**91.(A)** Both assertion and reason are correct and reason incorrect.

**92.(B)** In $BCl_3$, the state of hybridisation, $H = \frac{1}{2}(3+3+0-0) = 3$ i.e, $sp^2$.

So the bond angle is 120°.

The state of hybridisation in case of P, As and Bi is $sp^3$ hybridisation and due to the presence of a lone pair on the central atom the bond angle $< 109°28'$. Since the central atom (P, As, Bi) belong to the same group, the bond angle of $ECl_3$ decreases as we go down the group, i.e., from P to As to Bi, thus the correct order of bond angle is $BCl_3 > PCl_3 > AsCl_3 > BiCl_3$.

**93.(D)** $(NH_4)_2Cr_2O_7 \xrightarrow{\Delta} N_2\uparrow + Cr_2O_3 + 4H_2O$

**94.(C)** $Ca_3P_2 + 6H_2O \longrightarrow 3Ca(OH)_2 + 2PH_3$

In the reaction 2 moles of $PH_3$ are formed.

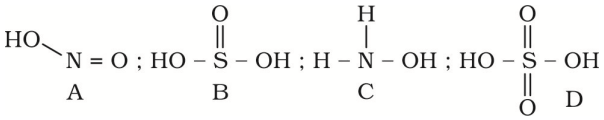
**95.(C)** $2NH_3 + OCl^- \longrightarrow NH_2 - NH_2 + H_2O + Cl^-$

**96.** In contact process the $SO_3$ produced is dissolved in concentrated $H_2SO_4$ to produce oleum. $SO_3$ produced is not dissolved in water because it forms dense fog of sulphuric acid particles.

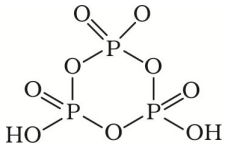
In contact process the catalyst used is $V_2O_5$.

**97.** The reaction is $\underset{A}{HNO_2} + 2\underset{B}{H_2SO_3} + H_2O \rightarrow \underset{C}{NH_2OH} + 2\underset{D}{H_2SO_4}$

The structure of A, B, C and D as follows




**98.(C)** For drying, CaO is used as it does not react with $NH_2$.

**99.(C)** Its structure is 


In this structure we find three $P-O-P$ bonds.

**100.** In its elemental form nitrogen exists as a diatomic molecule $(N_2)$. This is due to the fact that nitrogen can form $p\pi - p\pi$ multiple bonds $(N \equiv N)$. However formation of multiple bonds is not possible in case of phosphorus because repulsion between non-bonded electrons of the core. In case of small nitrogen atom there is no such repulsion as they have only $1s^2$ electrons in their inner core.

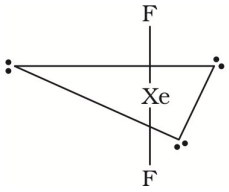
**101.** The hybridisation (H) in case of $XeF_2$, $XeF_4$ and $XeO_2F_2$

In $XeF_2$ : $H = \frac{8+2-0+0}{2} = 5$, i.e., $dsp^3$ or $sp^3d$

In $XeF_4$ : $H = \frac{8+4-0+0}{2} = 6$, i.e., $d^2sp^3$ or $sp^3d^2$

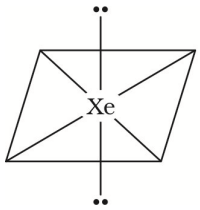
In $XeO_2F_2$ : $H = \frac{8+2-0+0}{2} = 5$, i.e., $sp^3d$

Thus in $XeF_2$, the hybrid state of Xe is $sp^3d$ but its shape is linear due to VSEPR theory. In it we find there lone pairs and due to their presence the geometry of $XeF_2$ is distorted from trigonal bipyramidal (expected for $sp^3d$) to linear.



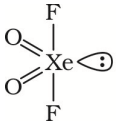

(Structure of $XeF_2$)

In $XeF_4$, the hybrid state of Xe is $sp^3d^2$ but its shape is square planar. Due to the presence of two lone pairs the geometry of $XeF_4$ is distorted from octahedral (expected for $sp^3d^2$) to square planar.




(Structure of $XeF_4$)

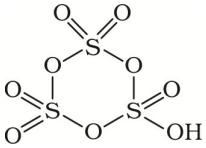
In case of $XeO_2F_2$, the hybrid state of Xe is $sp^3d$ but its geometry is planar due to VSEPR theory. Because of presence of a lone pair of electrons its geometry is distorted from trigonal bipyramidal (expected for $sp^3d$) to planar.




(Structure of $XeO_2F_2$)

**102.** We know that more electronegative halogen can displace lesser electronegative halogen from its halide.

Thus $Cl_2 + 2KBr\,(\text{or } KI) \longrightarrow 2KCl + Br_2\,(\text{or } I_2)$

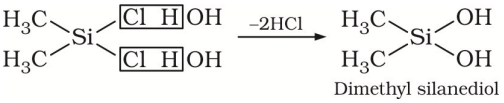
**103.(D)** 

Structure of $S_3O_9$ is also called $\gamma$ - $SO_3$.

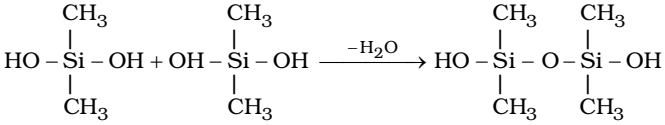
In it there is no $S-S$ bond. The sulphur atoms are linked to each other via oxygen.

**104.** **(i)** $SiCl_4 + 2Mg\,(\text{or } Zn) \longrightarrow Si + 2MgCl_2\,(\text{or } ZnCl_2)$

**(ii)** $SiCl_4 + 2CH_3MgCl \longrightarrow (CH_3)_2SiCl_2 + 2MgCl_2$




Dimethyl silanediol




This type of polymerisation continues at both ends to form linear silicone.

**(iii)** $SiCl_4 + 4H_2O \xrightarrow{-4HCl} \underset{\text{(unstable)}}{Si(OH)_4}$

$$Si(OH)_4 \xrightarrow{\Delta} SiO_2 + 2H_2O$$

$$SiO_2 + Na_2CO_3 \xrightarrow{1400^\circ C} Na_2SiO_3 + CO_2$$

**105.(C)** $SiCl_4$ undergoes hydrolysis due to the presence of empty d-orbitals in the valence shell of Si, while C has no vacant d-orbitals to accommodate electron pairs denoted by water molecules during hydrolysis.