

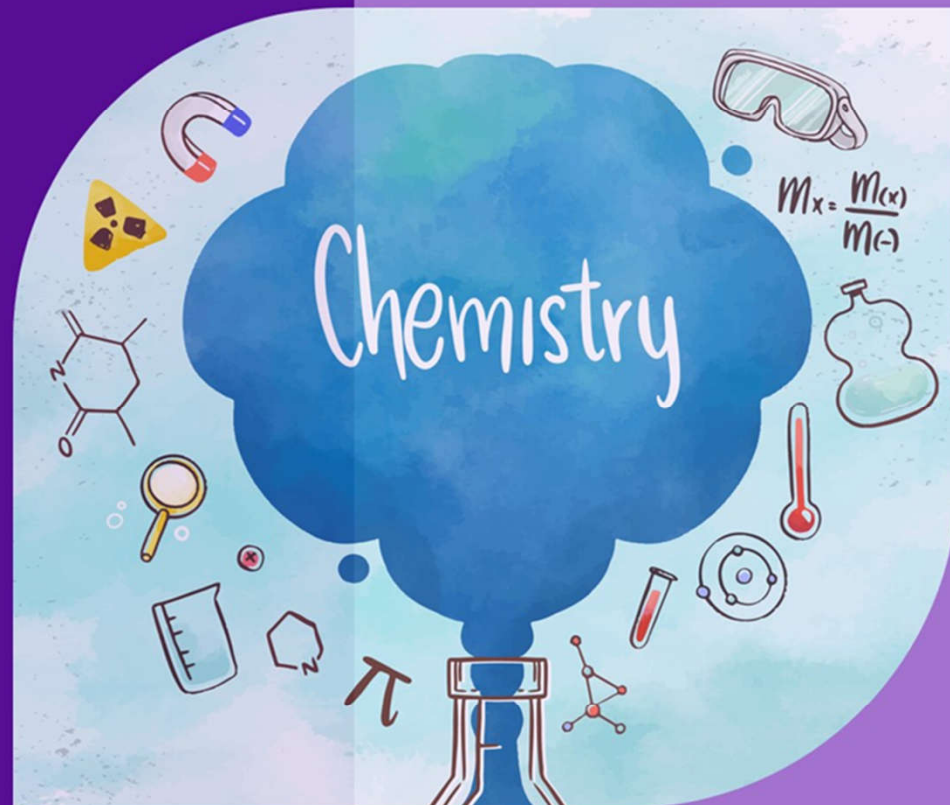


CLASS IX ACADEMIC PROGRAM 2020

CHEMISTRY

LECTURE : C-07

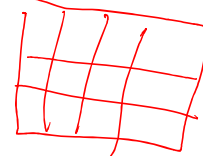
CHAPTER 4 : PERIODIC TABLE



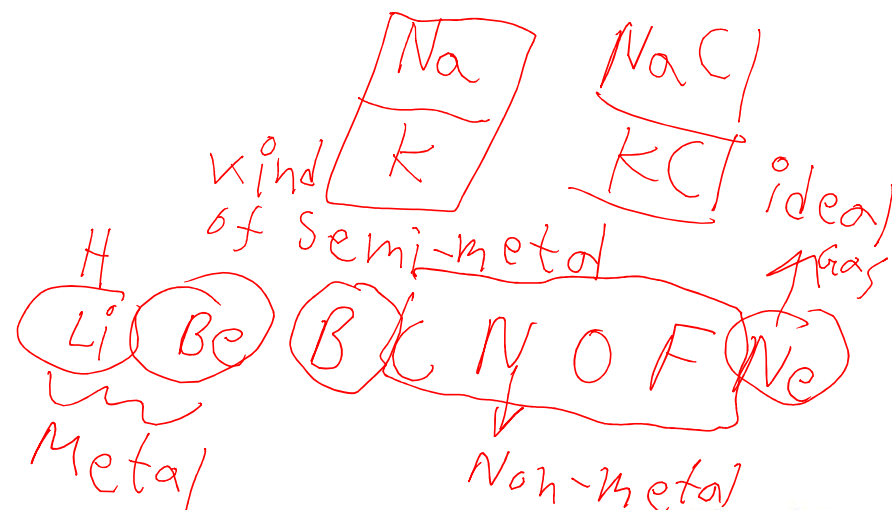
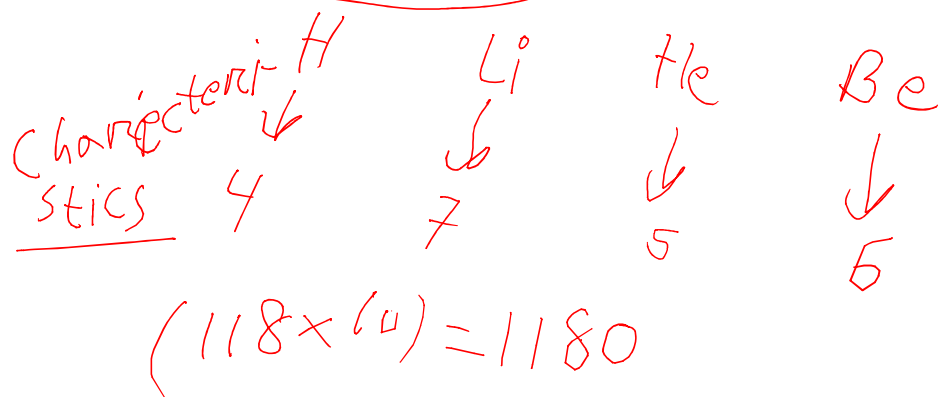
WHY PERIODIC TABLE IS NEEDED?

- Keeping the discovered elements together who have same properties.

Periodic Table



- Upholding the gradual change of properties of elements easily.



PERIODIC TABLE

Horizontal
Period → 7

1, 2, 3, 4

Vertical
group

18

period	group 1*	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	H	He																
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
7	Fr	Ra	Ac	Rf	Db	Sg	Bh	Hs	Mt	Ds	Rg	Cn	Nh	Fl	Mc	Lv	Ts	Og

lanthanoid series 6

58	59	60	61	62	63	64	65	66	67	68	69	70	71
Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
90	91	92	93	94	95	96	97	98	99	100	101	102	103
Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

actinoid series 7



উদ্ভাস

একাডেমিক এন্ড এডমিশন কেয়ার

Chemistry

Chapter 4 : Periodic Table

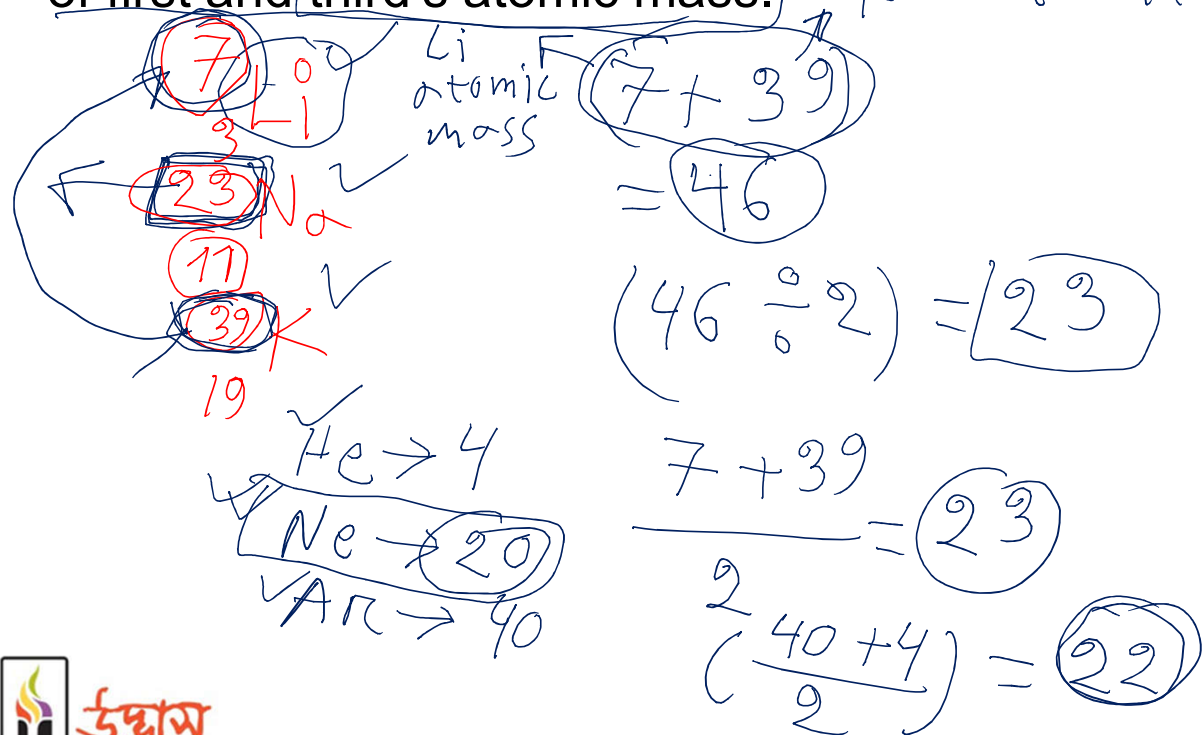
BACKGROUND OF PERIODIC TABLE

- In 1789, Antonie Lavoisier first divided the elements into metals and non - metals .
Handwritten notes: "O₂ Gas discover" with an arrow pointing to 1789; "Overnight" in a box with an arrow pointing to Lavoisier; "F, Cl, Br, O, N" in a box with an arrow pointing to non-metals; "Mg, Na, K, Ca" in a box with an arrow pointing to metals.
- In 1829, Dobereiner gave his Triad's Law. *
- In 1864, Newland gave his Octet Law. *
Handwritten note: "English" with an arrow pointing to Newland.
- In 1869, Mendeleev gave his Periodic law. *
Handwritten note: "Russia" with an arrow pointing to Mendeleev.

Father of periodic
Table
Mendeleev

DOBEREINEIR'S LAW OF TRIADS

- Atomic mass of the second element is half or near about half of the summation of first and third's atomic mass.



$$\frac{1st\ Atom's\ mass + 3rd's\ Atomic\ mass}{2} = 2nd's\ Atomic\ mass$$

POLL QUESTION 01

Among Be, Mg and Ca the atomic mass of the first and third elements are 9 and 40 respectively. What is the atomic mass of second element (Mg)?

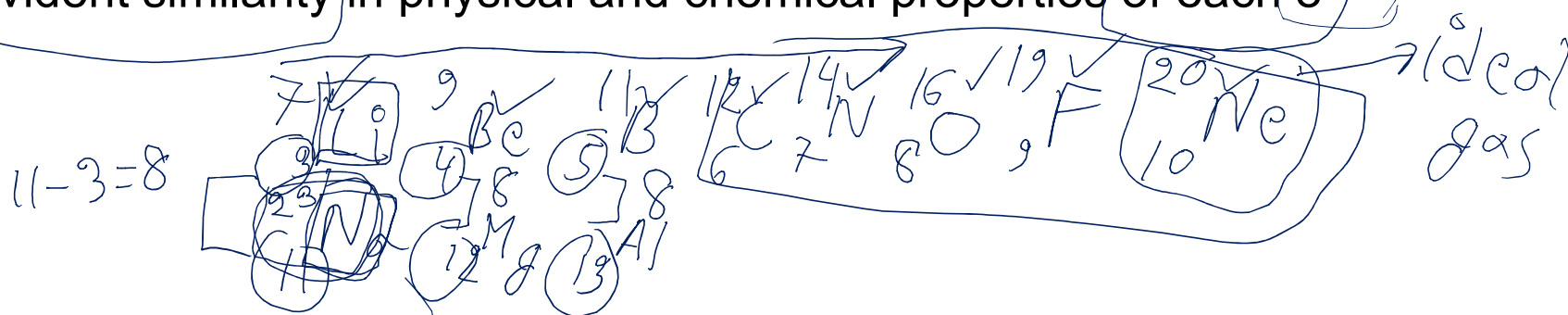
$$\frac{40 + 9}{2} = \frac{49}{2} = 24.5$$

- ☒ (a) 24.3
- (b) 30.2
- (c) 35.4
- (d) 20.2

PERIODIC TABLE

English → Newland's Octet law

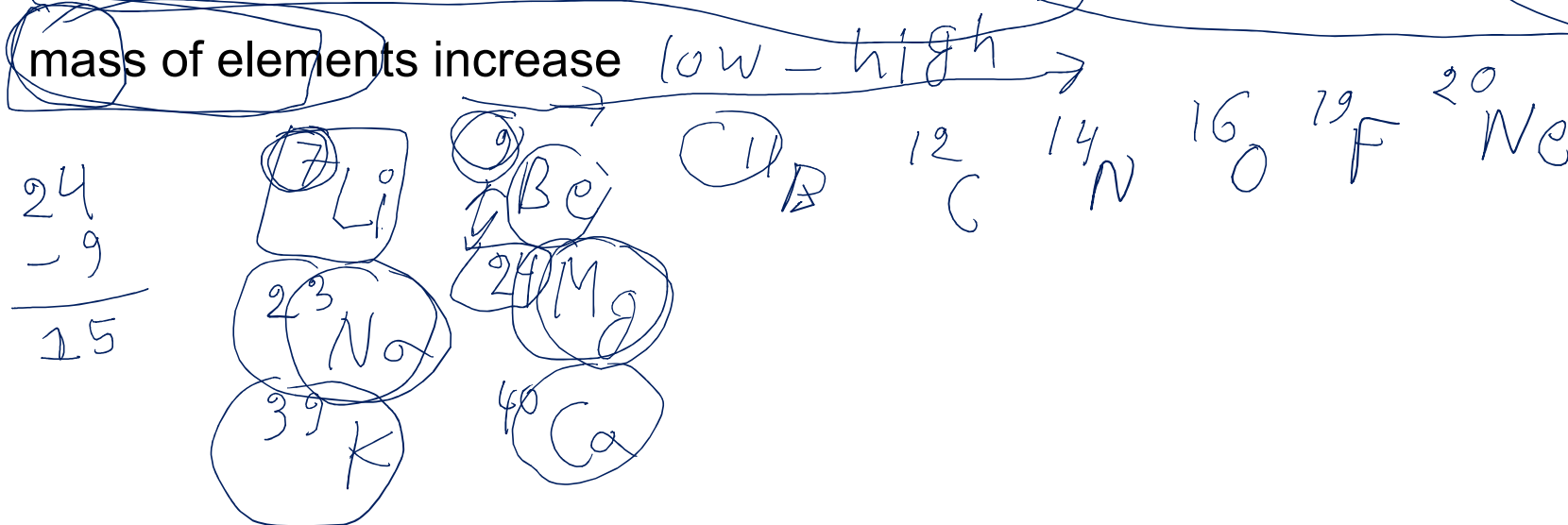
- If elements are organized following a sequence of lower to higher atomic mass, there is evident similarity in physical and chemical properties of each 8th element.



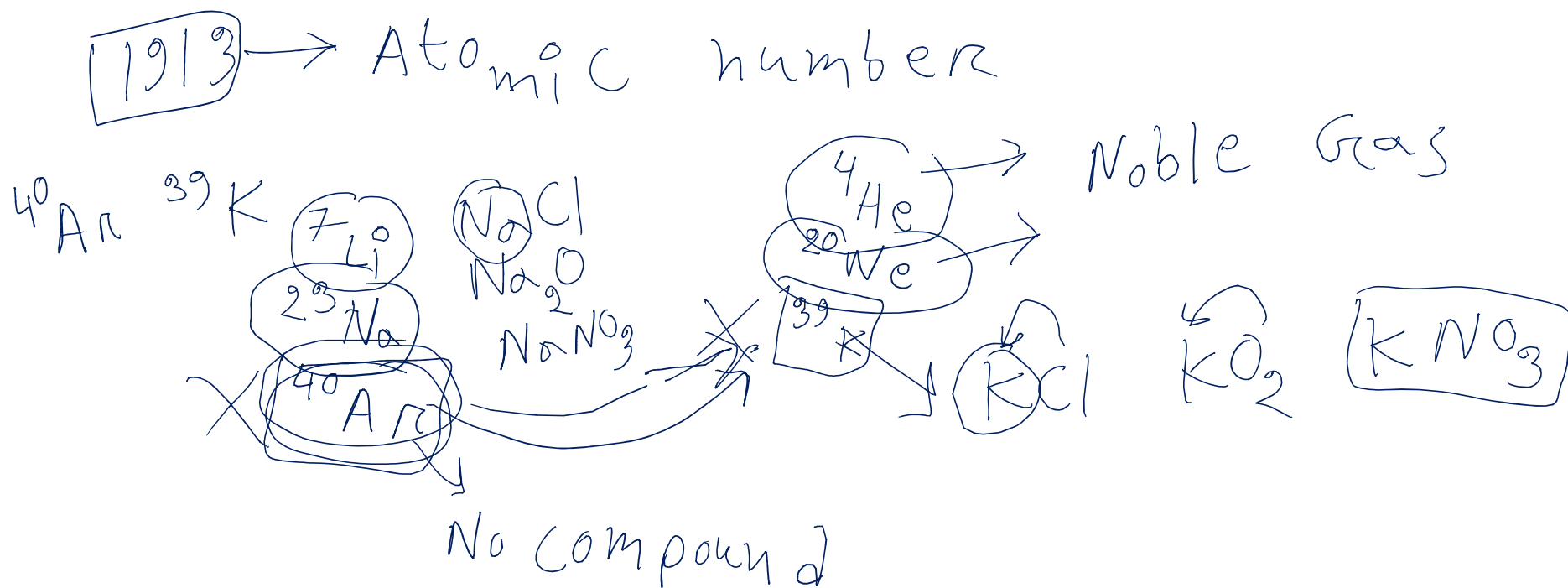
Li⁺
Na⁺ } Metal

MENDELEEV'S PERIODIC LAW

- Physical and chemical properties of elements return periodically as atomic mass of elements increase low - high →

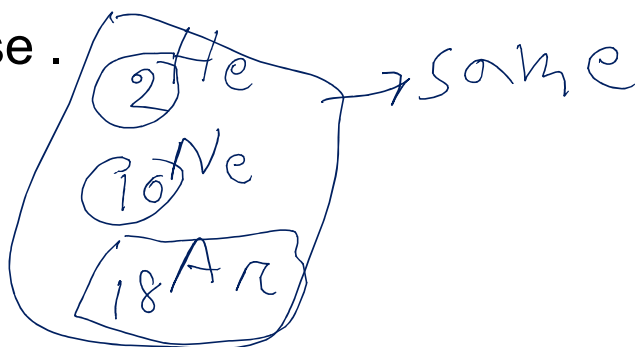


MISTAKE OF MENDELEEV'S PERIODIC LAW



MODERN PERIODIC - LAW

- ~~max~~
- Physical and chemical properties of elements return periodically as atomic number of elements increase.

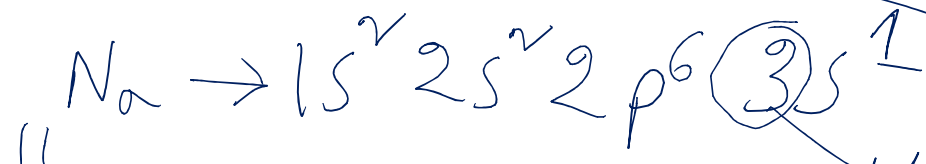


DETERMINATION OF ELEMENT'S POSITION USING ELECTRONIC CONFIGURATION

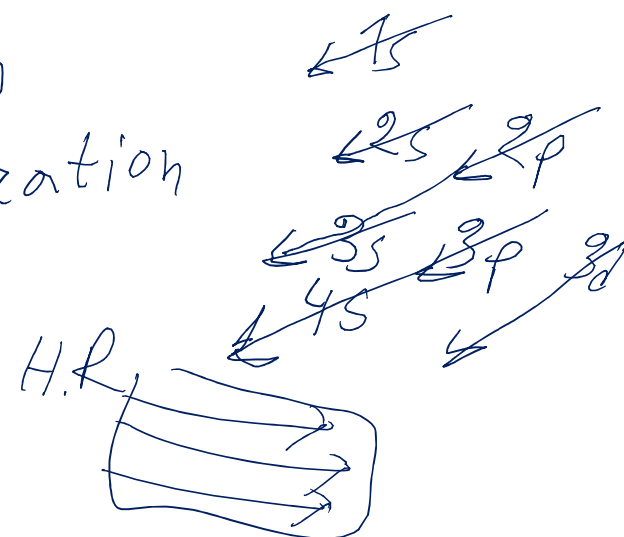
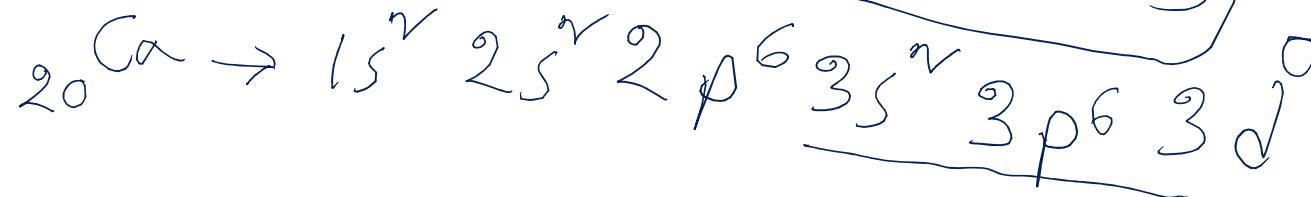
- Determination of Period of elements. last orbit number
Electron configuration



Period-1



Period-3

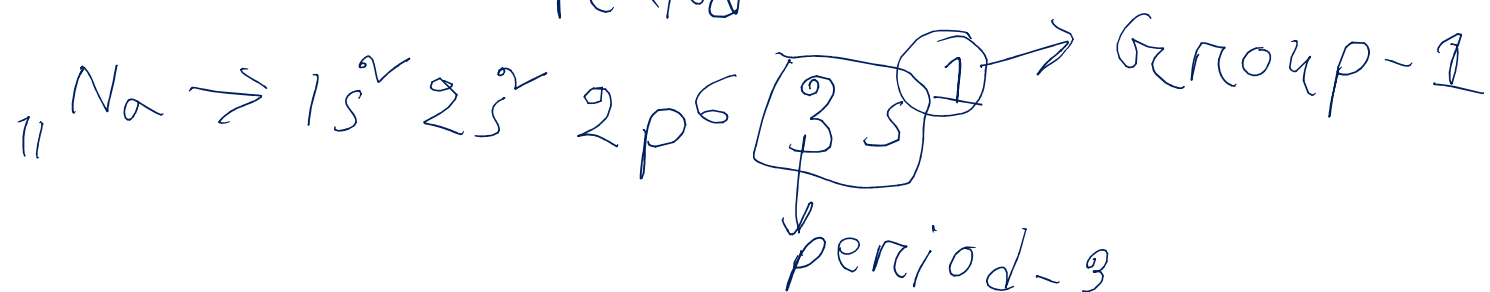
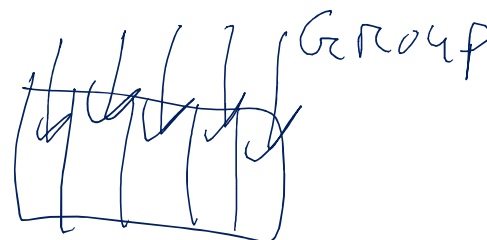


Period 4

last orbit

DETERMINATION OF GROUP OF ELEMENTS

- If last electron enters into s orbital.



POLL QUESTION 02

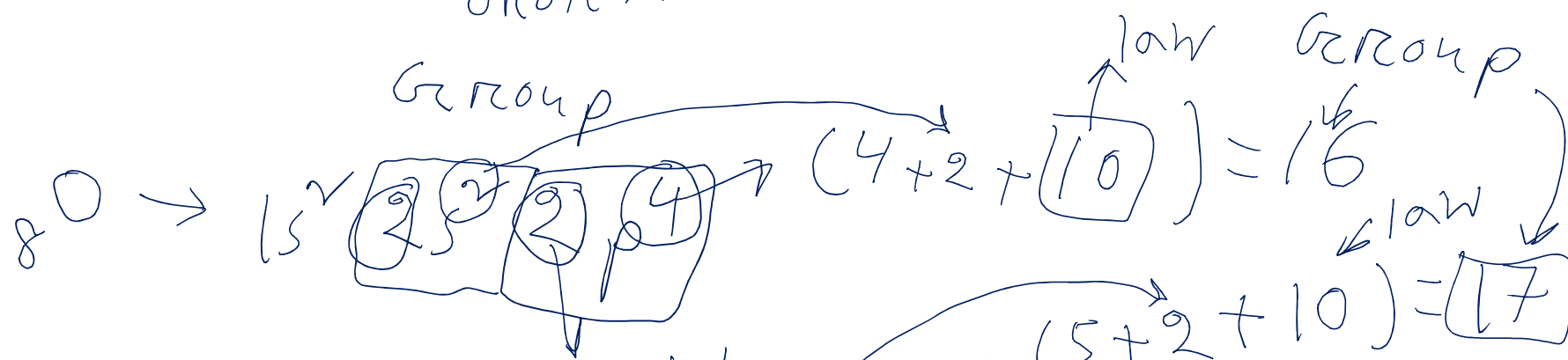
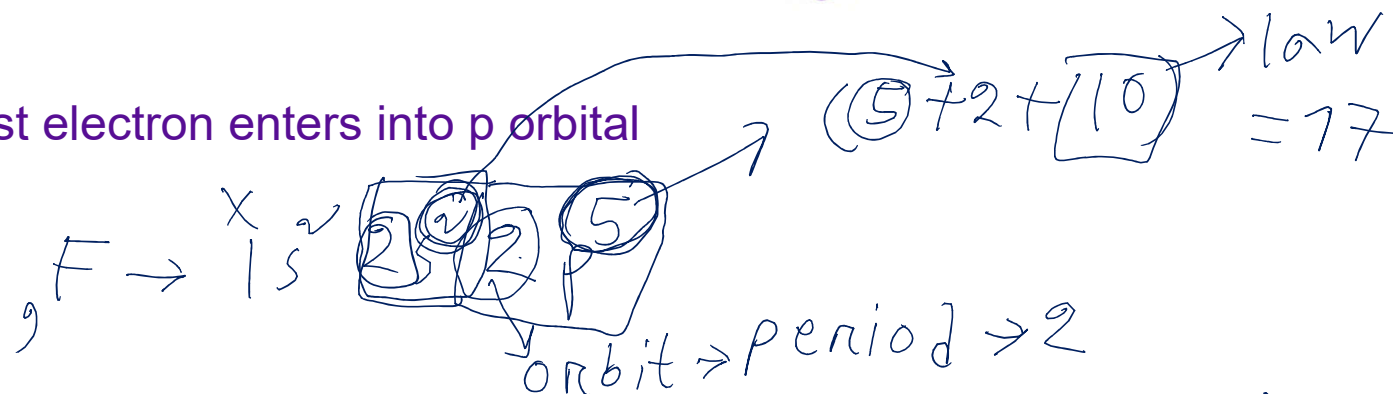
The electronic configuration of Mg is $(1s^2 2s^2 2p^6 3s^2)$. What is the Period and Group of Mg?

Handwritten notes: $2 \rightarrow 6, 7, 8, 9$
↓
Period $\rightarrow 3$

- (a) Period 2 and Group 2
- (b) Period 3 and Group 1
- ☒ (c) Period 3 and Group 2
- (d) Period 4 and Group 1

DETERMINATION OF GROUP OF ELEMENTS

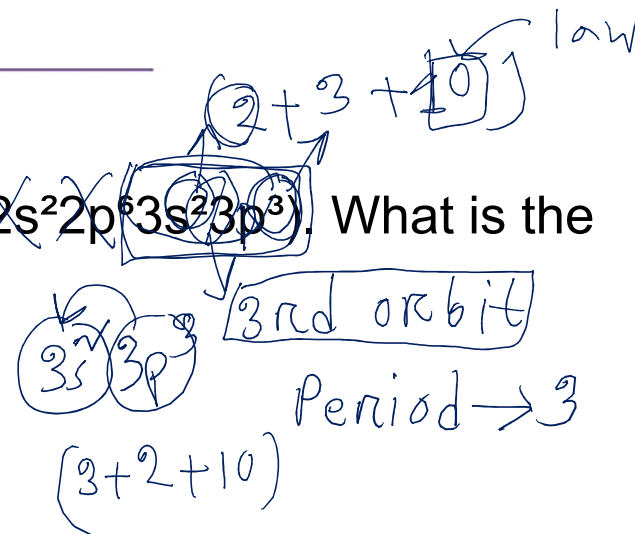
□ If last electron enters into p orbital



POLL QUESTION 03

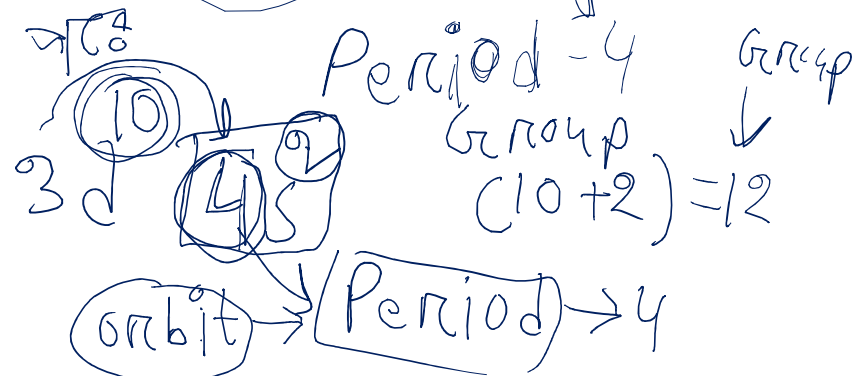
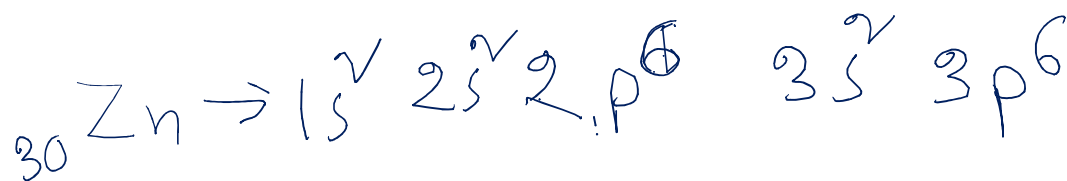
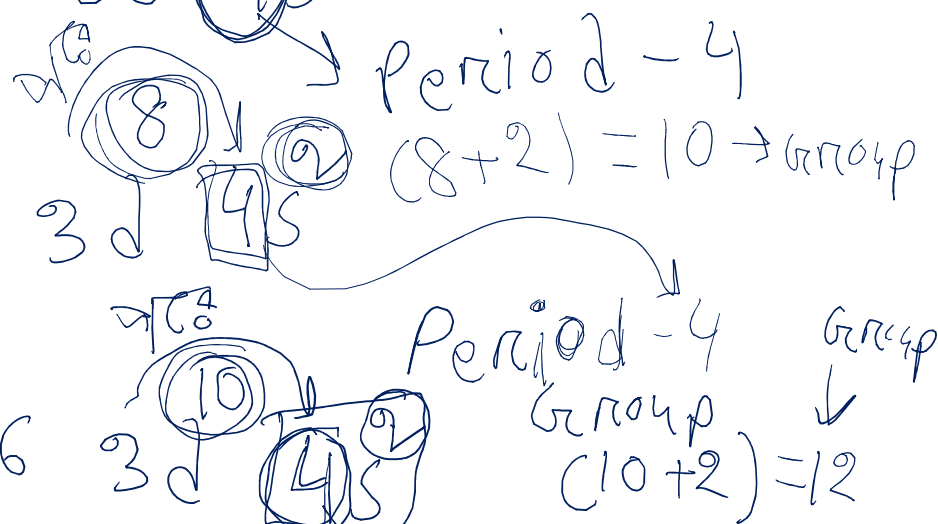
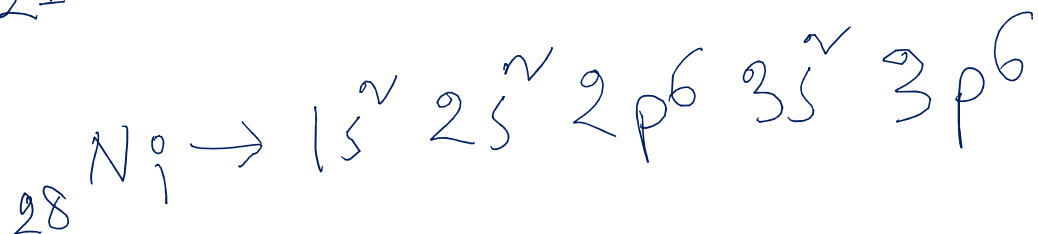
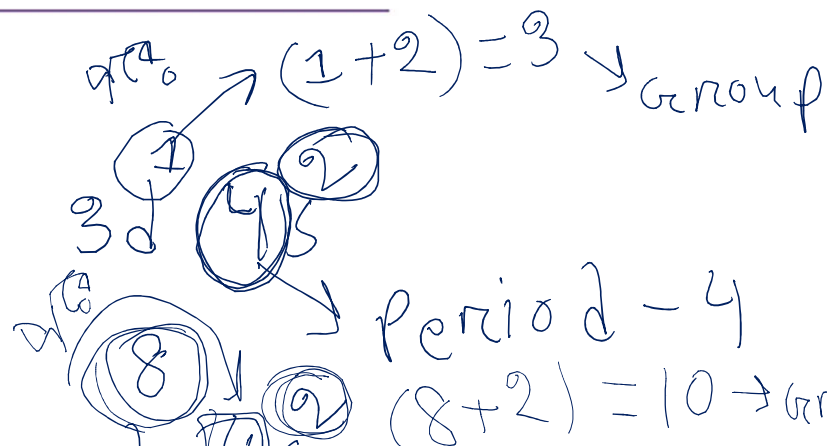
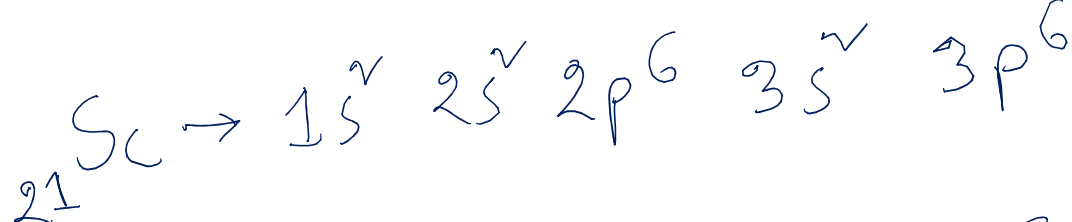
The electronic configuration of P (Phosphorus) is $(1s^2 2s^2 2p^6 3s^2 3p^3)$. What is the Period and Group of Phosphorus?

- (a) Period 3 and Group 1
- (b) Period 3 and Group 2
- (c) Period 3 and Group 13
- (d) Period 3 and Group 15



DETERMINATION OF GROUP OF ELEMENTS

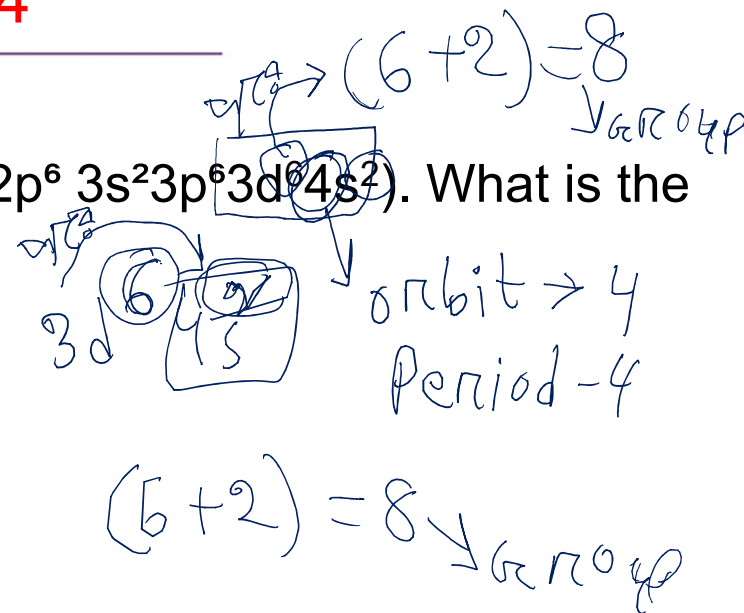
□ If last electron enters into d orbital



POLL QUESTION 04

The electronic configuration of Fe (iron) is $(1s^2 2s^2 2p^6 3s^2 3p^6 3d^6 4s^2)$. What is the period and group of iron ?

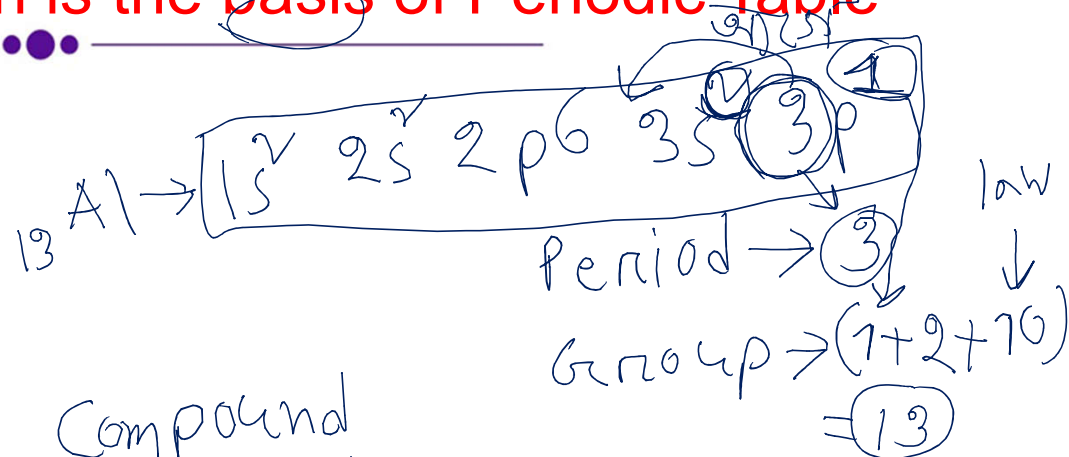
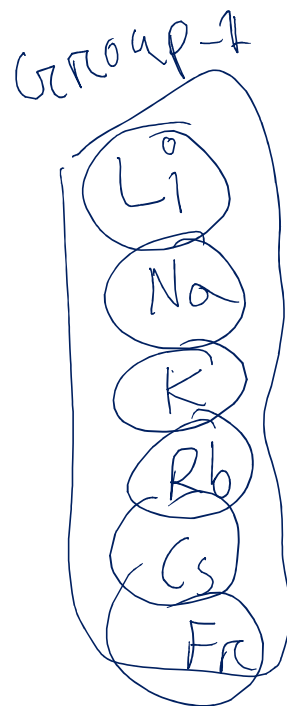
- (a) Period 3 and Group 2
- (b) Period 3 and Group 8
- (c) Period 4 and Group 2
- ☒ (d) Period 4 and Group 8



The electronic Configuration is the basis of Periodic Table

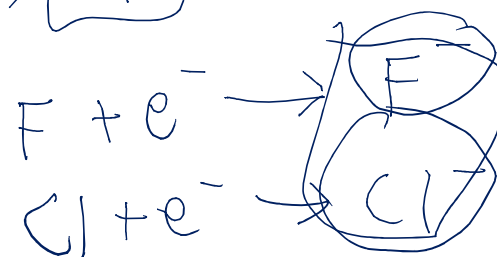
- Easy determination of position:

- Explanation of ion:

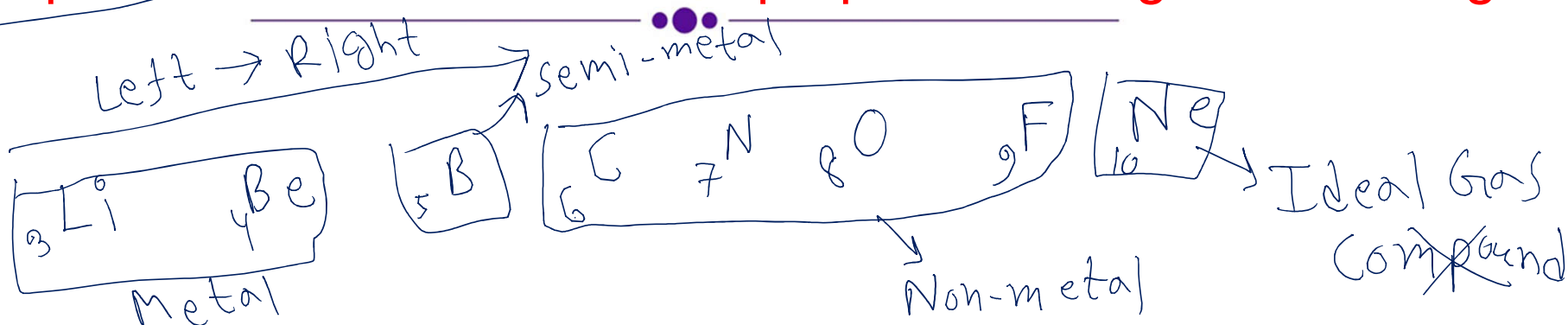


Compound

Metal:



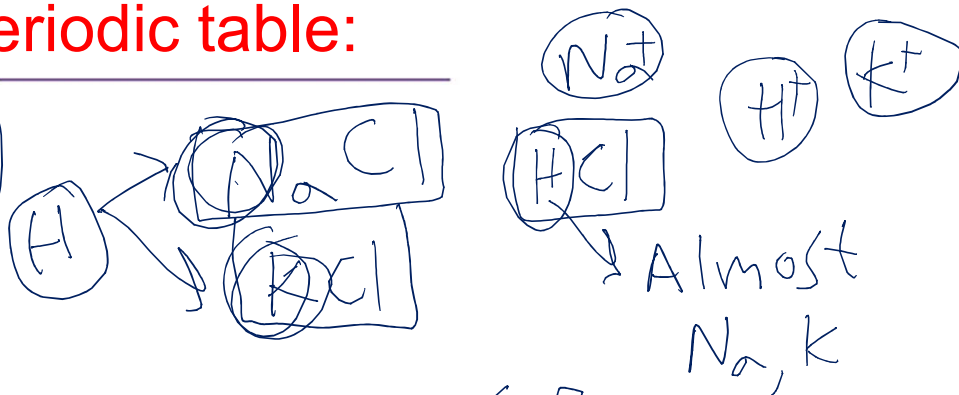
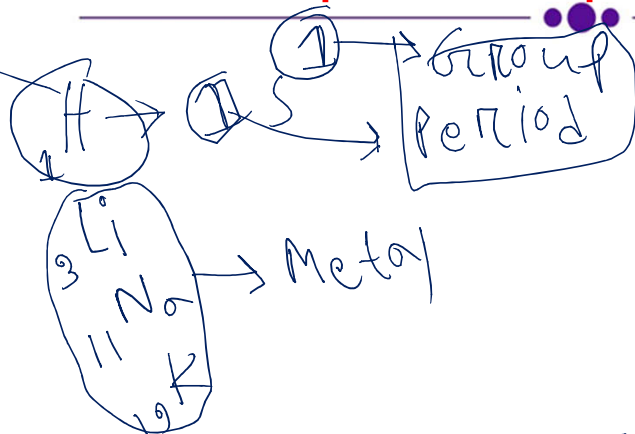
Easy explanation of elements same properties and gradual change



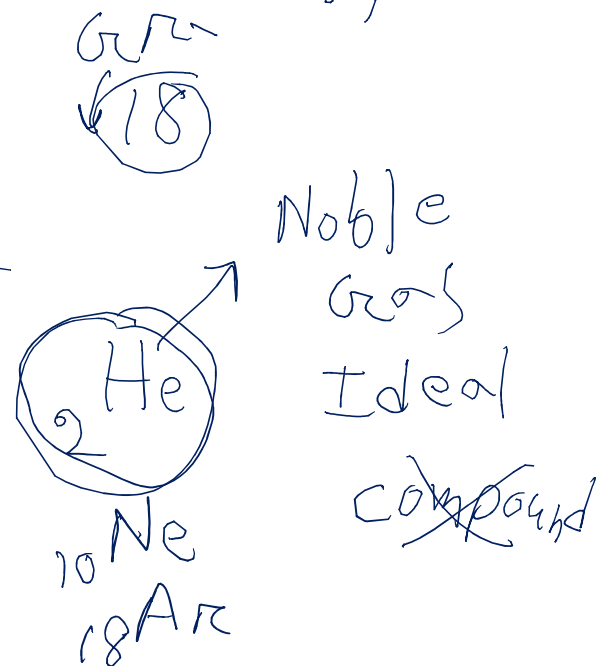
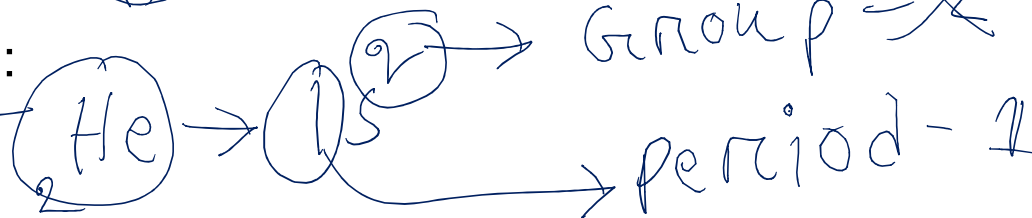
Exceptions in periodic table:

• Position of H:

Non metal



• Position of He:

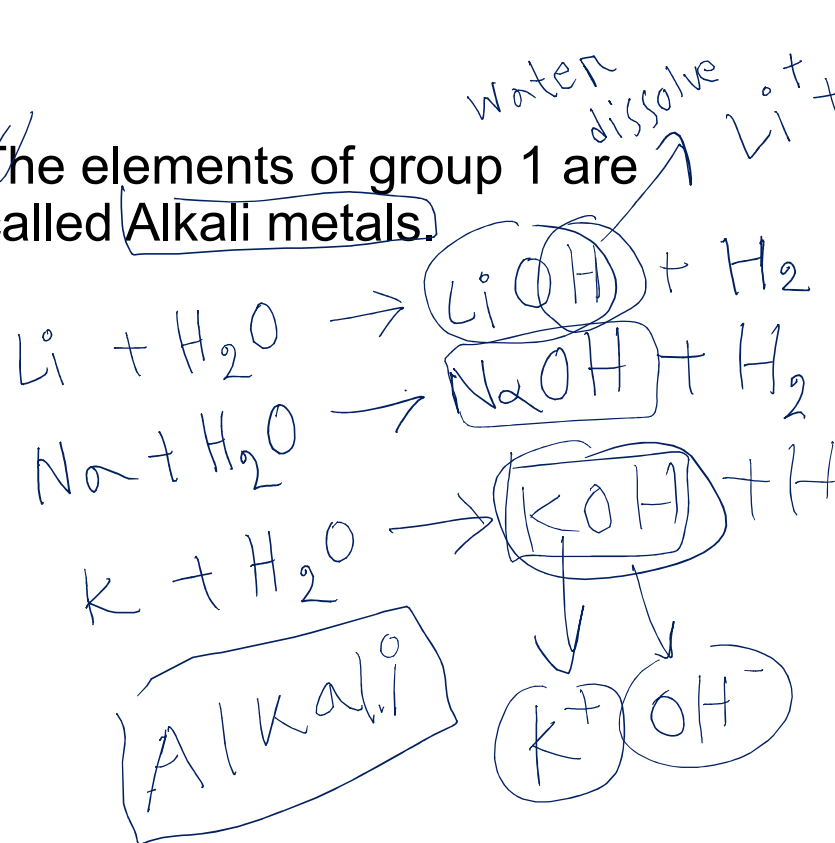


Beatty



ALKALI METALS:

- The elements of group 1 are called Alkali metals.



Releases OH^-

Group 1 The Alkali Metals

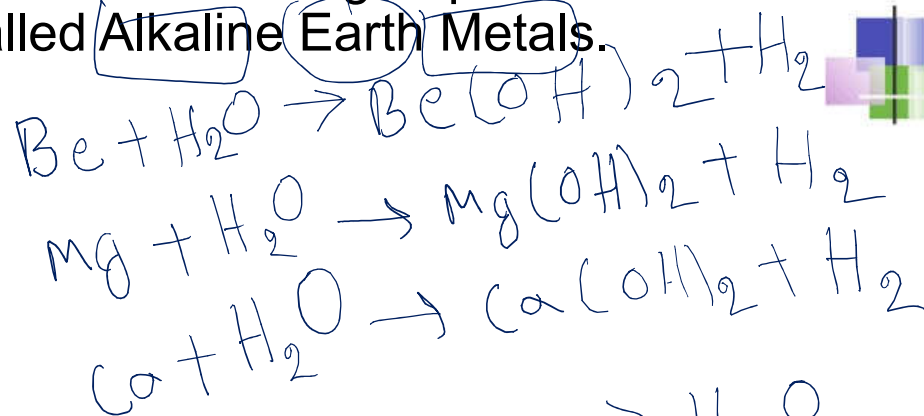
Electronic configuration

Li	Lithium	2,1
Na	Sodium	2,8,1
K	Potassium	2,8,8,1
Rb	Rubidium	2,8,8,18,1
Cs	Cesium	2,8,8,18,18,1
Fr	Francium	2,8,8,18,18,32,1

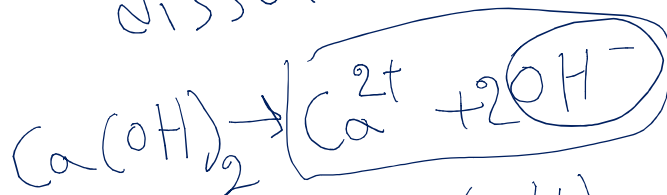
ALKALINE EARTH METALS

Under Earth

- The elements of group 2 are called Alkaline Earth Metals.



dissolve $\rightarrow \text{H}_2\text{O}$



Group 2- (Alkali Earth Metals)

4	Be	Beryllium
12	Mg	Magnesium
20	Ca	Calcium
38	Sr	Strontium
56	Ba	Barium
88	Ra	Radium

- Cu \rightarrow Copper
Ag \rightarrow Silver
Au \rightarrow Gold

Group 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Period 1 2 3 4 5 6 7

Coinage Metals
Copper Family
Group 11

Group 1: H, Li, Na, K, Rb, Cs, Fr
Group 2: He, Be, Mg, Ca, Sr, Ba, Ra
Group 13: B, Al, Ga, In, Sn, Pb, Bi, Po, At, Ts
Group 14: C, Si, Ge, Sn, Pb, Bi, Po, At, Ts
Group 15: N, P, As, Sb, Bi, Po, At, Ts
Group 16: O, S, Se, Te, Po, At, Ts
Group 17: F, Cl, Br, I, At, Ts
Group 18: Ne, Ar, Kr, Xe, Rn, Og
Group 19: K, Rb, Cs, Fr
Group 20: Ca, Sr, Ba, Ra
Group 21: Sc, Y, Lu
Group 22: Ti, Zr, Hf, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Po, At, Ts
Group 23: V, Nb, Ta, W, Re, Os, Ir, Pt, Au, Hg, Tl, Pb, Bi, Po, At, Ts
Group 24: Cr, Mo, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 25: Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
Group 26: Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
Group 27: Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
Group 28: Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr
Group 29: Cu, Zn, Ga, Ge, As, Se, Br, Kr
Group 30: Zn, Ga, Ge, As, Se, Br, Kr
Group 31: Ga, Ge, As, Se, Br, Kr
Group 32: Ge, As, Se, Br, Kr
Group 33: As, Se, Br, Kr
Group 34: Se, Br, Kr
Group 35: Br, Kr
Group 36: Kr
Group 37: Rb, Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 38: Sr, Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 39: Y, Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 40: Zr, Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 41: Nb, Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 42: Mo, Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 43: Tc, Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 44: Ru, Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 45: Rh, Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 46: Pd, Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 47: Ag, Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 48: Cd, In, Sn, Pb, Bi, Po, At, Ts
Group 49: In, Sn, Pb, Bi, Po, At, Ts
Group 50: Sn, Pb, Bi, Po, At, Ts
Group 51: Pb, Bi, Po, At, Ts
Group 52: Bi, Po, At, Ts
Group 53: Po, At, Ts
Group 54: At, Ts
Group 55: La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 56: Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 57: Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 58: Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 59: Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 60: Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 61: Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 62: Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 63: Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 64: Dy, Ho, Er, Tm, Yb, Lu
Group 65: Ho, Er, Tm, Yb, Lu
Group 66: Er, Tm, Yb, Lu
Group 67: Tm, Yb, Lu
Group 68: Yb, Lu
Group 69: Lu
Group 70: La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 71: Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 72: Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 73: Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 74: Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 75: Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 76: Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 77: Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 78: Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 79: Dy, Ho, Er, Tm, Yb, Lu
Group 80: Ho, Er, Tm, Yb, Lu
Group 81: Er, Tm, Yb, Lu
Group 82: Tm, Yb, Lu
Group 83: Yb, Lu
Group 84: La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 85: Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 86: Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 87: Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 88: Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 89: Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 90: Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 91: Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 92: Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 93: Dy, Ho, Er, Tm, Yb, Lu
Group 94: Ho, Er, Tm, Yb, Lu
Group 95: Er, Tm, Yb, Lu
Group 96: Tm, Yb, Lu
Group 97: Yb, Lu
Group 98: La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 99: Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 100: Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 101: Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 102: Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 103: Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 104: Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 105: Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 106: Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 107: Dy, Ho, Er, Tm, Yb, Lu
Group 108: Ho, Er, Tm, Yb, Lu
Group 109: Er, Tm, Yb, Lu
Group 110: Tm, Yb, Lu
Group 111: Yb, Lu
Group 112: La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 113: Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 114: Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 115: Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 116: Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 117: Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu
Group 118: Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu



Transitional Elements

Grp - (3-12) elements

Coloured Compound

Catalyst \rightarrow ~~अम्ल~~

Fe, Ni, Cu,

POLL QUESTION 05

Which of the following is correct?



- (a) *Na* Alkali Metal
- (b) *Ca* Alkaline Earth Metal
- (c) *Cu* Coinage Metal
- (d) All of the above

লেগে থাকো সৎ ভাবে,
স্বপ্ন জয় তোমারই হবে।