Lect-30

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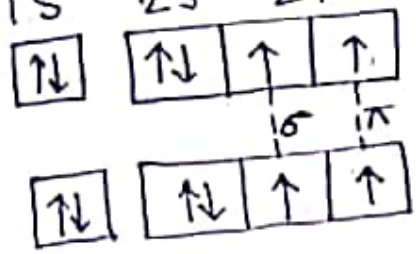
Ques $O_2$ & $N_2$ is stable at room temp. but $S_2$ not explain why?

O $1S^2\ 2S^2\ 2P^4$

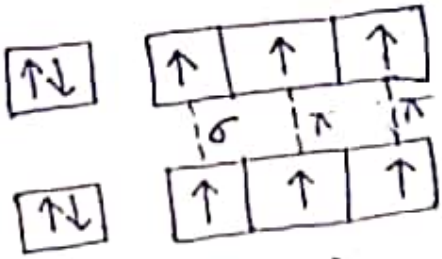



O = O

$2P_x = 2P_x$

O

N

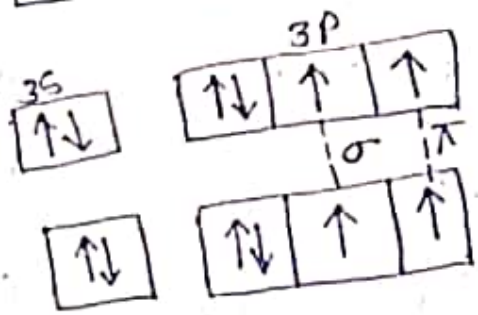



N = N

$2P_\pi - 2P_\pi$

N

S $3S$ $3P$




S = S

$3P_\pi - 3P_\pi$

| | Orbital | INA axis | bond |
|---|---|---|---|
| 1. | S+S | any axis | σ |
| 2. | S+Px | x | σ |
| 3 | S+Py | y | σ |
| 4 | S+Pz | z | |

| | | |
|---|---|---|
| 5. $S + P_x$ | y or z | no overlap/zero bond |
| 6. $s + P_y$ | x or z | no overlap/zero bond |
| 7. $s + P_z$ | x or y | no overlap/zero bond |
| 8. $P_x + P_x$ | x | $\sigma$ |
| 9. $P_y + P_y$ | y | $\sigma$ |
| 10. $P_z + P_z$ | z | $\sigma$ |
| 11. $P_x + P_x$ | y or z | $\pi$ |
| 12. $P_y + P_y$ | x or z | $\pi$ |
| 13. $P_z + P_z$ | x or y | $\pi$ |
| 14. $P_x + P_y$ | any axis | no overlap |
| 15. $P_y + P_z$ | any axis | no. overlap |
| 16. $P_z + P_x$ | any axis | no. overlap |
| 17. $P_x + d_{xy}$ | y | $\pi$ |
| 18. $P_y + d_{xy}$ | x | $\pi$ |
| 19. $P_z + d_{xz}$ | z | $\pi$ |
| 20. $P_z + d_{xz}$ | x | $\pi$ |
| 21. $P_y + d_{yz}$ | z | $\pi$ |

| | | | |
|---|---|---|---|
| 22. | $P_z + d_{yz}$ | y | $\pi$ |
| 23. | $d_{xy} + d_{xy}$ | x or y | $\pi$ |
| 24. | $d_{yz} + d_{yz}$ | y or z | $\pi$ |
| 25. | $d_{xz} + d_{xz}$ | x or z | $\pi$ |
| 26. | $d_{xy} + d_{xy}$ | z | $\delta$ bond |
| 27. | $d_{yz} + d_{yz}$ | x | $\delta$ bond |
| 28. | $d_{xz} + d_{xz}$ | y | $\delta$ bond |
| 29. | $d_{x^2-y^2} + d_{x^2-y^2}$ | z | $\delta$ bond |
| 30. | Hybrid orbital or any orbital | any-axis | $\sigma$ |

## VSEP

The Valence shell electron pair repulsion theory given by Sidgwick & Powell in 1940 redefined by N Sylom & Gillespie 1957

→ to explain shape and geometry of molecule

→ based on electronic repulsion of $e^{\ominus}$ pairs in Valence shell.

### Postulates:—

1. Geometry & shape of molecule is decided by no. of $e^-$ pairs (lp + bp) in Valence shell.

Repulsion :- lp - lp > lp - bp > bp - bp (4)

lp are influenced by only nuclear att. of C.A.

bp. $e^{\ominus}$ are influenced by nuclear attr of C.A & S.A


2. lp & bp tends to occupy such a posn that minm $e^{\ominus}$ repulsion & maximize distance b/w them. double bond occupy more space around C.A

Representation :- $AB_mL_n$

A → C.A. m → no. of S.A.

B → S.A. n → no. of lp

L → lp