

B.Sc. (Honours) Examination, 2017

Semester-II

Chemistry (Honours)

Course: BCHC-21

(Inorganic Chemistry)

Time: Three Hours

Full Marks: 30

Questions are of value as indicated in the margin.

Answer *any three* questions.

1. a) What is formal charge? Draw the probable Lewis structures of N_2O and select the most suitable one based on formal charge distribution. 1+(1+0.5)
b) What is oxidation number? Calculate the oxidation number of phosphorus of the given oxyacids – H_3PO_2 , $\text{H}_4\text{P}_2\text{O}_6$, $\text{H}_5\text{P}_3\text{O}_8$. 1+(0.5+0.5+0.5)
c) Arrange the given species according to decreasing bond angle and explain if in the light of VSEPR theory – NO_2 , NO_2^+ , NO_2^- . 1+(0.5+0.5+0.5)
d) What do you mean by equivalent and non-equivalent hybridization? Illustrate with examples. 1+1.5
 2. a) What do you mean by solubility product principle? Will a precipitate of $\text{Mg}(\text{OH})_2$ be formed in a 0.001 M solution of $\text{Mg}(\text{OH})_2$ if the pH of the solution is adjusted to 9. 2+2
b) Mention the symmetry element(s) present and assign point group of the compounds: N_2 , $\text{B}_3\text{N}_3\text{H}_6$ and B_2H_6 . 1+1+1
c) Using symmetry argument discuss whether the molecules CH_3Cl , CH_2Cl_2 and CHCl_3 will have dipole moment or not. 1+1+1
 3. a) Show the mechanism of hydrolysis of NCl_3 and PCl_3 . 3
b) Arrange the hydrides of group 16's elements according to reducing capacity – give reason. 2
c) Comment on the nature of bonding in polymeric, dimeric and monomeric form of BeCl_2 . 3
d) Between Sn(II) and Pb(II) salts which one is stronger oxidant and why? 2
 4. a) Perchloric acid is formulated as HClO_4 but periodic acid as H_5IO_6 – Explain. 1+1
b) $\text{H}_3\text{C}-\text{O}-\text{CH}_3$ reacts with BF_3 to form adduct but $\text{H}_3\text{Si}-\text{O}-\text{SiH}_3$ remain unreacted – Justify. 2
c) Show the mode of bonding in B_2H_6 . 4
d) Paramagnetic NO_2 dimerizes to N_2O_4 but the same of ClO_2 does not – Explain. 2
 5. a) CO can act as a good ligand for low oxidation states of metals but CO_2 or SiO_2 not – Justify. 2
b) Compare the mode of bonding in Inorganic Graphite and Diamond. 3
c) 'The chemistry of the alkali metals is primarily the chemistry of their ions' – Justify the statement. 3
d) Comment on the molecular arrangement of: XeF_2 , XeOF_4 , XeO_3 and XeF_6 . 2
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