

Chemical Bonding

Assignment-5

Q1. The highest occupied MO in N_2 and O_2^+ respectively are (take x axis as internuclear axis) [NET June 2011]

- (a) $\sigma 2p_x, \pi^* 2p$ (b) $\pi 2p_y, \pi 2p_z$ (c) $\sigma^* 2p_x, \sigma 2p_x$ (d) $\pi^* 2p_y, \pi^* 2p_z$

Q2. The number of anti bonding electrons in NO and CO according to MO theory are respectively [NET Dec 2011]

- (a) 1, 0 (b) 2, 2 (c) 3, 2 (d) 2, 3

Q3. The molecule in which the bond order increases upon addition of an electron is [NET Dec 2013]

- (a) O_2 (b) B_2 (c) P_2 (d) N_2

Q4. The correct statement among the following is [NET Dec 2015]

(a) N_2 has higher bond order than N_2^+ and hence has larger bond length compared to N_2^+

(b) N_2^+ has higher bond order than N_2 and hence has larger bond length compared to N_2

(c) N_2 has higher bond order than N_2^+ and hence has higher dissociation energy compared to N_2^+

(d) N_2 has lower bond order than N_2^+ and hence has lower dissociation energy compared to N_2^+ energy

Q5. Correct combination for π and π^* orbitals in B_2 molecule is

[NET June 2016]

π	π^*
(a) Gerade	Ungerade
(b) Ungerade	Gerade
(c) Gerade	Gerade
(d) Ungerade	Ungerade

Q6. Boron in BCl_3 has

[NET Dec 2017]

- | | |
|--------------------------|--------------------------|
| (a) sp hybridization | (b) sp^2 hybridization |
| (c) sp^3 hybridization | (d) no hybridization |

Q7. According to Bent's rule, for p-block elements, the correct combination of geometry around the central atom and position of more electronegative substituent is

[NET Dec 2017]

- a) Trigonal bipyramidal and axial
- b) Trigonal bipyramidal and equatorial
- c) Square pyramidal and axial
- d) square pyramidal and basal

Q8. Removal of an electron from NO molecule results in

[NET June 2018]

- A) an increase in the (NO) in the IR spectrum
- B) an EPR active species
- C) electrons in HOMO's being closer to the Oxygen than to Nitrogen 2p orbitals
- D) electrons in HOMO's being closer to the Nitrogen than to Oxygen 2p orbitals

The correct answer is

- a) A only
- b) A and C
- c) B and D
- d) A, B and C

Q9. Consider the nature of solvents in Column-I and the corresponding λ_{max} for I_2 in various solvents given in Column-II. (for I_2 vapour λ_{max} is 520 nm). Match Column-I with Column-II

[NET June 2018]

Column-I	Column-II
A) Non donor	I) 520
B) Weak donor	II) 500

- C) Strong donor III) 450
D) π electron donor IV) 360

The correct match is

- a) A-I, B-II, C-III, D-IV
b) A-III, B-IV, C-II, D-I
c) A-I, B-III, C-IV, D-II
d) A-IV, B-III, C-II, D-I

Q10. Among the following diatomic molecules, the shortest bond length is to be found in [GATE 2000]

- a) C_2
b) N_2
c) O_2
d) F_2

Q11. The paramagnetic species among the following is [GATE 2001]

- a) B_2
b) C_2
c) O_2^{2-}
d) CO

Q12. The highest occupied molecular orbital of HF is [GATE 2008]

- a) bonding
- b) antibonding
- c) ionic
- d) nonbonding

J Chemistry