16.(D) Acidity of the oxides of non metals increases with the electronegativity and oxidation number of the element $Al_2O_3 < SiO_2 < P_2O_3 < SO_2$

Al_2O_3 is amphoteric, SiO_2 is slightly acidic whereas P_2O_3 and SO_2 are the anhydrides of the acids H_3PO_3 and H_2SO_3.

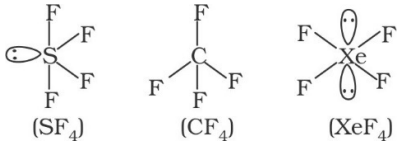
17.(A) Helium is twice as heavy as hydrogen, its lifting power is 92 per cent of that of hydrogen.
Helium has the lowest melting and boiling points of any element which makes liquid helium an ideal coolant for many extremely low-temperature applications such as superconducting magnets, and cryogenic research where temperatures close to absolute zero are needed.

18.(D) The fluorine has low dissociation energy of $F-F$ bond and reaction of atomic fluorine is exothermic in nature.

19.(C) The maximum valency of beryllium is $+2$ while that of aluminium is $+3$.

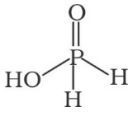
20.(B) $Al_2Cl_6 + 12H_2O \rightleftharpoons 2\left[Al(H_2O)_6\right]^{3+} + 6Cl^-$

21.(4) SF_4(sp^3d, trigonal bipyramidal with one equatorial position occupied by 1 lone pair), CF_4(sp^3, tetrahedral, no lone pair), XeF_4(sp^3d^2, tetrahedral, no lone pairs),



(SF_4) (CF_4) (XeF_4)

22.(B) Hypohosphorus acid



Number of hydrogen atom(s) attached to phosphorus atom = 2.

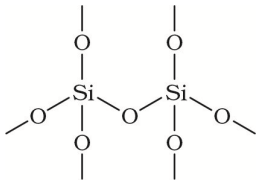
23.(B) As the size of the halogen atom increases from F to I, $H-X$ bond length in HX molecules also increases from $H-H$ to $H-I$($H-F < H-Cl < H-Br < H-I$).
The increase in $H-X$ bond length decreases the strength of $H-X$ bond from $H-F$ to $H-I$ ($H-F > H-Cl > H-Br > H-I$). The decrease in the strength of $H-X$ bond is evident from the fact that $H-X$ bond dissociation energies decrease from $H-F$ to $H-I$. Due to successive decrease in the strength of $H-X$ bond from $H-F$ to $H-I$, thermal stability of HX molecules also decreases from HF to HI, ($HF > HCl > HBr > HI$)

24.(B) The solution of aluminium chloride in water is acidic due to hydrolysis.

$$AlCl_3 + 2H_2O \longrightarrow Al(OH)_3 + 3HCl$$

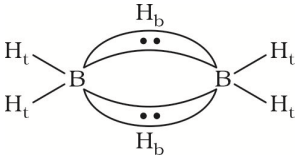
On heating it till dryness $Al(OH)_3$ is converted into Al_2O_3.

25.(D) In SiO_2 (quartz), each of O-atom is shared between two SiO_4^{4-} tetrahedral.



26.(D) In diborane structure B_2H_6 there are two 2c-2e bonds and two 3c-2e bonds (see structure of diborane).

Structure of B_2H_6 :



27.(D) $HOCl \rightarrow HCl + HClO_3$

It is a disproportional reaction of hypochlorous acid where the oxidation number of Cl changes from +1 $(\text{in}\, ClO^-)$ to + 5 $(\text{in}\, ClO_3^-)$ and $-1(\text{in}\, Cl^-)$.

28.(D) Higher is the oxidation state of the central atom, greater is the acidity. Hence, $HClO_4$ is a stronger acid than $HClO_3$.

HNO_3 is a stronger acid than HNO_2.

Now, greater is the electronegativity and higher is the oxidation state of the central atom, greater is the acidity. Hence, H_2SO_3 is a stronger acid than H_3PO_3.

Due to higher dissociation energy of $H-F$ bond and molecular association due to hydrogen bonding in HF, HF is a weaker acid than HCl.

29.(B) The correct order of ionisation enthalpies is $F > P > S > B$.

NOTE : On moving along a period ionization enthalpy increases from left to right and decreases from top to bottom in a group. But this trend breaks up in case of atom having fully or half filled stable orbitals.
In this case P has a stable half filled electronic configuration hence its ionisation enthalpy is greater in comparision to S. Hence the correct order is $B < S < P < F$.

30.(D) $3Br_2 + 6NaOH \rightarrow 5NaBr + NaBrO_3 + 3H_2O$

$O_3 + SO_2 \rightarrow O_2 + SO_3$

$Si + 2NaOH + O_2 \rightarrow Na_2SiO_3 + H_2O$

Cl_2 reacts with excess of ammonia to produce ammonium chloride and nitrogen.

$$2NH_3 + 3Cl_2 \longrightarrow N_2 + 6HCl$$
$$6NH_3 + 6HCl \longrightarrow 6NH_4Cl$$
$$\overline{8NH_3 + 3Cl_2 \longrightarrow N_2 + 6NH_4Cl}$$