U. G. 4th Semester Examination 2022

CHEMISTRY (Honours)

Paper Code : CEMH DC-9

(Inorganic Chemistry)

[CBCS]

Full Marks : 25 Time : Two Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

1. Choose the correct alternative in each questions (any *five*) : 1×5=5

(a) Electrolytic refining is used to purify which of the following metals?

(i) Cu and Zn

(ii) Ge and Si

(iii) Zn and Hg

(iv) Zr and Ti

(b) Which of the following are per acids of Sulphur?

(i) H_2SO_5 and $H_2S_2O_8$

(ii) H_2SO_5 and $H_2SO_2O_7$

(iii) $H_2SO_2O_7$ and $H_2SO_2O_8$

(iv) $H_2SO_2O_6$ and $H_2SO_2O_8$

(c) Which of the following does not exist?

(i) $XeOF_4$

(ii) NeF_2

(iii) XeF_2

(iv) XeF_6

(d) Which of the following compound does not produce oxyacid of central atom on hydrolysis?

(i) BCl_3

(ii) BF_3

(iii) NCl_3

(iv) PCl_3

(e) Consider the following sequence of reaction:

$$Na + NH_3(g) \rightarrow [X] + N_2O \rightarrow [Y] + \Delta \rightarrow [Z]$$

Identify [Z] gas

(i) N_2

(ii) HN_3

(iii) O_2

(iv) H_2

(f) Which of the following polyhalide ion is most stable?

(i) Br_{3^-}

(ii) I_{3^-}

(iii) Cl_{3^-}

(iv) F_{3^-}

(g) Identify the optically active compounds from the following :

(a) $[CO(en)_3]^{3+}$

(b) Cis $[CO[en)_2Cl_2]^{+}$

(c) trans $[CO(en)_2Cl_2]^{+}$

(d) $[Cr(NH_3)_5Cl]$

(h) When 0.1 mol $COCl_3$ $(NH_3)_5$ is treated with excess of $AgNO_3$; 0.2 mol of AgCl are obtained. The conductivity of solution will correspond to.

(a) 1 : 3 electrolyte

(b) 1 : 1 electrolyte

(c) 1 : 2 electrolyte

(d) 3 : 1 electrolyte

2. Answer any ***four*** questions : 2×4=8

(a) Explain the following:

(i) Among hydrogen halides, HI is the strongest reducing agent.

(ii) H_2Te is more acidic than H_2S.

(b) Write down the product of the following reaction

(i) $XeF_6 + 3H_2O = ?$

(ii) $6XeF_4 + 12H_2O = ?$

(c) Write short note on (any one)

(i) Polling (ii) Zone refining

(d) What is meant by term Smelting? Give an example.

(e) Why reduction of Cr_2O_3 to Cr by Al is possible? Discuss in the light of Ellingham diagrams?

(f) Write down the IUPAC nomenclature of the following chemical formula:

(i) $[Co(NH_3)_5ONO]Cl_2$ and (ii) $[Ru(NH_3)_5N_2]Cl_2$

(g) A coordination compound has the formula $CoCl_3.4NH_3$. It does not liberate NH_3 but forms a precipitate with $AgNO_3$. Write the structure and IUPAC name of the complex compound. Does it show geometrical isomerism ?

(h) Give the chemistry involved in the use of carbon as a reducing agent.

3. Answer any ***two*** questions : 6×2=12

(a) Molar conductances at dilution of 1024 litres of $PtCl_4.NH_3$, $PtCl_4.3NH_3$ and $PtCl_4.6NH_3$ are 7, 97 and 520 $ohm^{-1}cm^2$ respectively. Rationalise these data in the light of Werner's theory. 3×2=6

(b) The compound $Co(en)_2(NO_2)_2Cl$ (en = ethylenediamine) has been prepared in a number of isomeric forms. One form undergoes no reaction with either $AgNO_3$ or ethylenediamine and is optically inactive. A second form reacts with $AgNO_3$ but not with ethylenediamine and is also optically inactive. A third form reacts with $AgNO_3$ and ethylenediamine and is optically active. Identify each of the three forms by their IUPAC names and discuss the above reactions in the light of Werner's theory. 2+2+2=6

(c) Write short notes on :

(i) Silicones and (ii) Boron nitride 3+3=6

(d) Whats happen when a concentrated solution of $NaNO_2$ is mixed with a solution of Na_2CO_3 and SO_2 which is then acidified with dilute H_2SO_4 at 90ºC. Write the all reaction equations involve in the reaction. 6