

2021

CHEMISTRY — HONOURS

Paper : CC-6

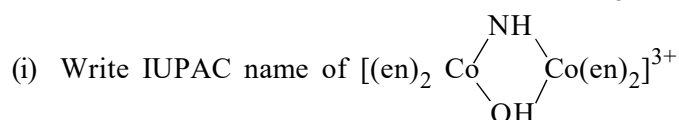
(Inorganic Chemistry)

Full Marks : 50

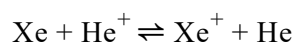
*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.***Question no. 1** is compulsory and answer **any eight** questions from the rest.1. Answer **any ten** questions :

1×10

- (a) Out of P and S whose 1st ionisation potential will be higher?
- (b) What will be effective nuclear charge (z^*) on a 3p electron of Cl atom?
- (c) What happens when borax is heated strongly?
- (d) Arrange the following ions in the order of increasing size : H^- , F^- , Cl^- , Br^- .
- (e) Give molecular formula of Potassium Iron(III)hexacyanoferrate(II).
- (f) What will be the shape of thionyl chloride?
- (g) Among SF_4 , SF_5 and SF_6 , which compound has minimum electron affinity?
- (h) Comment on the oxidation state of Tl in TlI_3 .



- (j) In which direction the following reaction will proceed in gas phase?



- (k) Give two examples of siloxanes.
- (l) Give one example of purely inorganic optically active compound.
2. (a) The interionic distance of $Mg^{2+} - O^{2-} = 257.4$ pm. Calculate the Pauling univalent radii of Mg^{2+} and O^{2-} .
- (b) Perdisulphates are strong oxidising agents and can be used in analytical processes. Explain with an example.

3+2

Please Turn Over

3. (a) P, Q, R are the elements of same period in the periodic table. From their 1st and 2nd ionisation energy table, identify them as alkali metal, alkaline earth metal and non-metal. Justify your answer.

	P	Q	R
I_1	17.4	5.39	6.11
I_2	35.0	75.6	11.87

(I_1, I_2 in kJ/mole)

- (b) Electron affinity of chlorine is 349 kJ/mole. How much energy in kJ is released when 1g of chlorine is converted completely into $\text{Cl}^-(\text{g})$ ions? 3+2
4. (a) Discuss the hydrolytic trends of CCl_4 and SiCl_4 .
 (b) Give all the geometrical isomers with their IUPAC names of the following : $[\text{Ru}(\text{py})_3\text{Cl}_3]$. 3+2
5. (a) Complete the reactions and balance in each case :
 (i) $\text{ClF}_5 + \text{AsF}_5 + \text{KrF}_2 \rightarrow$
 (ii) $\text{XeF}_4 + \text{KI} \rightarrow$
 (iii) $\text{SF}_4 + \text{XeF}_4 \rightarrow$
 (b) Sn^{4+} is stable whereas Pb^{4+} is highly oxidizing. Explain. 3+2
6. (a) ClF_3 falls under which class of compounds? What will be its structure? How polyhalides can be obtained from it?
 (b) N – atoms of phosphazenes are weakly basic.— Justify. 3+2
7. (a) Calculate the electronegativity of chlorine in Mulliken's scale and hence find out the electronegativity of the same in Pauling's scale.
 Given : Electron affinity of chlorine = 4.0 eV per atom. Ionisation energy of chlorine = 13.0 eV per atom.
 (b) Discuss bonding of XeF_4 . 3+2
8. (a) What is polymer? What do you understand by the term 'Inorganic Polymer'? How it differs from organic polymers?
 (b) Inorganic benzene is more reactive than benzene. Prove it with examples. 3+2
9. (a) How will you generate perxenate ion from XeO_3 ? Xenon fluoride compounds should not be handled in glass apparatus. Why?
 (b) Molar conductance (in $\text{ohm}^{-1}\text{cm}^2\text{mol}^{-1}$) at 0.001 (M) concentration of $\text{CoCl}_3 \cdot 4\text{NH}_3$, $\text{CoCl}_3 \cdot 5\text{NH}_3$ and $\text{CoCl}_3 \cdot 6\text{NH}_3$ complexes are 98, 261 and 426 respectively. Rationalise these in the light of Werner's theory. 3+2

10. (a) How does electronegativity vary with (i) hybridization (ii) screening effect of orbitals?
(b) Mention various allotrops of S and identify its most stable allotropic form. 3+2
11. (a) Discuss structure and bonding in phosphazene.
(b) Stable form of oxygen is O₂ while that of sulphur is S₈. Explain. 3+2
12. (a) Explain :
(i) Gold generally forms auride ion.
(ii) Thermal stability of BeCO₃ and MgCO₃ are different.
(b) Justify very high melting point of boron and very low melting point of mercury. 3+2
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