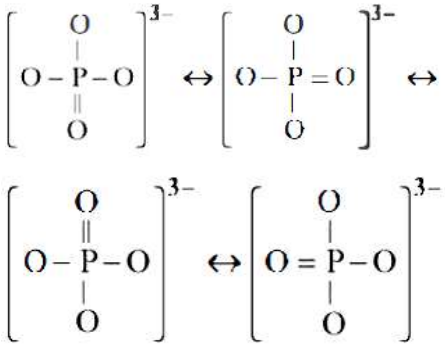
CHEMISTRY
Chemical Bonding

41. (3)



$$\text{Bond order} = \frac{\text{Number of bonds}}{\text{Number of Resonating structures}}$$

$\frac{5}{4} = 1.25$

Three unit negative charge is being shared by four O atoms. Formal charge $= -\frac{3}{4}$

42. (3)

Since, F form H-bond $[HF_2]^-$ exists.

Therefore, KHF_2 gives $K^+ + HF^-_2$.

43. (4)

In alcohol intermolecular H-bonding is possible whereas in ether it is not possible.

44. (3)

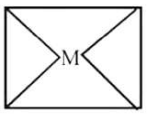
(1) N_2: bond order 3, paramagnetic
N_2^- : bond order, 2.5, paramagnetic

(2) C_2: bond order, diamagnetic
C_2^+ : bond order 1.5, paramagnetic

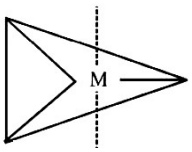
(3) NO: bond order 2.5, paramagnetic
NO^+: bond order 3, diamagnetic

(4) O_2: bond order 2, paramagnetic
O_2^+ : bond order 2.5, paramagnetic

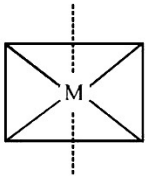
45. (4)



dsp^2 hybridisation
Number of 90° angle
Between bonds = 4



sp^3d or dsp^3 hybridisation
Number of 90° angle
Between bonds = 6



sp^3d^2 hybridisation
Number of 90° angle
Between bonds = 12

46. (3)

It is due to H-bonding

47. (4)

In XeF_2 Total number of valence electrons of Xe = 8, two electrons shared with 2F atoms, 6 electrons left hence 3 lone pairs, in XeF_4 4 shared with 4 F atoms 4 left hence 2 lone pairs; in XeF_6 6 shared with 6F atoms 2 left hence 1 lone pair.

48. (2)

$NO_2^+ = \frac{1}{2}[5+0+0-1] = sp$

$NO_2^- = \frac{1}{2}[5+0+1-0] = 3\ sp^2$

$NH_4^+ = \frac{1}{2}[5+4+0-1] = 4\ sp^3$

49. (2)

$NH_3 \rightarrow 1lp, 3bp \rightarrow$ Trigonal pyramidal

$SO_2 \rightarrow 1lp, 2bp \rightarrow$ Bent

$SF_4 \rightarrow 1lp, 4bp \rightarrow$ See-saw

$ClF_3 \rightarrow 2lp, 3bp \rightarrow$ T-shape

50. (2)

Atomic orbitals having same or nearly same energy will not combine if they do not have the same symmetry. $2p_z$ orbital of one atom cannot combine with $2p_x$ or $2p_y$ orbital of other atom because of their different symmetries.