CH 1 Atomic Structure

Friday, 30 January 2026 4:12 PM

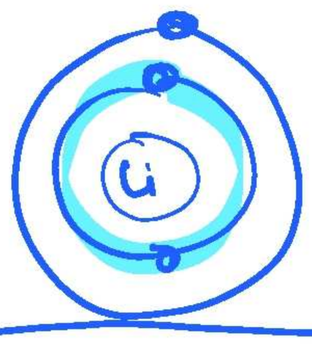
Atomic Radius

$_8O$ =

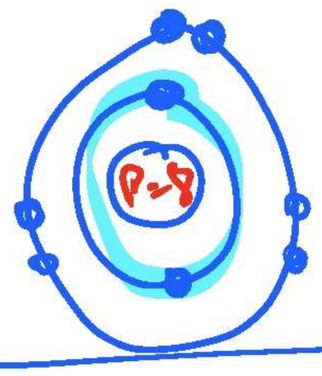
P = 3

P = 8

nuclear charge



2 shell



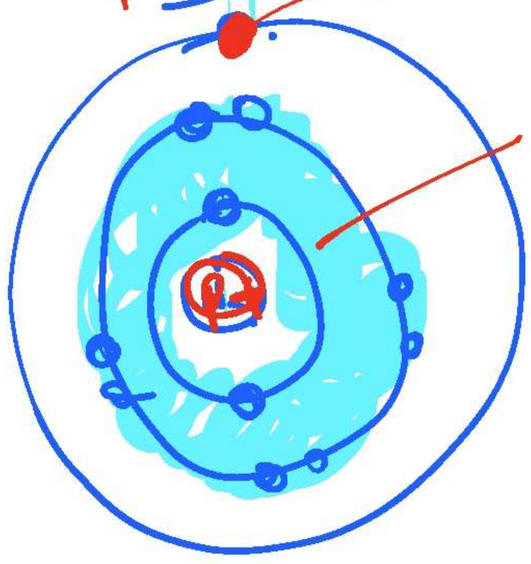
2 shell

Period

from same Period

P = 11 sodium

Name Shielding effect



Period 3

Period number = number of shell.

Group number = number of outer shell electron

Down Group (Moving Down the group)

① Shielding effect increase → dominating factor.

② size increase dominating

nuclear charge → Proton number

neutron 0

* Along the Period

Moving from left to right

→ Nuclear charge *

→ [illegible] size (radius) will shrink due to increase in nuclear charge..
→ shielding effect will be constant.

① Atomic radius $\propto \frac{1}{\text{Nuclear charge (Period)}}$

② Atomic radius $\propto$ Shielding effect (groups)

(Ionization Energy)

energy needed to remove 1$\bar{e}$ from gaseous atom to make 1 mole of gaseous ion.

Mg for 1st I.E

$Mg_{(g)} \longrightarrow Mg^{+1}_{(g)} + 1\bar{e}$

2nd I.E

$Mg^{+1}_{(g)} \longrightarrow Mg^{+2}_{(g)} + 1\bar{e}$

Factors Affecting I.E

Shielding effect ↓ ↓ Nuclear charge → Size

Spin Pair repulsion → Grp 6

$_8O = 1s^2, 2s^2, 2p^4$

1↓ 1 | 1 → (spin pair repulsion decrease I.E

$_7N = 1s^2, 2s^2, 2p^3$ | 1 | 1 | 1 |

Li, Be B C N O F → IE increase from left to right 3/3

Na

I.E decrease

↓ → Increase in atomic size
→ Increase shielding effect
Rb → nuclear charge increase but it is suppress by shielding effect
Cs
Fr

I.E higher I.E lower

G1 G2 G3 G4

Li Be B C

I.E higher I.G lower

G5 G6 G7

N O F

Anomalous Behaviour

G2 G3

Be B

$_4Be = 1s^2, 2s^2$

$_5B = 1s^2, 2s^2, 2p^1$

Reason

→ Distance of outer shell e from the nucleus.

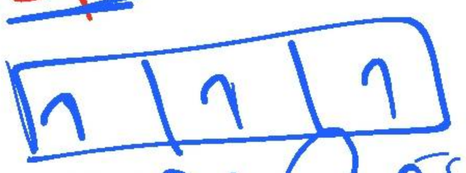
→ Shielding effect more in B than Be

I.E Be > I.E B

Gr 5 and Gr 6

N O

$_7N = 1s^2, 2s^2, 2p^3$



Reason

→ Both same number of subshells

→ Spin Pair Repulsion

$_8O : 1s^2, 2s^2, 2p^4$

I.E of Gr 5 > I.E of Gr 6

Big Jump

I.E is use to detect any element

Value	1st I.E	2nd I.E	3rd	4th
	590	1150	4940	6480

Big Jump

577 1820 2740 11650

494 4560 6940 9540

Big Jump

$1S^2\ 2S^2\ 2P^6$

Shell Subshell orbitals electron

School Class Desk Student

$P_x\ P_y\ P_z$

each orbital occup 2 es

S → 2

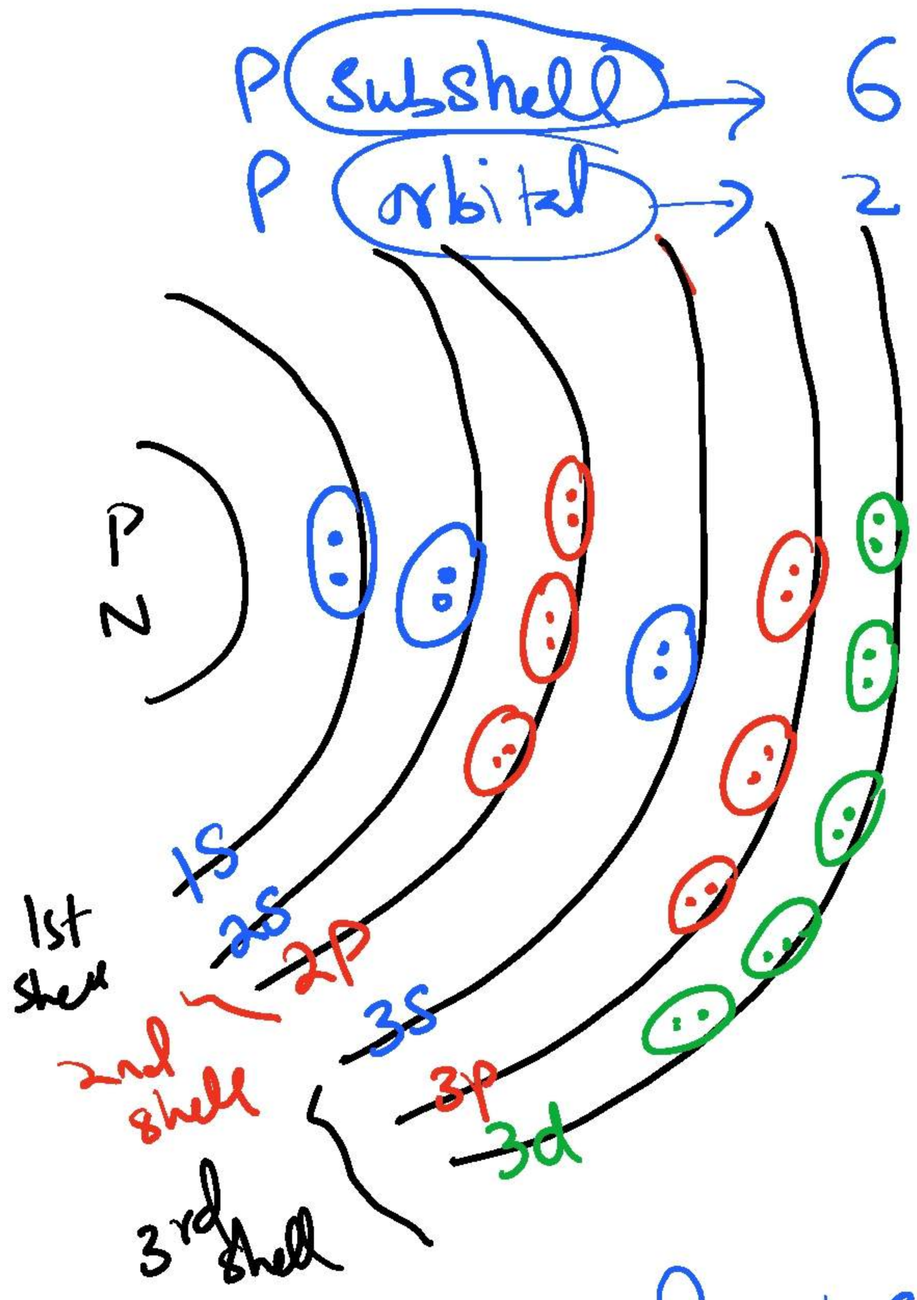
P → 6

d → 10

f → 14

P Subshell → 6

P orbital → 2



$_{24}Cr = 1S^2, 2S^2, 2P^6, 3S^2, 3P^6, 4S^2, 3d^4$

$4S^1, 3d^5$

$_{29}Cu = 4S^1, 3d^{10}$

3d 4S

d orbital is highly stable when it is

higher less energy

half filled / completely filled

Short Notations

Transition ions electronic Configuration

Cu^{+2}

$4S, 3d^{10}$ → always remove es from 4S then go will remove from 3d

+3

$4^{\circ}S, 3d^{9}$

Mass Spectrometry

→ to detect isotopes. → Ne → 3 isotopes

→ to % age abundance ✓

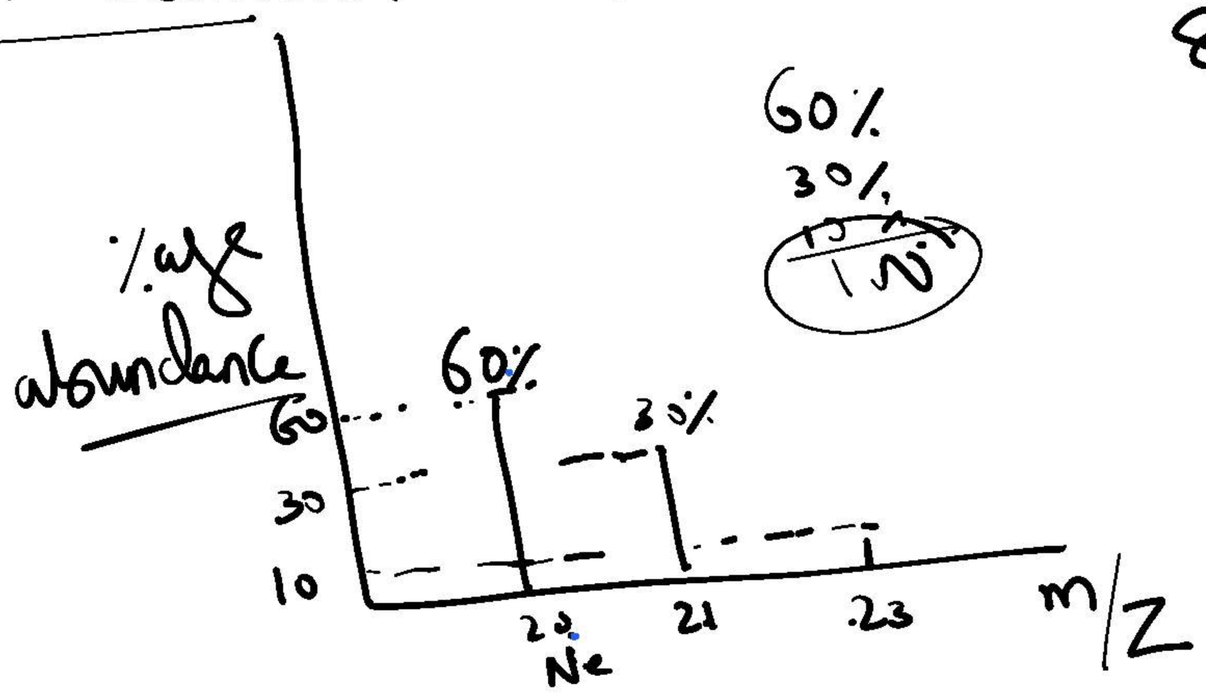
→ to Relative atomic Masses ✓

→ to know about unknown compound

Monoatomic element Spectrum

Spectrum ✓

graph ✗



$$RAM = \frac{20\times60 + 21\times30 + 23\times10}{100} = 20.34$$

Diatomic Elements

Cl_2

^{35}Cl 75%

^{37}Cl 25%

Br_2

Br