Unit - I

(*Answer <u>any one</u> question*)　　　　　　　　　　　　　　　　　　　[1×13]

1.　a)　Write the electronic configuration of an element having atomic number 35. Predict the probable stable oxidation state of the element.　[2]

　　b)　Explain why phosphorous has higher ionisation energy than sulphur in spite of having lesser nuclear charge than sulphur.　[2]

　　c)　Using Bohr's theory, find out the ionisation energy of the electron in the hydrogen atom.　[2]

　　d)　Discuss the significance of magnetic quantum number.　[2]

　　e)　Calculate the amount of energy radiated in the following reaction :

$$^{238}_{92}U \rightarrow {}^{234}_{90}Th + {}^{4}_{2}He + Energy .$$ 　[3]

　　　　[Given : $^{238}U = 238 \cdot 1249$ amu, $^{234}Th = 234 \cdot 1165$ amu, $^{4}_{2}He = 4 \cdot 0039$ amu]

　　f)　$^{208}_{82}Pb$ has a n/p ratio of $1 \cdot 536$, yet it is non-radioactive. —Explain.　[2]

2.　a)　Define electronegativity of an element. Why it is not an inherent property?　[2]

　　b)　Be has higher ionisation energy value than B. —Explain.　[2]

　　c)　Arrange the following ions in increasing order of their ionic radii : $H^-, I^-, Cl^-, Br^-, F^-$　[3]

　　d)　Explain why ^{238}U cannot be commonly used as a nuclear fuel.　[2]

　　e)　Calculate the change in energy of the following reaction in Joule—

$$^{1}_{0}n \rightarrow {}^{1}_{1}p + {}^{0}_{-1}e$$ 　[2]

　　　　[Given: $m_p = 1 \cdot 00728$ amu, $m_n = 1 \cdot 00867$ amu and velocity of light, $C = 3 \times 10^8$ ms^{-1}]

　　f)　Ionisation energy of noble gases are very high, but their electron affinities are zero. —Explain.　[2]

Unit - II

(*Answer <u>any one</u> question*)　　　　　　　　　　　　　　　　　　　[1×12]

3.　a)　Name the IUPAC names of the following compounds :

　　　　i)　$[Cr(NH_3)_4Cl_2]Cl$

　　　　ii)　$[Co(NH_3)_4(NH_2CH_2CH_2NH_2)]Cl_3$　[2]

　　b)　What do you mean by ambidentate ligands?　[1]

　　c)　BF_3 is weaker Lewis acid than BBr_3. —Explain.　[2]

　　d)　Calculate the electron affinity of chlorine from the following ΔH data (Kj mol^{-1})

　　　　$D_{Cl_2} = 242$, $I_{Na} = 494$, $\Delta H_{sub.(Na)} = 109$, $\Delta H^o_f(NaCl) = -414$, $U = -787$　[3]

　　e)　A coordination compound is formulated as $CoCl_3.4NH_3$. It does not liberate NH_3 but on treatment with silver nitrate, silver chloride is precipitated. Write the structural formula.　[2]

　　f)　Predict the shapes of the following : $PbCl_4$, SbF_6^-　[2]

4.　a)　BF_3 molecule has shorter B–F bond length than that of BF_4^- ion. —Explain.　[2]

　　b)　What are the limitations of radius ratio rule?　[2]

　　c)　Explain why the bond between sodium and chloride ion is more stronger than that of potassium and chloride ion.　[2]

d) Show the possible coordination sites of the following ligands : NO_2^- and SCN^- [2]

e) There are three chlorotoluenes with three dipole moment value of 1·35D, 1·9D and 1·78D. Identify the isomers. [2]

f) Chelate complexes are more stable than non-chelate complexes. Explain giving example. [2]

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