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B.Sc. RNLKWC-/CC6T/22

2022

Chemistry

B.Sc. Third Semester End Examination - 2022

PAPER - CC6T

Full Marks : 40

Time : 2 hours

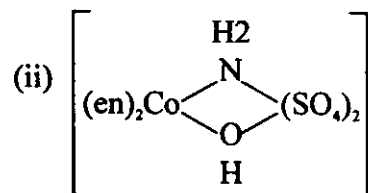
*The figures in the right-hand margin indicate marks.  
Candidates are required to give their answers in their own  
words as far as practicable.  
Illustrate the answers wherever necessary.*

**Group-A**

1. Answer any five questions : 5×2=10
- a) Compare the acidity order of  $BX_3$ , where X=halide.
  - b) Why boron nitride is called “inorganic graphite”?
  - c) Write down the IUPAC nomenclature of the following compounds :

*(Turn Over)*

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- d) What do you mean by Clathrate compound? It is a true compound – explain.
- e)  $I_2$  is sparingly soluble in water but it is readily dissolved in the aqueous solution of KI– Explain.
- f) Draw the structural formula of two isomers of the complex ion  $[\text{Co}(\text{NH}_3)_3\text{NO}_2]^+$ . Mention the type of isomerism involved.
- g) All six hydrogen atoms of  $\text{B}_2\text{H}_6$  are not equivalent – Explain.
- h) Differentiate between borates and silicates.

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**Group - B**

Answer any four questions.

4×5=20

2. (a) “With the increase of positive oxidation number of the central element, acidity of the compound increases.” – Justify the statement.
- (b) Fluorine is very pale yellow but Iodine is violet in colour, though they belong to the same halogen group – why? Explain with the help of M.O.T. 2+3
3. (a) Complete the reactions
- (i)  $\text{B}_3\text{H}_3\text{H}_6 + \text{C}_6\text{H}_5\text{NH}_2 \longrightarrow$
- (ii)  $\text{S}_4\text{N}_4 \xrightarrow[\text{[H]}]{\text{SnCl}_4, \text{EtOH}} ?$
- (b) Write a short note on ternary boron nitride. 2+3
4. (a) Explain the factors that affect the stability or coordination complexes.

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- (b) Give the names and illustrate all types of isomers that are possible in an octahedral complex compound of one cobalt(III) ion, two en molecules, two chloride ions and one nitrate ions. 2+3
5. (a) B-X bond in  $BX_3$ , C-F bond in  $CF_4$  and Si-Cl bond in  $SiCl_4$  are shorter than a pure single bond – why? Mention each case.
- (b) Write a short note on Berrys pseduoroation. 3+2
6. (a) Why Group 1 elements are strong reducing agents?
- (b) Give equations to show the reactions between Calcium and (i)  $H_2O$  (ii)  $NH_3$  (iii)  $O_2$ . 2+3
7. (a) Write the formula for the following complexes.
- (i) Tetrapyridineplatinum(II) tetrachloroplatinate(II)
- (ii) Diamminebis(ethylenediamine)cobalt(III)chloride
- (b) Write down three important postulates of Werner's coordination Theory. 2+3

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### Group - C

Answer any one question

1×10=10

8. (a) Explain the term 'Pearson-Pauling Paradox' of chemistry.
- (b) Draw each of the possible stereoisomers of the octahedral complexes (i)  $Ma_3bcd$  (ii)  $Ma_2bcde$  and (iii)  $M(AA)(AA)cd$ . The lowercase letters a, b, c, d and e represent monodentate ligands and upper case letters (AA) represent the donor atoms of a bidentate ligand. Indicate which isomers are optically active (chiral).
- (c) How will you differentiate between boric acid and borates? Write chemical reaction.
- (d) Explain the thermal stability of phosphonium halide compound. 2+4+2+2
9. (a) What does the preparation procedure of phosphazane. State the balanced equation.
- (b)  $Xe_6^{+}$  cannot be stored in glass apparatus – Explain.

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(c) Noble gases are monoatomic – Explain.

(d) What happens when a mixture of  $\text{PCl}_5$  and  $\text{NH}_4\text{Cl}$  is heated? Give the structure of the product and state its uses.

2+2+2+4