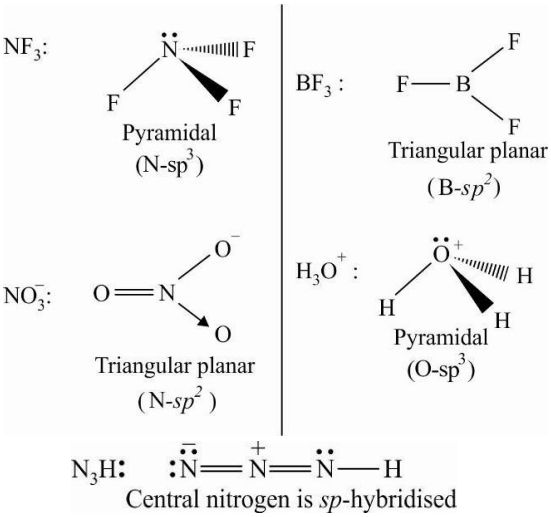
46. ***LiF* → more ionic, *LiI* → *more* covalent**

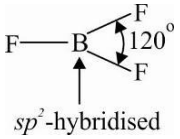
Both LiF and LiI are expected to be ionic compounds. However, LiI is predominantly covalent because of small size of Li^+ and large size of iodide ion. A smaller cation and a larger anion introduces covalency in ionic compound.

47.(C)



Therefore, NF_3, H_3O^+ and BF_3, NO_3^- pairs have same shape.

48.(D) BF_3 has triangular planar arrangement.



There identical vectors acting in outward direction, at equal angles in a plane, cancel each other giving zero resultant, hence non-polar.

49.(B) According to molecular orbital theory.

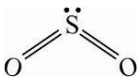
50. Increases, decreases

Bond order in N_2 is 3 while same in N_2^+ is 2.5, hence bond distance increases as N_2 goes to N_2^+.

Bond order in O_2 is 2 while same in O_2^+ is 2.5, hence bond distance decreases as O_2 goes to.

51. (N_2O, I_3^-) N_2O and I_3^- are linear species.

52.(B) Sulphur in SO_2 is sp^2 – hybridized.



Electron pair = 2 (σ – bonds) + 1 (lone pair) = 3

Hybridisation = sp^2

Carbon in CO_2 is sp-hybridised, N in N_2O is sp-hybridised, carbon in CO is sp-hybridised.

53.(C) Molecular orbital electronic configuration are

$$KO_2(O_2^-): \sigma 1s^2\, {}^*\sigma 1s^2\, \sigma 2s^2\, {}^*\sigma 2s^2 \sigma 2p_x^2 \left|\begin{matrix}\pi 2p_y^2 \\ \pi 2p_z^2\end{matrix}\right| \left|\begin{matrix}{}^*\pi 2p_y^2 \\ {}^*\pi 2p_z^1\end{matrix}\right| {}^*\sigma 2p_x^0$$

Has one unpaired electron in ${}^*\pi 2p$ orbital.

AlO_2^- has both oxygen in O^{2-} state, therefore, no unpaired electron is present.

BaO_2 (O_2^{2-})

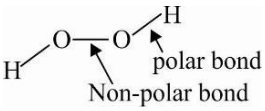
$$\sigma 1s^2\, {}^*\sigma 1s^2\, \sigma 2s^2\, {}^*\sigma 2s^2 \sigma 2p_x^2 \left|\begin{matrix}\pi 2p_y^2 \\ \pi 2p_z^2\end{matrix}\right| \left|\begin{matrix}{}^*\pi 2p_y^2 \\ {}^*\pi 2p_z^2\end{matrix}\right| {}^*\sigma 2p_x^0$$

Has no unpaired electron.

NO_2^+ has $[O{=}\overset{+}{N}{=}O]$ binding, hence no unpaired electron.

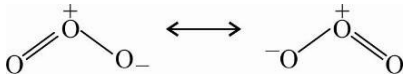
54.(B) N_2 is a neutral, non-polar, inert molecule while CN^- is a highly polar, highly active ion.

55.(C) H_2O_2



56.(C) Statement I is correct but Statement II is incorrect. The covalency in LiCl is due to small size of Li^+ ion which brings about large amount of polarization in bond.

57.(A) Statement I is correct, given structure is one of the resonance structure of ozone.



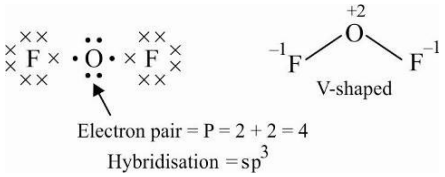
Statement II is also correct because oxygen cannot expand its octet. It is also the explanation for the given structure of ozone.

58. ***H_2S → V-shaped, PCl_3 → pyramidal***

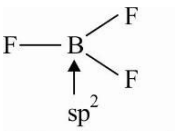
In H_2S, S is sp^3 – hybridized with two lone pairs of electrons on it giving V-shaped (water like) shape. In PCl_3 , P is sp^3 – hybridized with one lone pair of electrons on it.

Therefore, PCl_3 is pyramidal in shape.

59. ***sp^3, V – shaped, F = –1, O = +2***



60.(B)



(Trigonal planar)