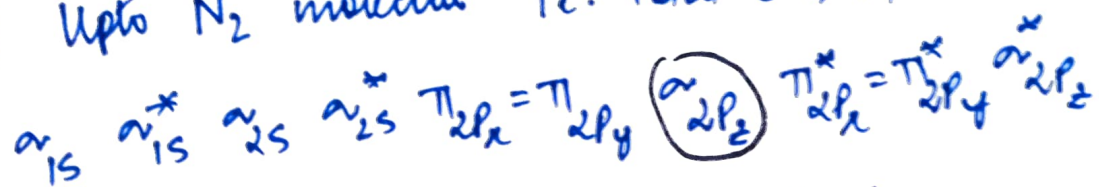
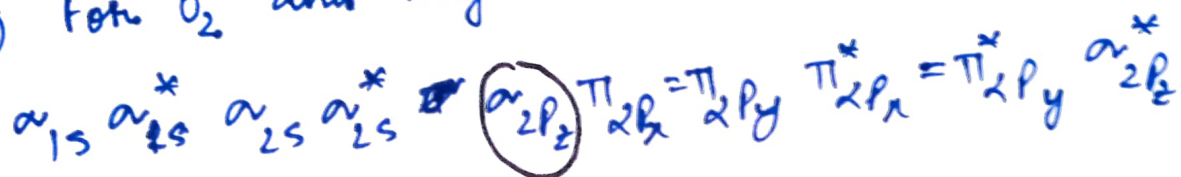


Electronic Configuration of Molecules

* Upto N_2 molecule i.e. total $e^- \Rightarrow 14$



* For O_2 and higher molecules :-



* Bond order :-

It may be defined as the half of difference between the number of e^- s present in bonding orbitals and anti-bonding orbitals.

$$\text{i.e. Bond order (B.O.)} = \frac{1}{2} (N_b - N_a)$$

* Magnetic behaviour :-

\Rightarrow If all the molecular orbitals in the species are spin paired, the substance is diamagnetic.

\Rightarrow If one or more molecular orbitals are singly occupied i.e. containing unpaired e^- s, then it is paramagnetic.

* Bond dissociation energy \propto bond order \Rightarrow stability

* Bond order $\propto \frac{1}{\text{Bond length}}$.

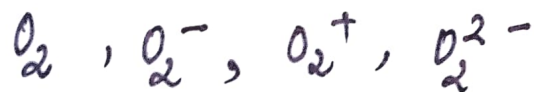
Q → Which of the molecular orbitals in N_2 has the least energy? ①

- (i) π_{2p_y} (ii) $\pi_{2p_x}^*$ (iii) σ_{2p} (iv) σ_{2p}^*

Q → What are the conditions for the combination of atomic orbitals? ②

Q → Draw the molecular orbital energy level diagram for B_2 molecule and predict its magnetic properties. ②

Q → Arrange the following in the increasing order of bond length: ②



Q → Define hydrogen bonding. The density of water is maximum at $4^\circ C$. Explain.

Q → What is the linear combination of atomic orbitals (LCAO)? Show with the help of LCAO the formation of bonding and anti-bonding molecular orbitals formed by 2p orbitals?

Q → Write down the molecular orbital configuration of O_2 . Find its bond order and mention its magnetic property.

Q → Write short notes on resonance energy. 1/2.

Q → Which of the following is paramagnetic?

- (i) O_2^- (ii) CO (iii) NO^+ (iv) CN^-

Q → What do you mean by bond order of a molecule?

The bond dissociation energy of O_2 (599 kJ mol^{-1}) decreases slightly on forming O_2^+ (513 kJ mol^{-1}) and increases greatly on forming O_2^- (818 kJ mol^{-1}). Why?

Q → Write short notes on solvation energy.

Q → Number of unpaired e^- present in NO molecule is - (i) 3 (ii) 2 (iii) 1 (iv) 0 (1)

Q → N_2 molecule is more stable than NO molecule.

Explain on the basis of MOT. (2)

Q → Compare bond lengths and magnetic properties of CN and CN^- species with the help of MOT. (2)

Q → Write a note on bonding and anti-bonding MO. (2)

Q → Write possible resonance structures of CO_3^{2-} ion.

Q →