

5. (a) Sketch the molecular orbitals resulting from the side on overlap of two p orbitals.
 (b) Draw the energy level diagram of molecular orbitals for F_2 molecule. State the bond order.
6. (a) Determine the electron configuration of the following molecules and calculate the bond order. Which species is diamagnetic (or) paramagnetic?
 (i) B_2 (ii) H_2^+ (iii) O_2^+
 (b) Draw the energy level diagram of molecular orbital for nitrogen monoxide (NO).
7. (a) Write a short note on the source and uses of iron.
 (b) Complete the following reactions.
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|-------|---|-------------------|---|
| (i) | $MnO_4^- + C_2O_4^{2-} + H_2PO_4 + H^+$ | \longrightarrow | ? |
| (ii) | $Cr_2O_7^{2-} + CH_3CHO + H^+$ | \longrightarrow | ? |
| (iii) | $MnO_2 + KOH + KNO_3$ | \longrightarrow | ? |
| (iv) | $Fe + Cl_2$ | \longrightarrow | ? |
| (v) | $Ni(OH)_2 + NH_3$ | \longrightarrow | ? |
| (vi) | $MnO_4^- + H_2S + H^+$ | \longrightarrow | ? |

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Bago University
Department of Chemistry
First Semester Examination, March 2019

Second Year BSc
(Chemistry Specialization)
Answer any six Questions

Chem-2101
Inorganic Chemistry I
Time Allowed: (3) hours

1. (a) Fill in the blanks with the correct word(s), unit(s), and etc., as necessary.
- (i) The formula of hydrazoic acid is _____.
 - (ii) White phosphorus is commonly stored under _____.
 - (iii) Dimeric molecules which show similarity to the halogens are called _____.
 - (iv) The _____ is the amount of energy necessary to break a mole of bonds.
 - (v) A _____ or nodal plane is a region in which the probability of finding electron is zero.
 - (vi) Mixture of iron and manganese oxides are reduced by carbon to give _____.
- (b) Select the correct statement(s), word(s), unit(s) and etc., given in the followings.
- (i) All isotopes of (radon, neon, xenon) are radioactive.
 - (ii) Ammonia is a (oxide, nitride, hydride) of nitrogen.
 - (iii) The major cause of the greenhouse effect is (carbon dioxide, oxygen, nitrogen) released by combustion and decomposition of organic matter.
 - (iv) The bond order of B_2 is (1, 2, 3).
 - (v) The structure of carbonate ion CO_3^{2-} is (tetrahedral, linear, trigonal planar).
 - (vi) The maximum oxidation number of Fe is (+2, +3, +6).
2. (a) (i) Write an equation to obtain $N_5^+[AsF_6]^-$ and briefly discuss about it.
(ii) Show the structural formulae of phosphorus in the liquid and gas phases and at very high temperature.
- (b) (i) Describe two methods for the preparation of phosphoric acid.
(ii) Give a brief explanation on the changes in viscosity of sulphur while heating.
3. (a) Draw a Lewis dot formula for each of the following species. Indicate the number of regions of high electron density and the electronic and molecular geometries.
(i) BF_3 (ii) CF_4 (iii) PF_5
- (b) State the type of hybridization at the central atom of the following molecules.
 $BeCl_2$, SF_6 , NH_3 , H_2S
4. (a) Describe the bonding in each of the following species with a Lewis structure and valence bond structure. Show the orbital orientation and label the orbital.
(i) CCl_4 (ii) H_2S
- (b) Show that nitrogen has variable oxidation number.

P.T.O