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{Tutorial-1} (Learnings)

Q1. (B.)

Q2. $Li_2 < B_2 < C_2 < N_2 > O_2 > F_2$

Q3. (C.)

Q4. (C.)

Q5. $ClF_3 \rightarrow sp^3d$ (c)

Q6. $SF_4 \rightarrow sp^3d$ (b)

Q7. $BH_3 \rightarrow$ trigonal planar (c)

Q8.
- Triatomic linear $\rightarrow CO_2, HCN, XeF_2$
- Bent $\rightarrow H_2O$

Trigonal planar ✗ (d.)

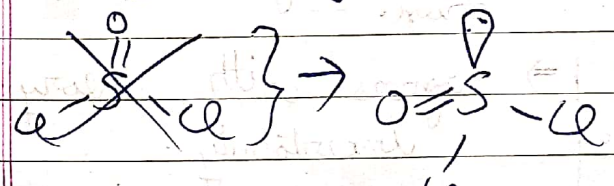
$AlCl_4^- \rightarrow sp^3$ ($3p_z$ orbital)

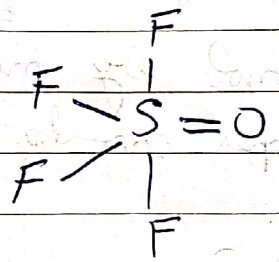
BH_3

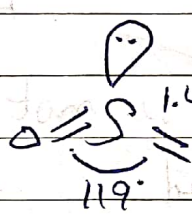
Q9. (a.) $AsF_3 \rightarrow$ Trigonal pyramidal
$AsF_5 \rightarrow$ Trigonal bipyramidal

Q10. $SO_3 \rightarrow$ Trigonal planar ??

C & D

(*)  → Trigonal Pyramidal

 → TBP



Non linear
Bent

Q11. (C.)

CH_4 (sp^3) NH_3 (sp^3) H_2O (sp^3)

$109°28' > 107.58 > 104.5$

$\left\{\begin{matrix} Pt \\ Pd \\ Mg \end{matrix}\right\}$ Pd → $3d^{10}$ $4s^{1}$

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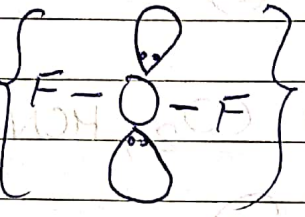
Q12. (a)

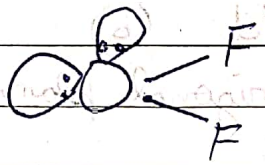
Q13. (b) $NH_3 \rightarrow SP_3 \rightarrow$ Tetrahedral but Trigonal Pyramidal

Q14. $SO_3 \rightarrow Sp^2$ (a)

Q15. OF_2

Non linear





Sp^3 (c)

Q16.

orbit	orbital
⇒ Planar (2D) repres. of e^-	⇒ 3D motion of e^- around nucleus
⇒ Path established	⇒ Probability to find e^- is max.
⇒ well defind → against Heisenberg's	⇒ agrees with theory of Uncertainity.
⇒ Shape is not well defined	⇒ directional by nature So shapes can be found out.

Q17. 6p → $n = 6$, $l = 1$, $\{m = -1, 0, 1\}$, $S = \pm\frac{1}{2}$

$\left\{\begin{matrix} 1^{st}\ e^- \rightarrow +\frac{1}{2} \\ 2^{nd}\ e^- \rightarrow -\frac{1}{2} \end{matrix}\right\}$

Q18. $P = 0.827\ D$

$l = 141.5\ pm$

$1D = 3.336 \times 10^{-30}\ cm$

1 Pm = 10^{-12} m = 10^{-10} cm

1 m = 10^{2} cm

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$P = Q \times l \Rightarrow Q = \frac{P}{l} = \frac{0.827 \times 3.336 \times 10^{-30}}{141.5}$

$\Rightarrow \frac{0.827 \times 3.316 \times 10^{-36}}{141.5 \times 10^{-10}}$

$\Rightarrow \frac{827 \times 3336 \times 10^{-6} \times 10^{-36}}{141.5 \times 10^{-10}}$

$\Rightarrow \frac{827 \times 3336 \times 10^{-32} \times 10}{1415}$

$\Rightarrow 1.94$

Q19. octet rule → Demerits :→ → No idea about shape
↳ only for atoms in ground state

O_2 → should be done accordingly

Q20. BeF_2
↳ $4e^-$ → Hypovalent

PF_5
↳ $10e^-$ → Hypervalent

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Q21. ?! Yes, Expansion of orbitals.

Q22. No, it cannot be shown. Sp^2 pd

more react in gaseous st

Q23. (*) $\{PCl_5$ (Gas + liq.) $\rightarrow Sp^3d$ (T.B.P.)$\}$

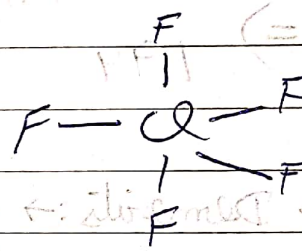
Covalent

PCl_5 (solid) $\rightarrow PCl_4^{\oplus} + PCl_6^{\ominus}$

Ionic

(SP_3) Tetrahedral — octahedral

Q24. ~~(*)~~



(3)

Q25. $\left\{\begin{array}{l} P \rightarrow 3p \\ 3Cl \rightarrow 3p \end{array}\right\} \rightarrow$ effective energy loss and more stability

$H \rightarrow 1s$

Effective Back bonding

As Cl^- is more electronegative ~~more~~ Its able to contact ~~both~~ with phosphorous d-orbital and form PCl_5 molecule. Whereas in PH_5 H as less electronegativity and hence it cannot contact phosphorous 3-D orbital to form PH_5 molecule

Q27.

$[BrF_6]^{\ominus} \rightarrow$ Distorted octahedral.

$[TeF_6]^{\ominus} \rightarrow Sp^3d^2$

Q28.

$TeF_5^{\ominus}$ → Square Pyramidal

$XeF_6 \rightarrow$ distorted octahedral

$ICl_4 \rightarrow Sp^3d^2$ → Square planar