Task#85361

On the basis of dipole study, predict whether HF compound is purely ionic or polar covalent. The bond length of HF is 92 pm and dipole moment is 1.92 D.

Solution: Dipole moment of HF is($\mu_{observed}$)=1.92D

Dipole moment= Charge× *Distance of charge separation*

$\mu_{Calculated}$=(1.6 ×10^{-19}) ×(92×10^{-12})C.m , Where bond length of HF =92× 10-^{12} m

$$[1D=3.336×10^{-30} C.m]$$

Or,$\mu_{Calculated}=\frac{1.472×10^{-29}}{3.336×10^{-30}}$D =4.412D

% of ionic Character of HF is given by = ($\mu_{observed}$/ $\mu_{Calculated}$)×100=$\frac{1.92}{4.412}$ × 100=43.51%

So HF has almost equally ionic and covalent nature.Thatmeans, it is not purely ionic .We can say it is polar covalent in nature.

$$H\text{-}F(Covalent)\leftrightarrow H^+ F^-(ionic)$$

$$\rightarrow HF(Polar Covalent)$$
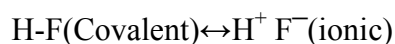
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