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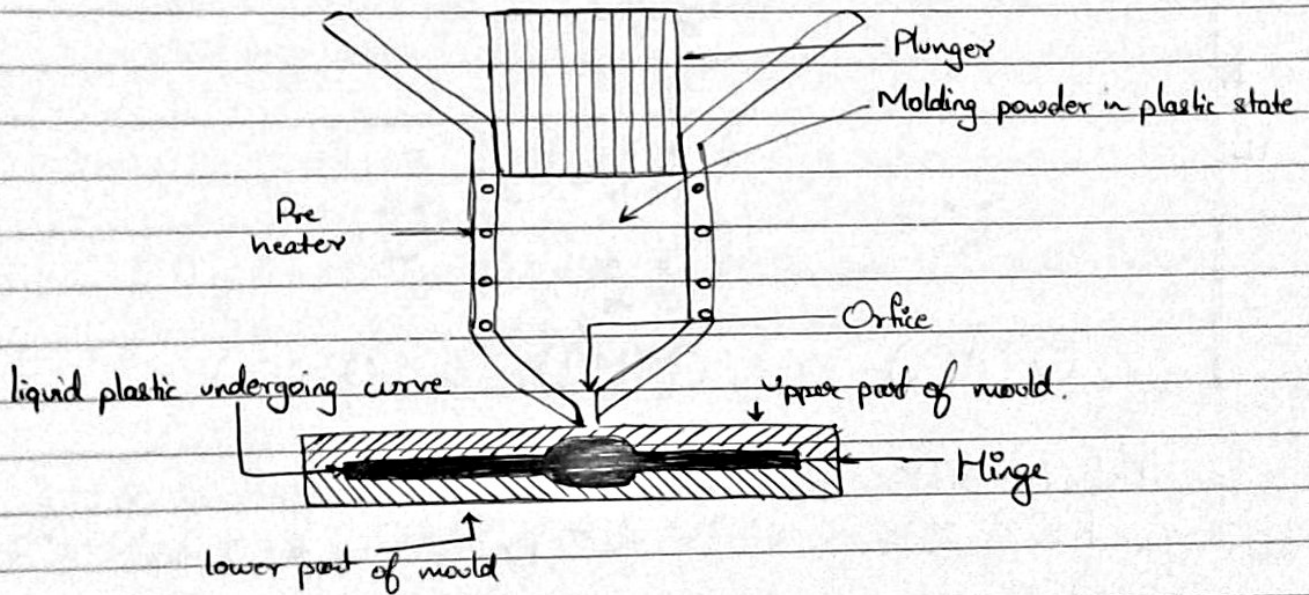
Q2.
b)

→ Transfer moulding - It is the modification of injection moulding and is suitable for thermosetting plastics.

The moulding composition is first plasticized by applying minimum heat and pressure in a chamber outside of the mould. This plasticized material is then injected through an orfice into the mould by a plunger working at a high pressure. It is heated upto curing temperature required for setting. The moulded article is ejected mechanically.

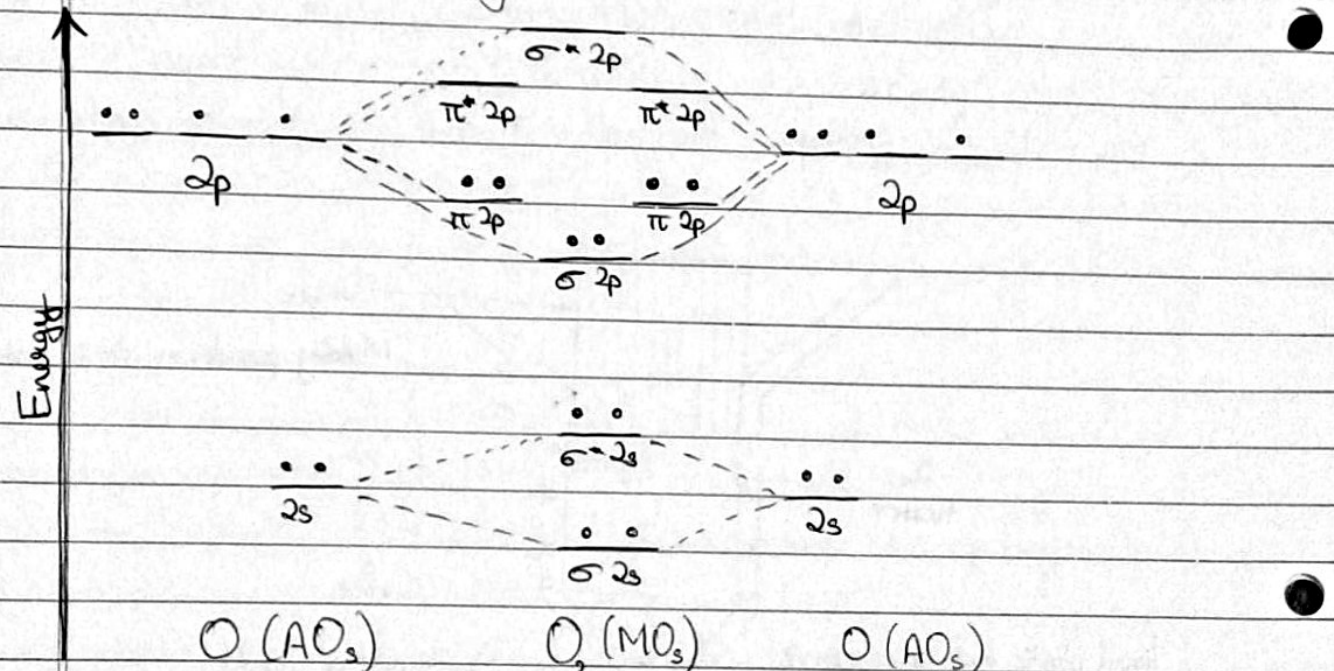


Q2.)
d)

$O_2$ molecule: O (Z=8)

Electronic configuration $1s^2\ 2s^2\ 2p^4$.

Since oxygen molecule is a homodiatomic molecule, atomic orbitals of the two oxygen atoms are at the same energy levels.
Molecular orbital diagram is -




Molecular orbital electronic configuration can be represented as:

$KK < \sigma 2s^2 < \sigma^* 2s^2 < \sigma 2p_x^2 < \pi 2p_y^2 = \pi 2p_z^2 < \pi^* 2p_y^1 = \pi^* 2p_z^1$

Bond order $= \frac{1}{2}(8-4) = 2$. implies there are two bonds between 2 oxygen atoms one is σ-bond and other is π-bond

As $\pi^* 2p_y$ and $\pi^* 2p_z$ molecular orbitals contain one electron each, oxygen molecule is paramagnetic in nature.

Q 2.

a)

→ Ion exchange process of demineralization of hard water:

Ion exchange resins are used for softening of water. They are organic polymers with long chains with cross links and having functional groups through which various ions are exchanged. The resins are porous and insoluble in water.

Principle - The principle of ion exchange method is based on stability of the ion exchange resins to exchange their functional groups with cations with all anions present.

This process includes the passage of raw water through cationic exchange resin and followed by passing it through anion exchange resin.

Reactions: i) As the raw water passes through cation exchange resin,

$$R\text{-}H_2 + MgCl_2 \rightarrow R\text{-}Mg + 2HCl$$

ii) The acidic water emerging from cation exchange bed is passed through anion exchange bed.

iii) $$R_2\text{-}(OH)_2 + H_2SO_4 \rightarrow R_2\text{-}SO_4 + 2H_2O.$$

$$R_2\text{-}(OH)_2 + 2HCl \rightarrow R_2\text{-}Cl_2 + 2H_2O.$$

∴ The water emerging from anion exchange bed is free from both cations anions and hence is completely demineralized.

The cation and anion exchange resin are regenerated when they get saturated and can be used repeatedly.

The softened water has very low hardness of <2 ppm and can be safely used for high pressure boilers.