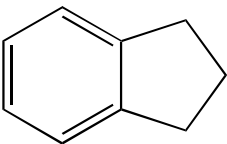
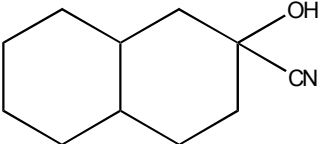
Immanuel Lutheran College
S7B Chemistry First UT (06-07)
Marking Scheme

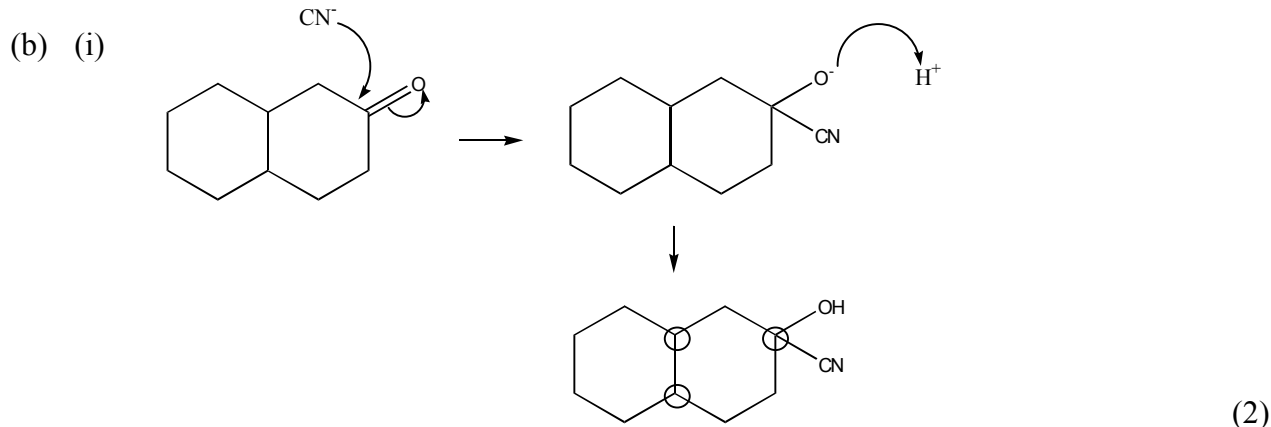
1. **Z** ($C_7H_6O_2$) is aromatic and it is an acid \Rightarrow **Z** is benzoic acid (1)
X has an IR absorption peak at $1720\text{ cm}^{-1} \Rightarrow$ **X** has a carbonyl group (1)
X can be reduced by $LiAlH_4$ but cannot be oxidized by Tollen's reagent \Rightarrow **X** is a ketone (1)
Y is formed from the reduction of a ketone \Rightarrow **Y** is a secondary alcohol (1)



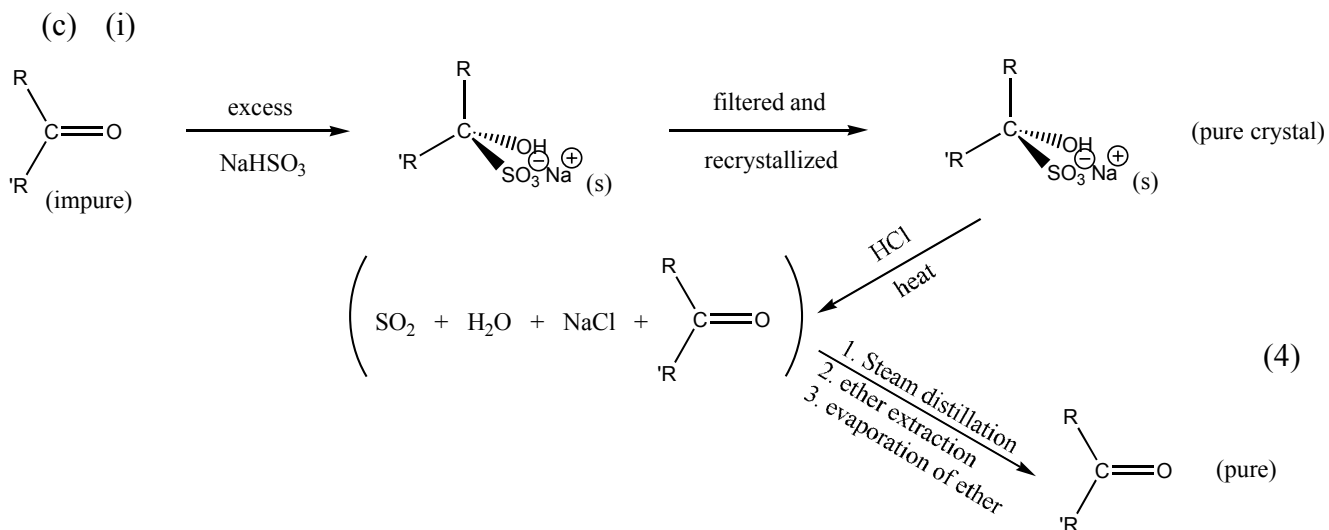
(3)



3. (a) (i) **A** is P_2O_5 (1)
 (ii) **B** is  (2)
 (iii) **C** is  (2)

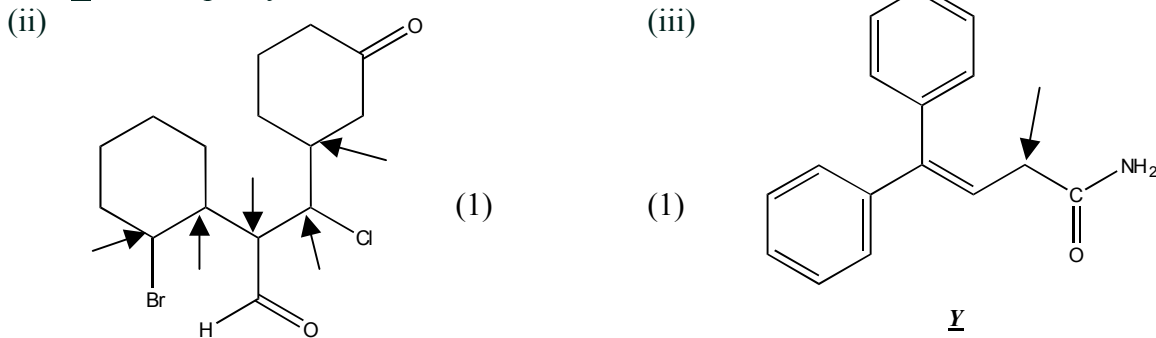


- (ii) Yes. The product has three chiral centers. (1)



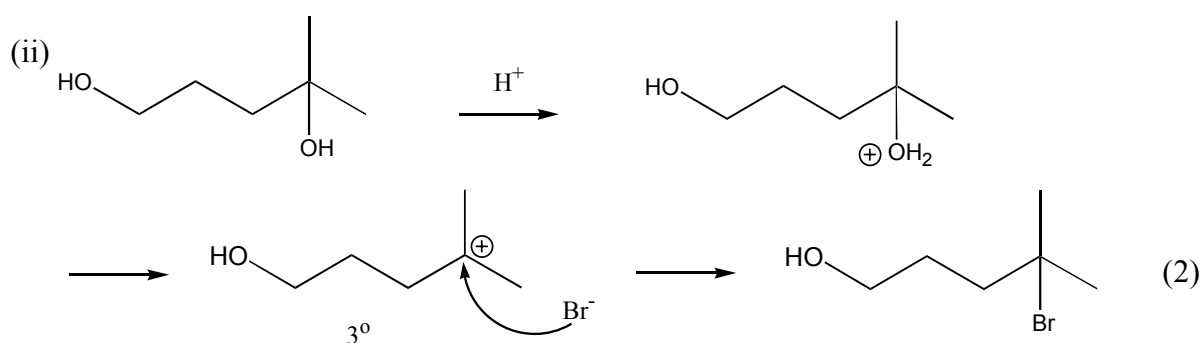
- (ii) Prepare a 2,4-dinitrophenylhydrazone derivative of the carbonyl compound obtained. Purify the derivative produced by recrystallization. Determine the melting point of the derivative and check the result against data book. (2)

4. (a) (i) **X** is 2-(2-bromohexyl)-3-chloro-3-(3-oxohexyl)propanal (1)
Y is 4,4-diphenylbut-3-enamide (1)



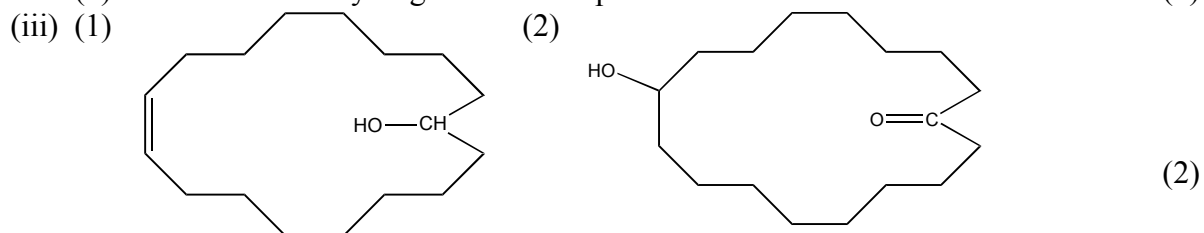
4. (b) (i) but-1-ene
(ii) ethyl benzoate
(iii) 1-bromohexane
(iv) phenylamine
(v) benzoic acid (5)

5. (a) Stability of carbanions : $F > D > E$ (1)
F is most stable because the negative charge on carbon can be dispersed to the electronegative oxygen by resonance effect. (1)
E is least stable because the negative charge on carbon is reinforced by the electron-donating methyl group. (1)



Substitution reaction (S_N1) at the fourth C atom is more favoured than at the first C atom due to the formation of a more stable carbocation (3°) (1)

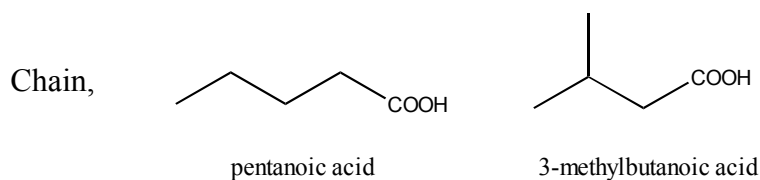
- (c) (i) (1) They are esters with low boiling points. (1)
(2) Only **B** decolourizes bromine solution. (1)
(ii) (1) **C** is 2-phenylethanol. (1)
(2) Intermolecular hydrogen bonds are present in **C**. (1)

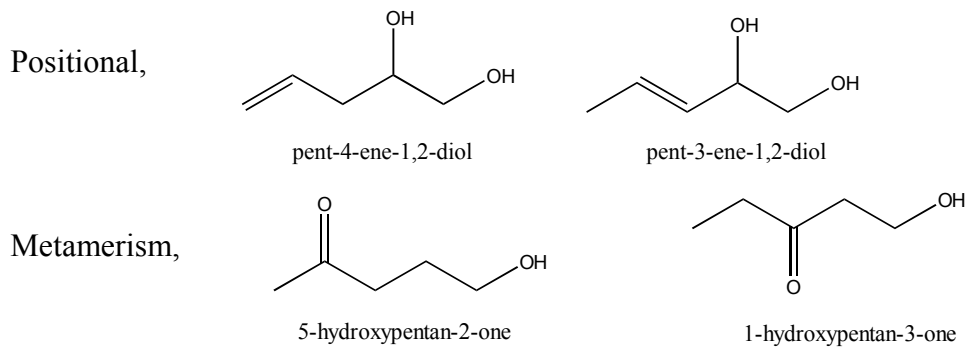


7. Isomerism is the phenomenon whereby certain compounds have the same molecular formula but have different molecular structures due to different arrangements of atoms. ($\frac{1}{2}$)

Types of isomerism :

- (a) Structural isomerism
(i) Same functional group
(1) Chain (2) positional (3) metamerism
(Any TWO. If more than two, a maximum of 2.5 marks will be awarded) (2)



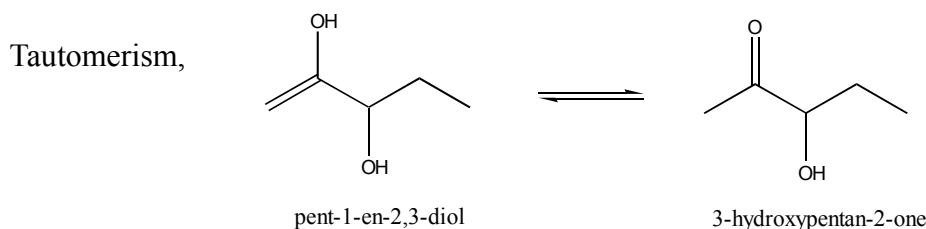
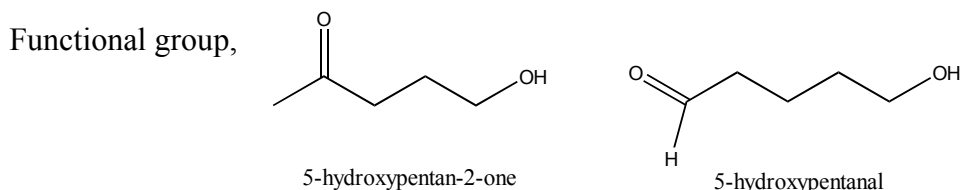


They have similar chemical properties but different physical properties. $(\frac{1}{2})$

(ii) Different functional groups

(1) Functional group (2) Tautomerism

(Any ONE. If more than one, a maximum of 1.5 marks will be awarded) (1)



They have different chemical and physical properties. $(\frac{1}{2})$

(b) Stereoisomerism : same structural formulae but different spatial arrangements of atoms

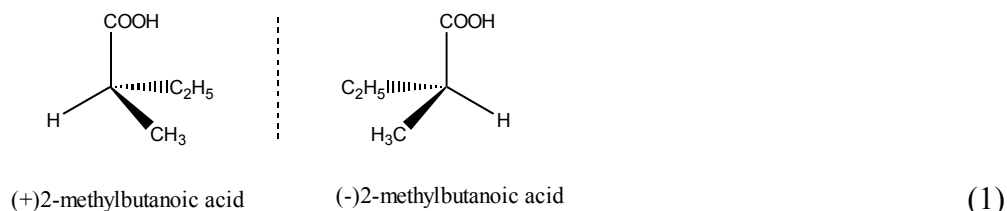


Arises from restricted rotation about C=C double bonds. $(\frac{1}{2})$

They have similar chemical properties but different physical properties. $(\frac{1}{2})$

Trans-isomer is more symmetrical but has smaller overall electric dipole moment. Thus trans-isomer may have higher m.p. but lower boiling point than the cis-isomer. $(\frac{1}{2})$

(ii) Enantiomers : a pair of non-superimposable mirror images $(\frac{1}{2})$



They have **identical** physical properties except their abilities to rotate plane-polarized light. $(\frac{1}{2})$

They have identical chemical properties except reactions with chiral compounds. $(\frac{1}{2})$

The (+) isomer rotates the plane of plane-polarized light to the right whereas the (-) isomer rotates the plane of plane-polarized light to the left. $(\frac{1}{2})$