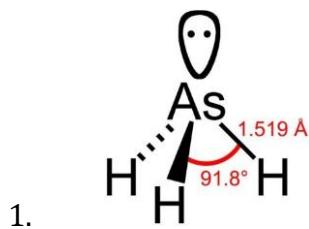
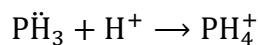


DPP-4
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The above rule is based upon the relation between hybridisation and bond angle for two or more equivalent $s - p$ hybrid orbitals, where the fraction of s character (S) or fraction of p character (P) is given by the relationship:

$$\cos \theta = \frac{S}{S-1} = \frac{P-1}{P}$$

2. The % s-character in one Sb-H bond in SbH₃ is 1.0%.
3. Due to lone pair of fluorine there will be more steric repulsion and bond angle will increase which leads to decrease in the bond angle. So, correct option is B.
4. The hybrid orbitals thus formed by the mixing of atomic orbitals are more stable and have less energy than the atomic orbitals. the excess amount of energy is released in the stabilization of hybrid orbitals and is used in the excitation of one electron from low energy 2s orbital to high energy 2p_z orbital.
Energy released is less than 600 kJ mol⁻¹
5. ...according to this theory, the position of the lone pair in XeF₆ molecule should be in axial position and the shape should be pentagonal pyramidal. But this is not observed and the actual shape of molecule is octahedral. This implies that the lone pair is placed at equatorial position, and this explains the structure of XeF₆ shown in figures 3 · 7a, b, c.
According to Figure 3.7, μ_{expected} for XeF₆ is not equal to zero. But $\mu_{\text{real}}(\text{XeF}_6) \sim 0$. To explain the above facts, it is considered that the actual molecule is in dynamic equilibrium of all the three structures shown in Figure 3.7. Here it is considered that the lone pair is present in the stereochemically active s orbital and similar structure is observed as IF₆⁻. But anions like [SbX₆]³⁻, [TeX₆]²⁻ (X = Cl, Br, I), [BrF₆]⁻, [ICl₆]⁻ have been assigned perfectly octahedral structure on the basis of X-ray crystallography and the lone pair is present in stereochemically inactive s orbital.
6. PH₃ is very less polar compound and cannot form hydrogen bond with water. Therefore, it is not much soluble in water and escapes as gas, forming bubbles.



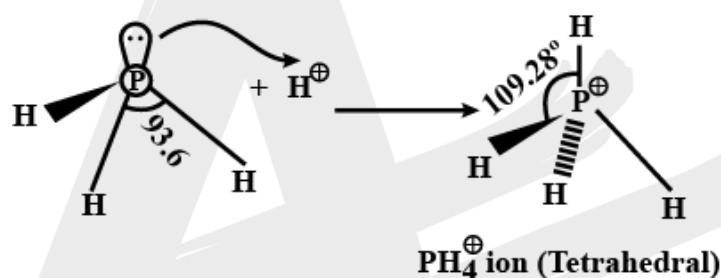
According to Drago's rule Lone pair on phosphorous resides in almost pure - s orbital, hence due to non - directional nature, its overlapping tendency is greatly reduced in comparison to a lone pair present in hybrid orbital, which is directional as present in NH₃

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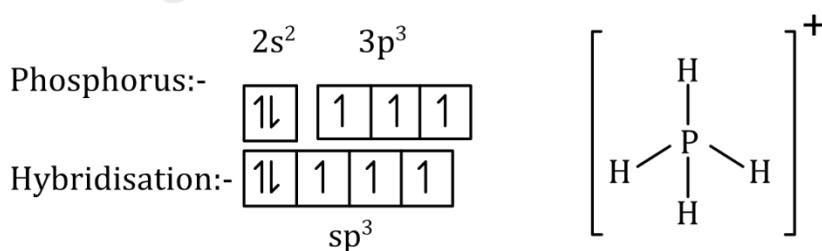
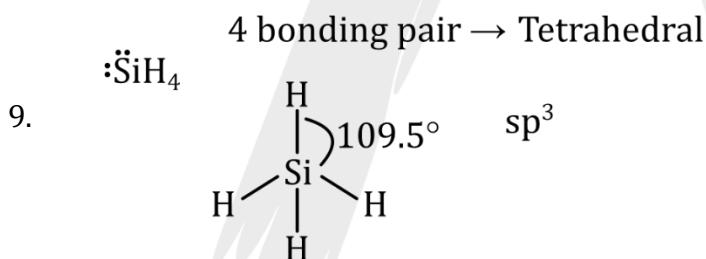
Thus, NH₃ is a stronger Lewis base than PH₃. Consequently, the tendency of NH₃ to form a complex by donating an electron pair to the metal ion is much higher than that of PH₃. Hence, NH₃ is a better complexing agent than PH₃.

7. The larger angles can simply be explained as a result of repulsion between the larger atoms of Br and Cl. Hydrogen atoms in PH₃, as they are so small, experience less repulsion as compared to Br atoms in PBr₃ or Cl atoms in PCl₃, therefore the larger bond angles in PBr₃ and PCl₃.

PH₃ (Phosphine) is a hydride of phosphorous. Phosphine is a gas and has pyramidal structure. Phosphorous involved sp₃ hybridized. Both PH⁴⁺ and PH₃ have sp₃ hybridisation state for phosphorous. In PH⁴⁺, all the four orbitals are bonded, whereas in PH₃, there is a lone pair electrons on phosphorous. In PH⁴⁺, the H-P-H bond angle is tetrahedral angle of 109.5°. But in PH₃, lone pair-bond pair repulsion is more than bond pair-bond pair repulsion so, that bond angles become less than normal tetrahedral angle. The bond angle in PH₃ is about 93.6°.



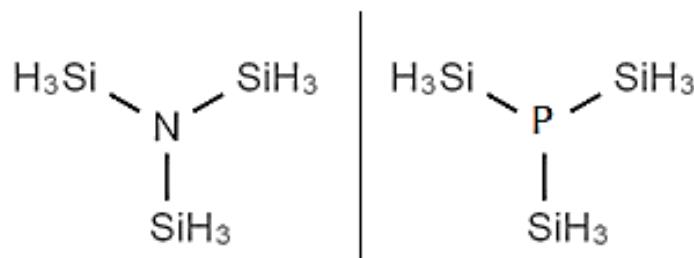
8. Due to more lone pairs on fluorine there will be greater repulsion causes greater angle.



10. N atom in N(SiH₃)₃ and P in P(SiH₃)₃ are both sp² hybridised. It has lone pair of electron (2p orbital in the case of N and 3p orbital in the case of P) which is forming a bond with d orbital of Si atom forming dπ – pπ bonding. So it has planar structure. The structure is



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In forming P_4 molecule, P atom uses sp^3 hybrid orbitals. Thus, p-character in hybrid orbitals is 75%. S character is 25%

sp^3

Hybridization: The central atom in GeH_4 is germanium (Ge). It has 4 valence electrons and forms 4 sigma bonds with 4 hydrogen atoms. Therefore, the hybridization of the central atom in GeH_4 is sp^3 .

There are three bonded atoms and one lone pair on the central P atom. Thus, the steric number of P in P_3 is $3 + 1 = 4$. We conclude that P must be sp^3 – hybridized. One of the sp^3 hybrid orbitals is used to accommodate the lone pair on P while the other three sp^3 hybrid orbitals form covalent P – F bonds with the $2p$ orbitals of F. We predict the shape of the molecule to be pyramidal and the

$F - P - F$ bond angle should be somewhat less than 109.5° .