INTER B.SC. EXAMINATION, 2019

(1st Semester, Old Syllabus)

CHEMISTRY (SUBSIDIARY)

PAPER - VIS

Time : Two hours Full Marks : 50

Use a separate answerscript for each group.

GROUP - A

1. a) State & explain Henry's law. 2

   b) The vapour pressure of two pure liquids A and B are 15000 and 30000 Nm^{-2} at 298 K. Calculate the mole fraction of A and B in vapour phase when an equi-molar solution of the liquids is made. 3

   c) How can you explain elevation of boiling point of a dilute solution ? 2

   d) Osmotic pressure of a solution containing 7 gram of dissolved protein per 100 cm^3 of a solution is 25 mm of Hg at 310 K. Calculate the molar mass of the protein. ($R = 0{\cdot}0825$ litre atm deg^{-1} mol^{-1}). 2

2. a) Give the labeled pahse diagram of water system and briefly discuss the salient points. Calculate the number of degree of freedom at the triple point. 3

b) The vapour pressure of water at 95°C is found to be 634 mm. What would be the vapour pressure at a temperature of 100°C ? The heat of vapourisation in this range of temperature may be taken as 40593 J mol^{-1}. 3

c) When varying amounts of iodine were shaken with CCl_4 – water mixture, the following concentrations of iodine (in g/100 cm^3) where obtained :

CCl_4 layer	5·1	10·2	15·2	20·3
Water layer	0·06	0·119	0·178	0·236

Show that these results illustrate the Nernst distribution law. 2

GROUP - C

4. a) Predict structure of the following compounds :

(i) Borazine (ii) BF_3 (iii) 16-crown-6 (iv) XeO_3 (v) XeF_6 $1+(\frac{1}{2}\times 4)$

b) Explain the Structure of $Be_4O(O_2CCH_3)_6$ and $BeCl_2$ in solid state. 3

c) Write down the short notes on

(i) Diborane (Synthesis, Structure and Reactivity)

(ii) Boric Acid (Synthesis and Structure) 4+3

d) What is alkalide and electride ? Explain with suitable example. 3

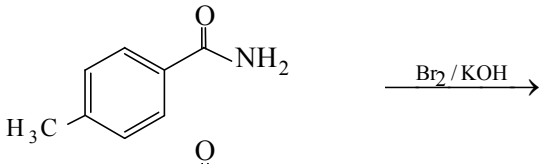
GROUP - B

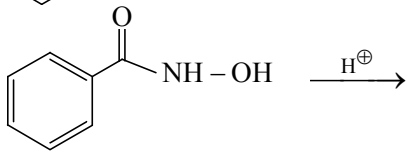
3. a) Answer ***any one*** of the following questions :

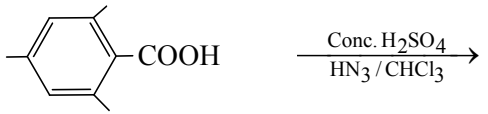
i) Give an account of the factors affecting the uv-visible spectra and IR-spectra. $1\frac{1}{2}+1\frac{1}{2}$

ii) Discuss the basic principles of uv-visible spectroscopy and its limitations. 2+1

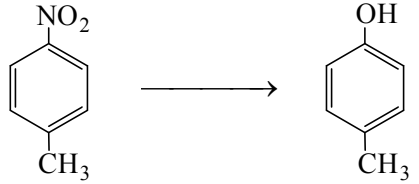
b) Predict the product(s) of the following reactions with plausible mechanism (answer ***any two***) : 2×2

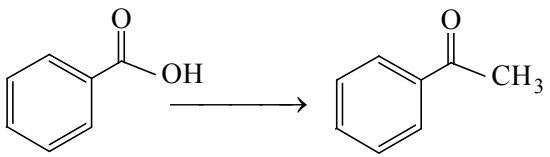
i) 

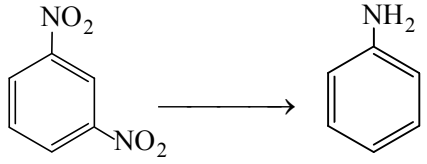
ii) 

iii) 

c) Carry out the following transformations ***(any two)*** : 2×2

i) 

ii) 

iii) 

d) Explain the following terms with examples ***(any two) :*** 2×2

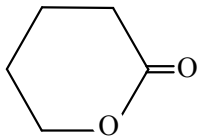
i) Blue Shift

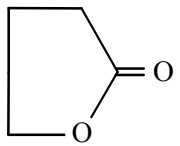
ii) Auxochrome

iii) Chromophore

iv) Hyperchromic Shift

e) Compare the IR-band for the stretching vibration of $\rangle C = O$ in the following compounds.

(i) 

(ii) 

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