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Inorganic Chemistry  
B.Sc Part-1, Unit-2  
Chemical bonding,  
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## CHEMICAL BONDING

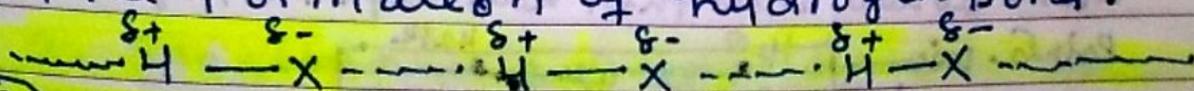
### Theories of hydrogen bond.

These are following main theories of hydrogen bond.

① Covalent nature :- The electronic configuration of H-atom is  $1s^1$ . Hence it can form only one covalent bond. The bicovalency for hydrogen (A-H-B) is not possible because it would involve the use of  $2s$  or  $2p$  orbitals which are of much higher energies than  $1s$  orbitals.

② Electrostatic nature :- In hydrogen compounds, the shared electron pair lies much nearer to small sized highly electronegative atom such as N, O, F etc. This develops a fractional positive charge on the H-atom.

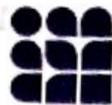
For example  $\delta^+ \quad \delta^-$   
 $H - X$  where X is some electronegative atoms. When two  $H - X$  molecules approach each other,  $H^{\delta+}$  exerts a strong electrostatic force and attracts  $X^{\delta-}$  of the other molecule. This results in the formation of hydrogen bond.



③ Valence bond theory :- According to this theory, hydrogen bond is a resonance

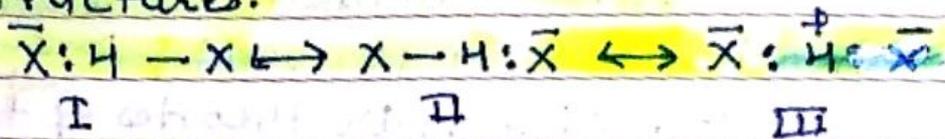
Notes

M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
19	20	21	22	23	24	25	26	27	28	29	30	31							



hybrid by the following resonating structures.

Structures.



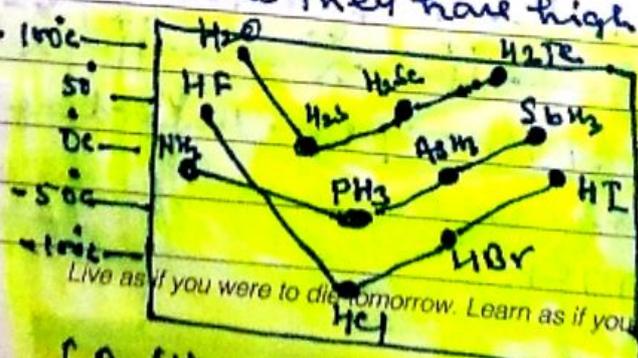
Effect of hydrogen bond on Physical Properties

These are following effect of hydrogen bond on Physical Properties.

①. State of H<sub>2</sub>O and H<sub>2</sub>S : - Since O-atom is more electronegative than S-atom. Hence hydrogen bond is possible in H<sub>2</sub>O while in H<sub>2</sub>S it is absent. In other words H<sub>2</sub>O molecules can associate to form a polymerised molecule (H<sub>2</sub>O)<sub>n</sub>. In which H-atom acts as a bridge between the two O-atoms. Thus due to the formation of polymerised (H<sub>2</sub>O)<sub>n</sub> molecules water exist as a liquid while H<sub>2</sub>S in which there is no hydrogen bond exist as a gas.

②. Melting and Boiling points of hydrides

The first member of hydrides of group IIA to VIIA elements (NH<sub>3</sub>, H<sub>2</sub>O, and HF) have high melting point and boiling points due to extensive molecular association of these hydrides by hydrogen bond. Therefore, more energy must be supplied to capture these bonds. Thus they have high melting and boiling points.



[ Rest Part Next Pdf ]

[ Boiling points of Hydrides ]

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