

**2/EH-23 (ii) (Syllabus-2015)**

**2 0 1 8**

( April )

**CHEMISTRY**

( Elective/Honours )

( **General Chemistry—II** )

( **Inorganic, Organic and Physical** )

( Chem-EH-201 )

Marks : 56

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

**SECTION—I**

( **Inorganic** )

( Marks : 19 )

1. (a) How is the concept of solubility product used in the group separation of cations? 4
- (b) What is a primary standard solution? Give two examples. 2
- (c) Which is the strongest Lewis acid in the series of—
- (i)  $\text{BF}_3$ ,  $\text{BCl}_3$ ,  $\text{BI}_3$ ;
- (ii)  $\text{BeCl}_2$ ,  $\text{BCl}_3$ ?
- Give reasons. 2



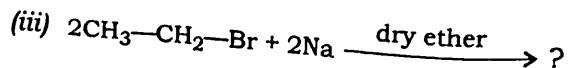
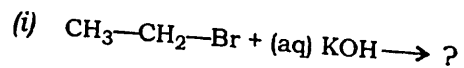
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when

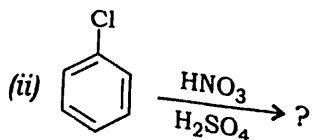
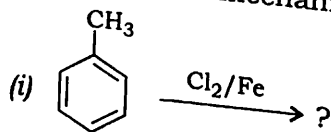
X = F	30%	70%
Cl	65%	35%
Br	72%	28%
I	80%	20%

Explain the variations in the proportions of the alkenes obtained. 4

(b) Complete the following reactions :  $\frac{1}{2} \times 3 = 1\frac{1}{2}$



(c) Predict the products in the following reactions with mechanism :  $2 \times 2 = 4$



OR

6. (a) Explain the stereochemistry of an  $\text{S}_{\text{N}}2$  reaction by giving suitable example. 3

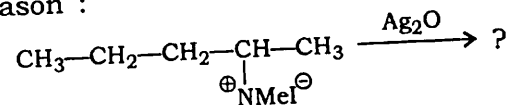
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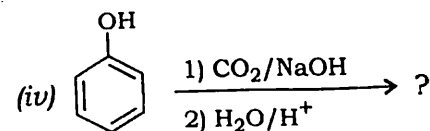
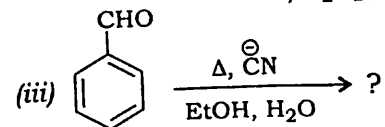
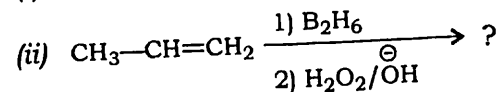
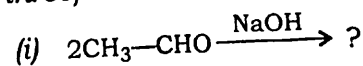
(b) Explain the effect of solvent on the rate of  $\text{S}_{\text{N}}1$  reaction. 2

(c) Predict the major product in the following reaction. Explain with proper reason :  $2\frac{1}{2}$



(d) How does electron withdrawing substituents affect the reactivity of aryl halide towards nucleophilic substitution reaction? 2

7. (a) Write the product(s) of the following reactions with proper mechanism (any three) :  $2\frac{1}{2} \times 3 = 7\frac{1}{2}$



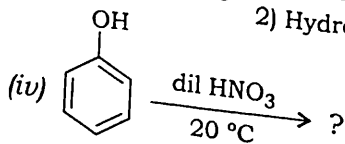
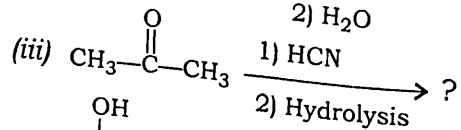
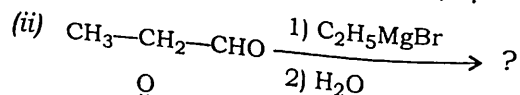
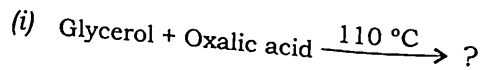
(b) Phenols are more acidic than cyclohexanol. Explain. 2

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( Turn Over )

OR

8. (a) How will you distinguish among primary, secondary and tertiary alcohols by Lucas test? 1½
- (b) Starting from benzaldehyde, how is cinnamic acid prepared? Give the mechanism. 2
- (c) Predict the product(s) in the following reactions with proper mechanism (any three) : 2×3=6



SECTION—III

( Physical )

( Marks : 18 )

9. (a) Define the following terms : 1×3=3
- (i) Adiabatic process
- (ii) Extensive property
- (iii) Reversible process

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( Continued )

- (b) 10 moles of an ideal gas at the initial pressure of 1 atmosphere at 0 °C were expanded reversibly under isothermal conditions to a final pressure of 0.1 atmosphere. Calculate the work done by the gas ( $R = 8.314 \text{ JK}^{-1} \text{ mol}^{-1}$ ). 2
- (c) Describe the osmotic pressure method for the determination of the molecular mass of macromolecules. 4

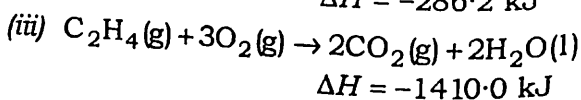
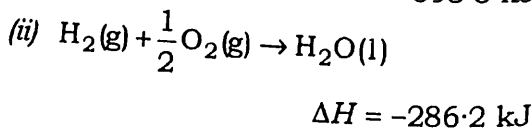
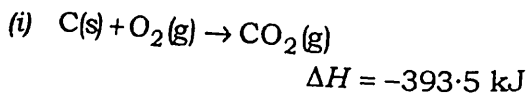
OR

10. (a) Deduce the relation between  $C_P$  and  $C_V$ . Explain why  $C_P$  is always greater than  $C_V$ . 2+1=3
- (b) What is Joule-Thomson effect? Describe the experimental setup of the Joule-Thomson effect. 1+2=3
- (c) In a particular sample of a polymer, 100 molecules have molecular weight  $10^3$  each, 200 molecules have molecular weight  $10^4$  each and 200 molecules have molecular weight  $10^5$  each. Calculate the number average and weight average molecular weights. 1½+1½=3
11. (a) State and explain Hess' law of constant heat summation. Explain some of its important applications. 1+2+1=4

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( Turn Over )

- (b) Calculate the enthalpy of formation of ethylene at 25 °C from the following data :



- (c) Derive an expression for work done in an isothermal reversible expansion of a gas.

OR

12. (a) What are exothermic and endothermic reactions? In an exothermic reaction, is the internal energy of the products greater or lesser than internal energy of the reactants?  $2 + \frac{1}{2} = 2\frac{1}{2}$
- (b) Give five differences between physisorption and chemisorption.  $\frac{1}{2} \times 5 = 2\frac{1}{2}$
- (c) Deduce the Langmuir adsorption isotherm equation. 4

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