

Problem 3:

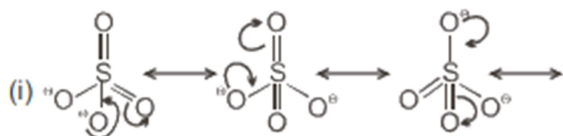
Write down the resonance structure(s) for :

(i) SO_4^{2-} (ii) CH_3COO^- (iii) HCO_3^- (iv) NO_3^- (v) PO_4^{3-}

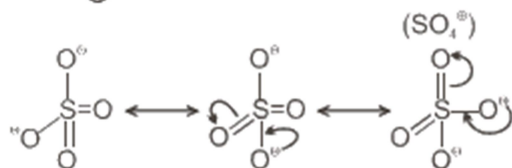
Also calculate average bond order of M–O bond in these compounds.

Where M is central atom (And M–O bonds considered are the one which involve delocalization)

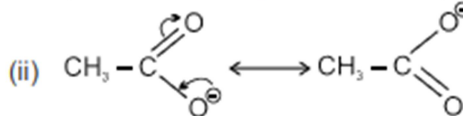
Solution:



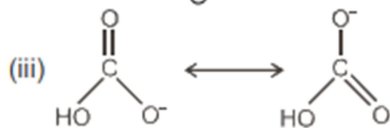
$$\text{Bond order} = \frac{2+1+1+2}{4} = 1.5$$



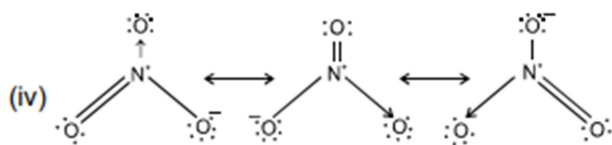
(SO₄²⁻)



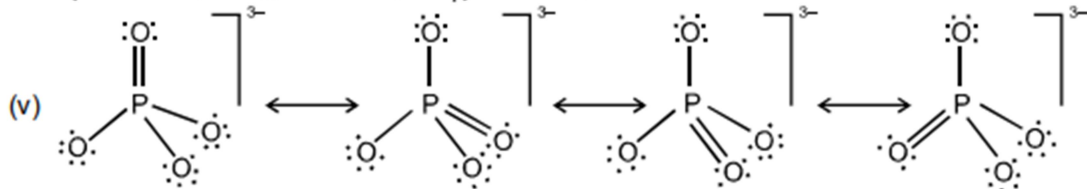
$$\text{Bond order} = 1 + \frac{1}{2} = 1.5$$



$$\text{Bond order} = 1 + \frac{1}{2} = 1.5$$



$$\text{Bond order} = 1 + \frac{1}{3} = 1.33$$



$$\text{Bond order} = 1 + \frac{1}{4} = 1.25$$