

Dr S.K. Gupta

Dept of Chemistry
Gyrfan College, Ady

Day - I (H/S)

Inorganic - At. Structure

Topics $\rightarrow$ (i) Pauli's Exclusion Principle.

(ii) Aufbau's Principle

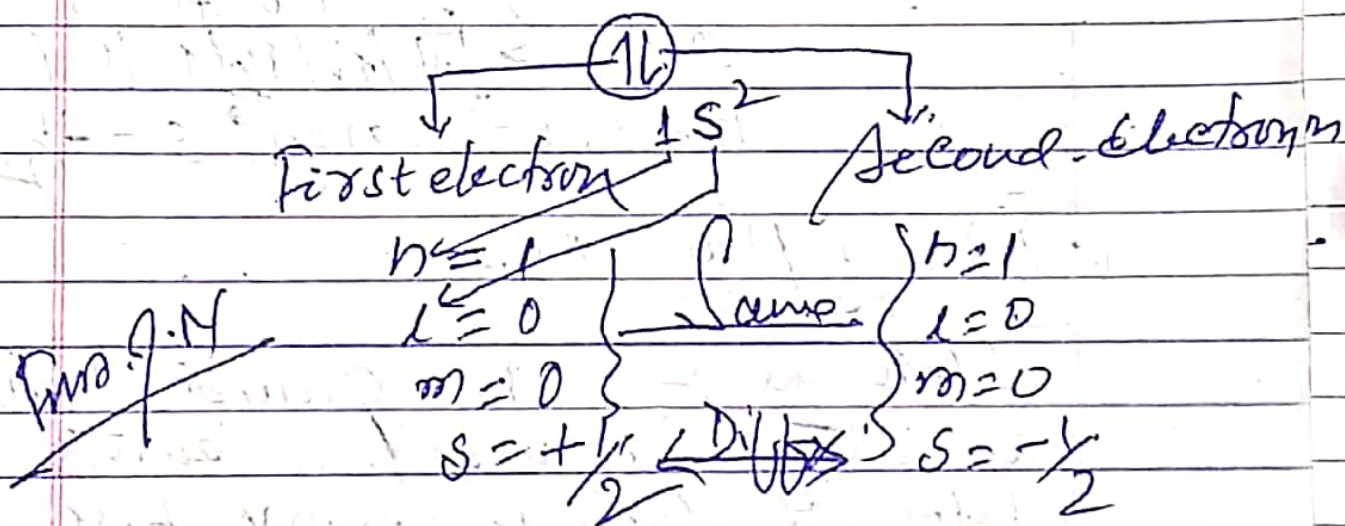
(iii) Hund's Rule

(i) Pauli's Exclusion Principle:-

Statement:- "No two electrons of same atom can have all the four q, n identical."

Out of four q, n , at least one must be different b/w two electrons of same atom.

Example:- For $He_2 \rightarrow 1s^2$

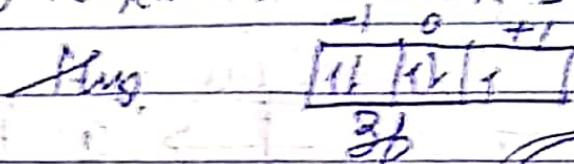


various another question -

- (a) To Calculate the number of
- (i) Maximum electrons
 - (ii) Minimum electrons
- if $n = 3, l = 1, m = 0$

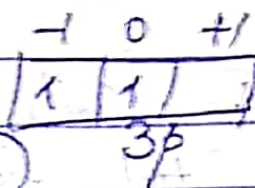
If $n=3, l=1, m=0$

① Maximum when $S = -\frac{1}{2}$



Max. electrons = 5

② Minimum when $S = +\frac{1}{2}$

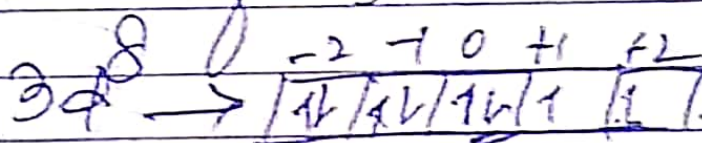


Min. e's = 2

② To determine all the F.g.N of last electron of Ni²⁸.

El. Conf of Ni: Ni²⁸ = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$

Last e of Ni is 8th electron of 3d.



$n=3, l=2, m=0, S = -\frac{1}{2}$

② Aufbau's Rule -

Statement:- In ground states of an atom, an electron enters the orbitals of lowest energy first than higher energy state.

① sub-shell filled first whose energy value (n+l) is minimum.

Thus 4s filled first before 3d.

Page No. _____

$$(n+l) \rightarrow \frac{4s}{(4+0)=4} \quad \bigg/ \quad \frac{3d}{(3+2)=5}$$

② But $(n+l)$ value becomes equal then it filled first having lower value of n .

$$(n+l) \quad \frac{3p}{=3+1=4} \quad \bigg/ \quad \frac{4s}{=4+0=4}$$

3p filled first.

Energy level Diagram $\rightarrow$ Sequence for filling electrons in multi-electron atoms in order of increasing energy.

1s, 2s, 2p, 3s, 3p, 4s, 3d, 4p, 5s, 4d, 5p, 6s, 4f, 5d, 6p, 7s $\rightarrow$ NOON

note — But it has various exceptions

Element Symbol	Subshell config according to Aufbau	Observed config
Cr 24	$4s^2 3d^4$	$4s^1 3d^5$
Cu 29	$4s^2 3d^9$	$4s^1 3d^{10}$
Nb 41	$5s^2 4d^3$	$5s^1 4d^4$
Mo 42	$5s^2 4d^4$	$5s^1 4d^5$
Ru 44	$5s^2 4d^6$	$5s^1 4d^7$
Rh 45	$5s^2 4d^7$	$5s^1 4d^8$

Page No. _____
Date _____

That during filling of p.d & f-cells which are different kinds, feeding only starts if it is singly occupied.

Examp^b: - $p^2 \rightarrow$ p have three vacaul = orbitals.
Correct filling $\rightarrow$

↑	↑	
---	---	--

 $p_x \quad p_y \quad p_z \rightarrow$

In correct flip -  - 4
both have
Parallel spin

III Correct-filling Parallel-spin
 (but Correct accp to Pauli's Exclusion Princp —

↑↓		
----	--	--

 — III)

Stability of Config is explained on the basis of Hund's Rule of Maximum Spin multiplicity - Hund's (2S+1) Rule.

$S = \text{Sum of Spin g.n}$
 $2S+1 = \text{Max. more stable of half \& less than half filled sub-shell. But more than half } (2S+1) \text{ is minimum more stable.}$