Inorgenic Chemistry

Date : 1

periodic Table & periodic properties

periodic Table :→

Elements in the periodic table divide on the basis of physical and chemical properties.

Modern periodic Law :→ "The physical and chemical properties of element are periodic functions of their atomic weights."

A periodic table in which elements are arranged in order of increasing atomic number in the manner that element with similar properties falls in the same vertical column is known as periodic table.

We consider modern form, known as Long form of periodic table.

Long Form Periodic table.

In the long form of periodic table elements are arranged in order of their increasing atomic number.

The periodic table divided into horizontal and vertical rows.

The horizontal rows are called as periods & Vertical rows / coloms are called as groups or sub groups.

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Groups and Subgroups

The vertical columns are called groups Their are 16 groups or vertical columns.

These are numbered as
IA, IB, IIA, IIB, IIIA, IIIB, ... VIIA, VIIB, VIII and zero ....
Total number of groups are nine.
In the periodic table they are arranged as
IA, IIA, IIIB, IVB, VB, VIB, VIIB, VIII, IB, IIB, IIIA, VA VIA, VIIA, zero
The element of sub groups IA, IIA .... VIIA are called normal or representative element.
The element of sub group IB, IIB, ... VIIB group are called transition element.
The element of zero group are called inert elements.

periods :→

Their are 7 periods in the periodic table
These periods are short and long.
First period :→ (n=1) It is short period & contain 2 element H & He.
Second period & 3rd period :- It is short period containg 8 element.
e.g. Li_3 — Ne_{10}
Na_{11} — Ar_{18}

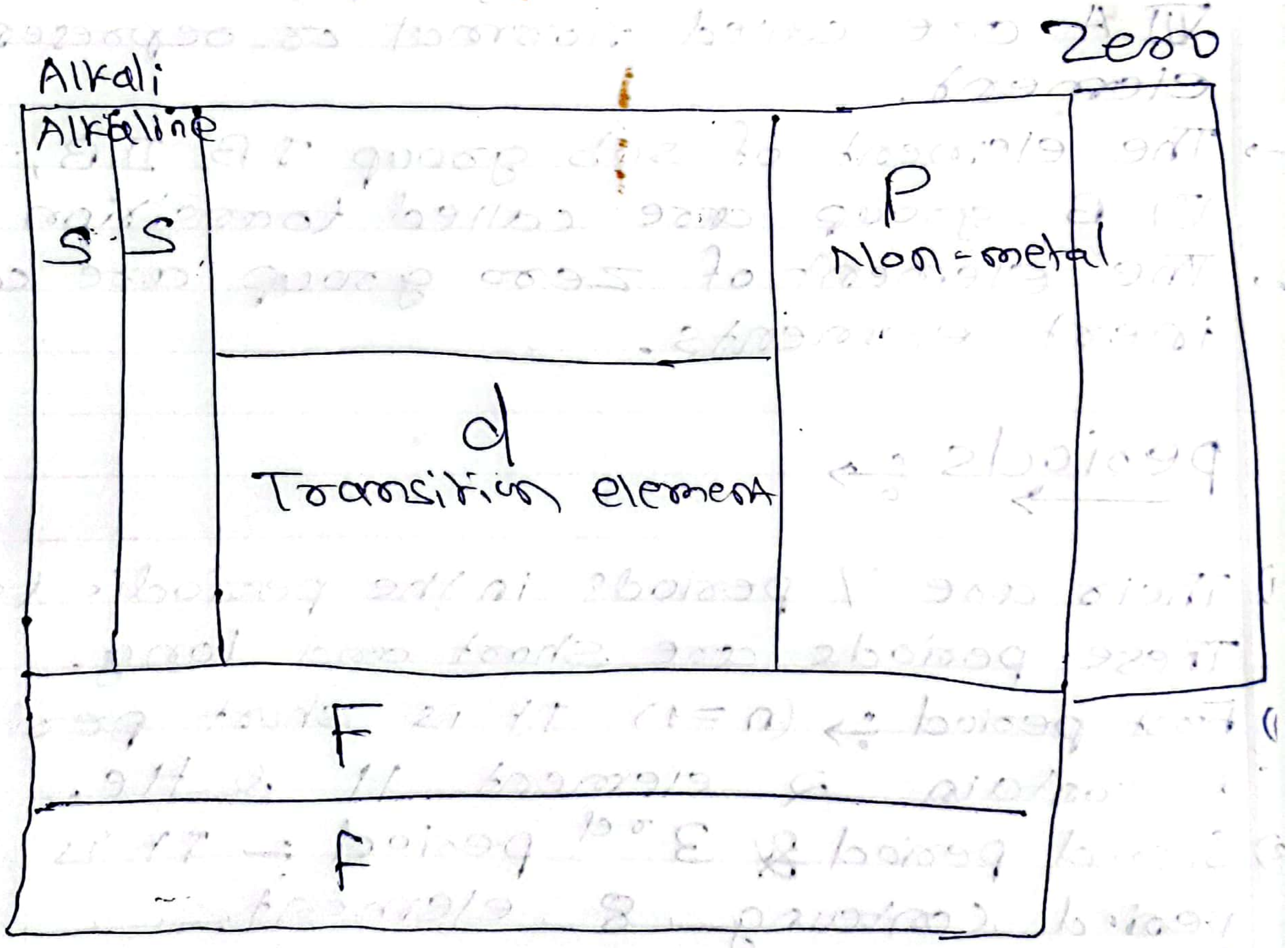
3] Fourth, 5th, 6th period ÷ It is long period containg 18, 18, 32 element respectively. The 6th period include 14 rare earth or Landhanide.

Fourth period K_{19} — Kr_{36}

5th —"— $_{37}Rb$ — $_{54}Xe$

6th —"— $_{55}Cs$ — $_{86}Rn$

4] 7th period ⇒ It is incomplet period. containg 23 element. These period include 14 actinide element.



Division of Elements into S, P, d, F Block

→ The elements are arranged in the long form of periodic table are divided into Four blocks known as S, P, d, F blocks.

→ The classification depend on type of orbital (S, P, d, F) into which last electron of atom of the elements enters.

1] S-Block elements :-

The elements whose atoms receive the last electron in the S orbital of their outermost energy shell are called S-block elements.

The element of Groups I & II in which the S-orbital is progressively Filled.

The element of Group-I have general electronic configuration ns^1 and are called as alkali metals.

The element of Group-II have general ~~Formula~~ electronic configuration ns^2 and are called alkaline earth metals.

2] P-Block elements :-

The element whose atom recive last electron in their P-orbital are called p-block element.

The atom of elements of Groups III, IV, V VI, VII and zero involving 1, 2, 3, 4, 5 & 6 electron respectively in p-orbital in the outermost shell.

The General electronic configuration for the atom of element ~~of~~ is $ns^2\,np^{1-6}$.

3] d-Block element :→

- The elements in which last electron enters the d orbital of their ~~last but one~~ energy shell are called d-block element.
- The general electronic configuration of ~~element~~ d-block element is

$(n-1)d^{1-10}\ ns^{1-2}$.

- These element are also called as transition elements.

These Transition element are divided into

- 1^{st} transition series ($_{21}$Sc — Zn$_{30}$) 3d
- 2^{nd} transition series ($_{39}$Yt — Cd$_{48}$) 4d
- 3^{rd} Transition series ($_{72}$Hf — Hg$_{80}$) 5d

4] F-Block element :→ / Inner Transition Ele

- The element in which last electron enters the F-orbitals of their atoms are called F-block elements.
- It consist of 2 series of 14 element placed at the bottom of periodic table.
- 1^{st} series are called Lanthanide series ($_{57}$La-L
- 2^{nd} series are called Actinide series (Th — Lu) respectively.

* characterstic of S-block element

1 They have one or two electron in their outermost shell ∴ they are Monovalent or divalent.

2 They are highly electropositive

3 They are silvery white soft metal having low density.

4 They are chemically very much reactive.

5 They Form mostly ionic compound.

6 The oxide and hydroxide of these element are strongly basic.

* characteristic of P-block element

1 These element show variable oxidation state.

2 They are generally electronegative.

3 Except O, P, S, X (halogen) most of p-block element are chemically less reactive

4 They generally Form covalent compound.

* characteristic of Transition Element

1 Metalic character : They are all ductile metal & good conductor of heat & electricity

2 Melting & boiling point : Most of these element have high melting & boiling point.

3 Variable oxidation state : These element shows variable oxidation state.

4] Reactivity :- These element are chemically less reactive.

5] Catalytic activity :- Most of transition metal & their compound possess catalytic activity. Ex:- Fe, Co, Ni, Pt. used as a catalyst in different reaction.

6] Formation of complex compound :- Transition element posses vacant d- orbital acept lone pair of electron from ligand & form complex.

7] Paramagnetic character :- Transition elements are paramagnetic i.e they are attracted into magnetic field due to presence of unpaired electron.

* Characteristic of F-block element or Inner Transition element :-

1. They are all metals
2. They show variable valency
3. Their salts are generally coloured
4. They form complex salt.
5. They are paramagnetic in nature.
6. They form electrovalent compound.
7. Some of element of F- block are radioactive element.

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Sketch of Long-Form of periodic table

The main body of long form of periodic table consist of.

i) 18 vertical columns, divided into 16 group

ii) 7 horizontal rows called as periods

iii) At the bottom two horizontal rows of 14 element each, called as Lanthanide & actinides.

(iv) In all about 110 or more element are known including artificially prepared element.

(v) Depanding on last electron enters in which orbit they classified into s, p, d, f orbital called block.

vi) Last column is called zero group element

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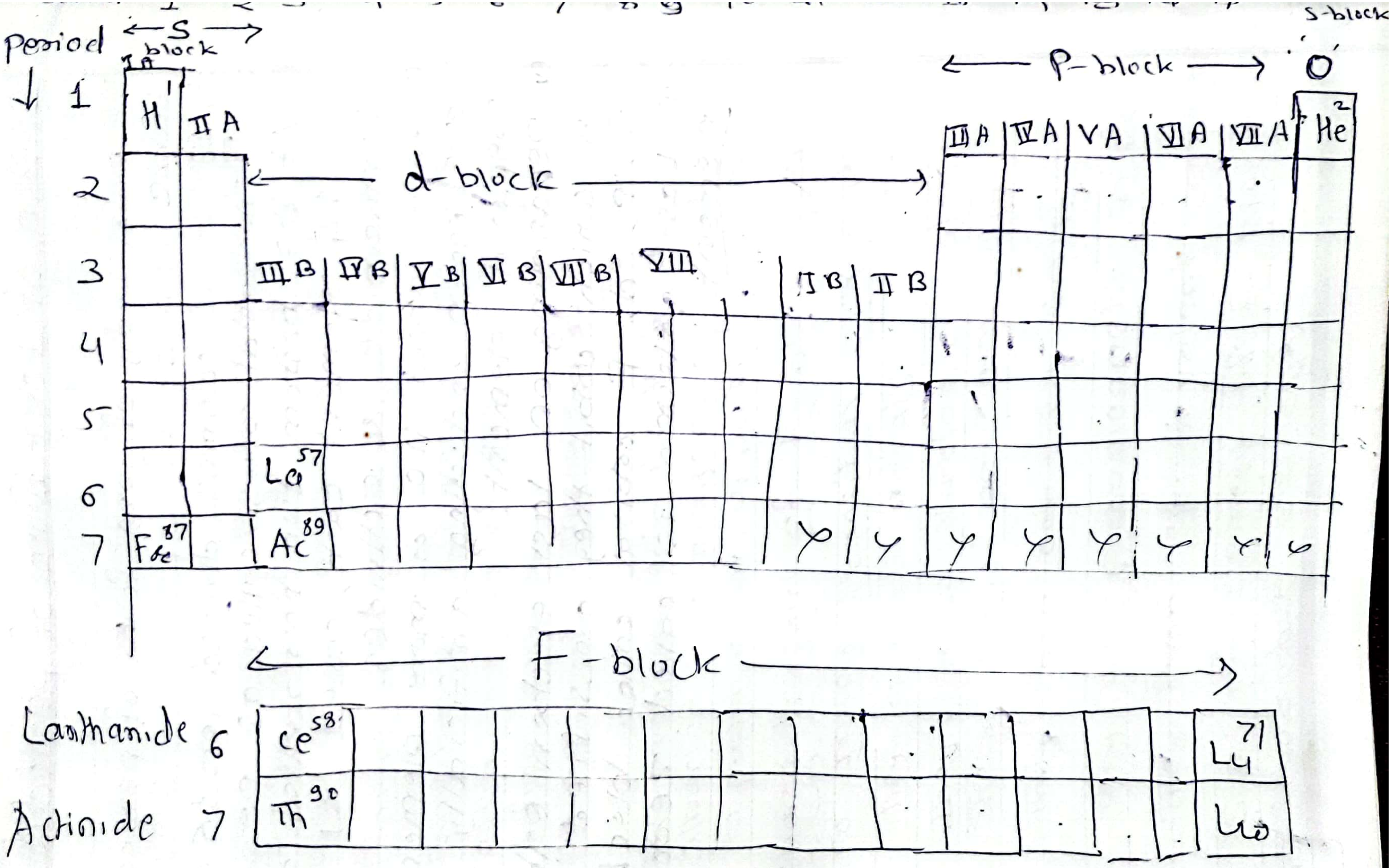


Fig: Sketch of Long-form of periodic table.

periodic properties

In the long Form of periodic table several properties of element such as atomic radii, ionic radii, ionisation potential, electronegativity etc vary in a regular way in a group & in a period. such a properties are called periodic properties.

Atomic radius :→

It is defined as distance between the centre of nucleus and electron cloud of outermost shell.
It is measured in ground state and expressed in Angstrom (A°) or meter (m) or picometer (pm)
Individual atoms cannot be isolated.
∴ it is difficult to determine exact size of atom. ∴ we measure
① covalent radius
② Vander Waals radius / collision radius
③ Atomic radius.
It is determined by methods like X-ray diffraction, neutron diffraction.
Depending on existance of element 3 operational defination of atomic radius are possiable. These are as follows
① covalent radius ⓑ metalic radius
③ vander waals radius.

(i) Covalent Radius :-

ef :- It is defined as "one half of distance between the nuclei of two like atoms joined by a single covalent bond."

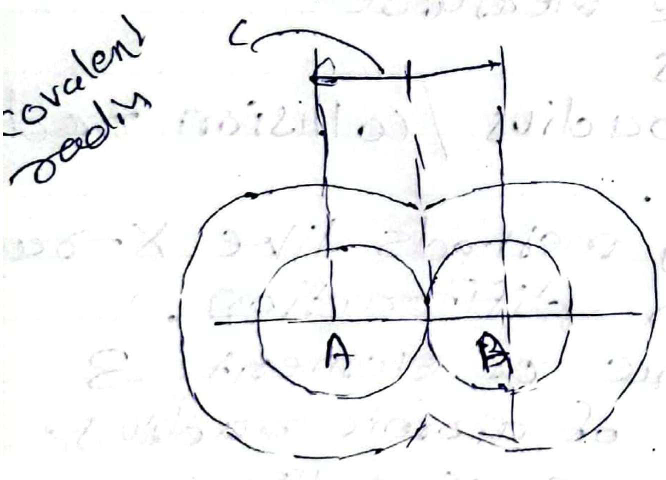
Ex:-
We know from spectroscopic data the distance betn 2 chlorine atom in a chlorine molecule is 1.98 Å.

∴ covalent radius of chlorine atom

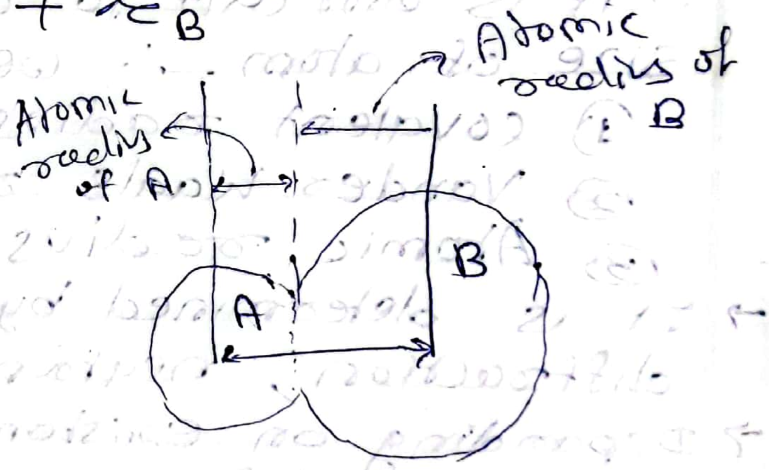
$$= \frac{1.98}{2} = 0.99 \text{ Å}$$

In heteronuclear diatomic molecule AB, if both atom are linked by single covalent bond having same electronegativity, the bond length d_{A-B} is equal to sum of covalent radii of two atoms.

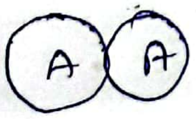
$$d_{A-B} = r_A + r_B$$



Homo atomic Molecule



Hetero atomic molecule.



$$r_A = \frac{d_{A-A}}{2}$$

e.g. $d_{H-Cl} = 1.36\ A^\circ$

$r_H = 0.37\ A^\circ$

$d_{H-Cl} = r_H + r_{Cl}$

$1.36 = 0.37 + r_{Cl}$

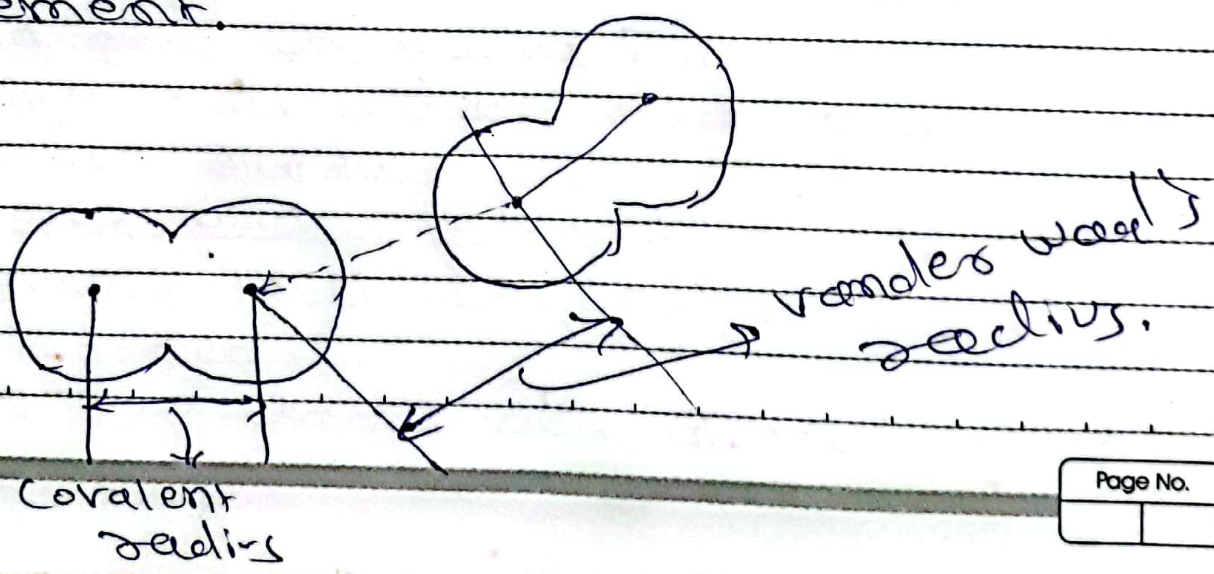
$r_{Cl} = 1.36 - 0.37 = 0.99\ A^\circ$

Vander waal's radius :->

It is defined as "one half of distance between the nuclei of two nearest atoms of two adjacent molecule of an element in solid state". It is a distance at which two atoms are in contact without bond formation. Distance betn the nuclei of two chlorine atom of two neighbouring chlorine molecule is 3.6 A°.

∴ Vanderwaal's radius of Cl $= \frac{3.6}{2} = 1.8\ A^\circ$

Value of vanderwaal's radius obtained by X-ray diffraction studies of various element.



→ Vanderwaal's forces are the only attractive forces in ~~these cases~~ the ~~solid~~ noble gases and in solid crystal of noble gases.

③ Metalic radius :- Most of metal do not form covalent compound. It is ∴ not possiable to determine covalent radii of these metals.

→ However size of metalic atom can be obtained from metalic close packed crystal lattice.

→ Def^n :- The metalic radius may be defined as one half of distance bet^n atom of ~~a~~ metal in the metalic close packed crystal lattice in which metal exibit co-ordination number : 12.

→ Metalic radii can be calculated by knowing density of metal & nature of unit cell

Factors affecting Atomic periodic Trends

Variation of Atomic size along a period and in a group

periodic Trend in a period :- In a period, atomic radius generally decrease from left to right.

Ex:- In 2nd period covalent radii are as follow

Element	Li	Be	B	C	N	O	F	Ne
covalent radii in A°	1.23	0.85	0.82	0.77	0.75	0.73	0.72	1.31

As nuclear charge increase regularly with increasing atomic number.
Electron in shell are attracted more & more strongly toward the nucleus. This leads to contraction of atomic size

Trend in a group :- Atomic radii increase in a group on moving from top to bottom.
Atomic radii increase as ~~to~~ atomic number increase due to
① Extra electron added to successive higher energy level i.e. extra shell of electron is added.
② Nuclear charge also increase but

- → Shielding effect or Screening effect also increase with the presence of larger no. of electron in inner shells which reduces effective nucleus charge.
- → The result is increasing in covalent radii as we move down the group.

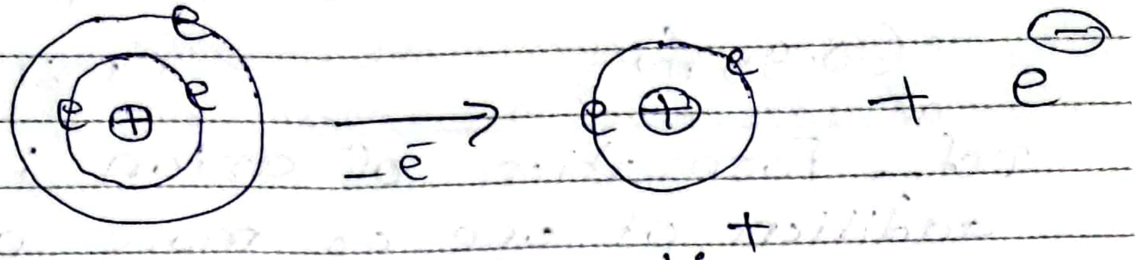
1-. covalent radii of Ist. I A group :-

Element	Li	Na	K	Rb	Cs
covalent radii in A°	1.23	1.54	2.03	2.16	2.35
n	2	3	4	5	6

* Ionic Radius :→

- Ionic radius is the radius of an ion in an ionic crystal.
- Def :- " Distance from center of nucleus of an ions ~~upto which it~~ and electron in the outermost shell of a cation or anion ".
- → Ion are of two type namely positive charged ion called cations & negative -"- -"- -"- anions.
- → Ionic radius is measured from X-ray measurement.

Radii of cations :→



Li $1s^2 2s^1$ & (1.23 Å)

Li^+ $1s^2$ (0.6 Å)

"cation or positive ion are formed from ~~atom~~ neutral atom by the loss of electron from outermost valency shell This causes removel of whole outermost shell of electron.

Thus no. of electron decreases while nuclear charge remain same ∴ electron are pulled more towards the nucleus due to increase in force of attraction.

Due to this there is decrease in radius of cation

e.g. In Lithium (Li) there is only one electron in outer (L) shell. This electron is removed in the Formation of Li^+.

L-shell in Li atom is disappear.

Size of cation is smaller than size of atom.

Removel of valency electron cause disappearance of shell.

Raddi of Anions :

$$\underset{(0.99\ \text{Å})}{Cl} + e^{-} \longrightarrow \underset{(1.81\ \text{Å})}{Cl^{-}}$$

Def^n :- Formation of anion involves the addition of one or more electron to valence shell of atom.

→ Due to this size of anion increase than atom.

→ Due to addition of electron

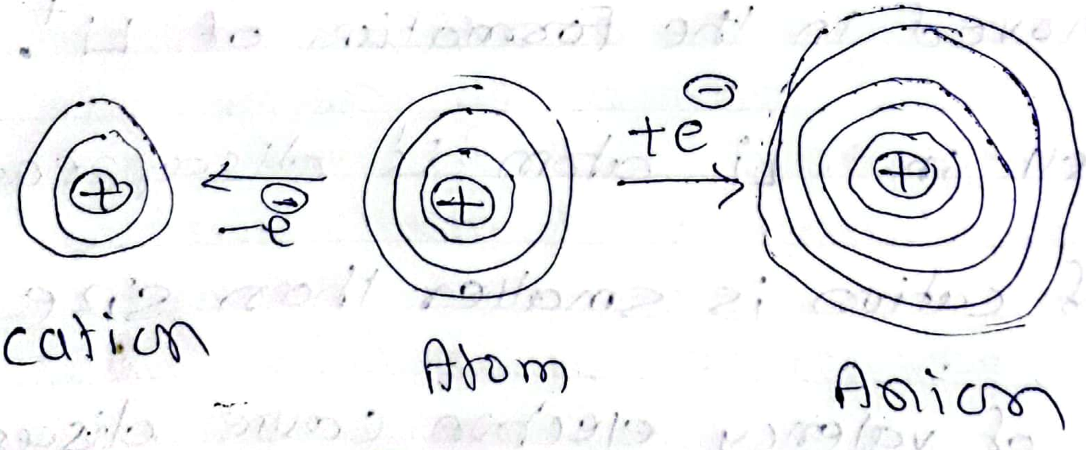
① Electron cloud expand and size of anion increases

② Nuclear charge act on larger electron.

∴ Effective nuclear charge per electron are weakly attracted to nucleus.

This result in expansion of electron cloud.

Hence size of an anion is highe than atom.



periodic trends in ionic radii

Ionic radii decrease on moving left to right in a period but increase from top to bottom in a group.

In a periodic:- The ionic radii decrease along a period because with increasing atomic number positive nuclear charge increase & also effective nuclear charge also increase. Due to this electron are attracted towards nucleus resulting in decrease in size of ion.

Ion	Na^+	Mg^{++}	Al^{+++}
Ionic radii in A°	1.02	0.72	0.50

In a groups:- Ionic radii increase on moving down a group.

Ion	Li^+	Na^+	K^+	Rb^+	Cs^+
Ionic radii in A°	0.68	0.98	1.33	1.37	1.57

Ionic radii increase in a group because on moving down a group, outermost electron is added to higher principle quantum number & ionic radii increase.

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Ionisation Energy or potential

Def :→
The minimum energy required to remove electron from isolated gaseous atom is known as ionisation potential or ionisation energy.

② Most losely outermost electron present in last shell is removed

③ The energy is generally measured in electron volt per atom (eV/atom) or K.cal/mole or KJ/mole.

*** Succesive Ionisation Energies** :→

① Electron is removed in stages one by one

① There may be 1st, 2nd, 3rd & n^{th} ~~electron~~ ionisation potential depending on the removel of 1st, 2nd, 3rd or n^{th} electron from atom.

Thus

- Frost ionisation potential is the energy required to convert

$$M_{(g)} \longrightarrow M^{+}_{(g)} + e^{\ominus}$$

- Second ionisation potential is energy required to convert

$$M^{+}_{(g)} \longrightarrow M^{+2}_{(g)} \quad \& \text{ So on.}$$

- It is observed that value of ionisation potential increase in the order

$1^{st} < 2^{nd} < 3^{rd} < \ldots$ So on.

- $I.E_1, I.E_2, I.E_3 \ldots$ is 1^{st} Ionisation potential, 2nd, 3rd I.P.

If one electron has been removed from atom, the energy required is called 1st ionisation energy (I.E₁).

$$Na_{(g)} \xrightarrow{I.E_1} Na^{\oplus}_{(g)} + e^{\ominus}$$

For removel of second electron from $Na^{\oplus}$ ion is called 2nd I. potential I.E₂. & so on

$$Na^{+}_{(g)} \xrightarrow{I.E_2} Na^{++}_{(g)} + e^{\ominus}$$

$$Na^{++}_{(g)} \xrightarrow{I.E_3} Na^{+++}_{(g)} + e^{\ominus}$$

It become increasingly difficult to remove 2nd & subsequently electron from resulting positively charged ion on account of increased force of attraction b/w nucleus and remaining electron.

$\therefore$ $I.E_1 < I.E_2 < I.E_3 \ldots\ldots$

Factors Affecting the Ionisation potential

Size of atom :-

Smaller the atomic size, greater will be ionisation energy & vice versa. This is because in larger atoms valence electron is present at larger distance & experience less nuclear attraction. Hence smaller amount of energy is needed for its removel.

Nuclear charge :-

If nuclear charge is high then ionisation energy will also high.

If nuclear charge is more, then it will attract the electron more strongly & hold the electron. Thus it will require higher amount of energy for its removal. Thus with increase in nuclear charge, ionisation energy will also increase

Screening effect :-

If more number of electron is present in inner shells, then smaller will be ionisation energy. The inner electron behave as screen or shield betn nucleus & valency electron This is known as screening or shielding effect If number of inner electron is large, screening effect will also larger. Thus valence electron will experience less nuclear attraction, which results in lower ionisation energy.

Electronic configuration of

4] **Half. filled** or **completely filled orbitals**:

According to Hunds rule, half filled orbital i.e. ns^1 or np^3, nd^5 – nF^7 or completly filled orbital i.e. ns^2, np^6, nd nF^{14} are more stable.
Hence more energy is required to remo electron from such orbit. Hence ionisati potential will be high.

5] **Shape of orbit** :→ The 's' electron is closer to nucleus than p, d, f electron.
The S electron are attracted more strongly by nucleus than p. d f electron and require more energy for its removal maxium amount of energy is require to remove S electron.
The energy requirement for orbit follows the order

$$S > p > d > F$$

Date :

Variation of ionisation Energy or periodic Trends

Along a period :-

Ionisation energy increase as we move from left to right along a period.

because : from left to right along a period

i) size of atom decreases

ii) Nuclear charge increases

iii) Electron is added to same principle energy shell.

Hence, Attractive Force betn outermost electron & nucleus increase so that ionisation energy increases from left to right.

II) Down a group :->

Ionisation energy decreases as we move from top to bottom along a ~~per~~ group.

because, on moving down a group

i) nuclear charge increases

ii) There is gradual increase in atomic size due to increase in number of principle energy shell.

iii) Due to increase in number of inner electron which shields the valence electron from nucleus.

The overall effect of increase in atomic size & shielding effect is much more than overall effect of increase in nuclear charge.

Hence ionisation potential decrease from top to bottom along a period.

Page No.

Applications of ionisation energy to chemical behavior of an element.

To know the number of valence electrons.
ionisation potential values gives evidence about number of valence electrons.
The first & second ionisation potential values of Li atom are 5.4 ev and 75.6 ev. This indicate that one electron is easily removed than other. This conform presence of one valence electron.

Reactivity of Element :-
Higher the value of ionisation energies indicate low reactivity (inert gases) while low value of ionisation energy indicate high reactivity (Alkali & alkaline earth metals)

Nature of Bond :-
Relative value of Ionisation potential and electron affinity of two element gives an idea about the nature of bond formed bet^n two element.
If difference bet^n both the value is greater the bond will be more ionic & if difference is less, the bond will be covalent.

Basic character :-
Lower the ionisation potential of element, more will be its basic character.

5] Relative energy state of electron

The successive value of ionisation energies of an atom indicate relative energy state of different electron in an atom.

6] Reducing power of elements:-

If I.P is ~~low~~ of element is low then its reducing power is greater because easily removed electron is accepted by species have low oxid. state.

Reducing character $\propto \frac{1}{I.P.}$

Electron Affinity

Date :

Def: Energy released when an electron is added to valence shell of an isolated gaseous neutral atom to form negatively charged ion.

$$A_{(g)} + e^{\ominus} \longrightarrow A^{\ominus}_{(g)} + \text{Energy released}$$

- Electron affinity is represented as E.A.
- Energy released is measured in electron volt per atom (e.v./atom) or Kilo Joule per mole (KJ/mole), Kcal / gm atom.
- This process involves release of energy i.e. exothermic & is represented by negative sign placed before it.
- It may be +ve or -ve
- Larger is the energy released, greater is electron affinity.

* ~~Successive~~ ~~Electron~~ ~~Affinity~~

\# Successive Electron Affinity [illegible]

[illegible]

$O_{(g)} + e^- \longrightarrow O^-_{(g)}$ E.A. [illegible]

$O^- + e^- \longrightarrow O^{2-}$ E.A. [illegible]

[illegible]

O^- to O^{2-}.

Factor affecting electron Affinity

Atomic size :- The electron affinity increase with decrease in atomic size because added electron will experienic more nuclear attraction.

Nuclear charge :- The electron affinity increase with increase in nuclear charge. because added electron will experienic more nuclear attraction.

Screening effect :- The electron affinity decreases with increase in screening effect or shielding effect because due to shielding effect added electron experienic less nuclear attraction.

Electronic configuration :- Atom having stable electronic configuration (half or full filled) or inert gas —"—) posses negligible electron affinity.

* Application of electron Affinity on chemical behaviour of an elements :-

1.] Relative reactivity of an Element :-

Element having more electron affinity will accept electron more easily & release more amount of energy. Hence element with higher electron affinity will be more reactive.

2] Nature of bond :-

The relative val of Ionisation potential & electron affinit of two element decides the nature of bond when they combine togethe When difference betn both the value is small, then bond is covalent ~~Ionic~~ & if difference is large then bond is ~~covalent~~. Ionic

3] Acidic character of an element :-

Element with higher value of electron affinity will be more acidi in nature.

4] oxidising power of Element :-

Highe value of electron affinity greater will be capacity to gain electron.

Hence element will possess more oxidisi power as they promote removal of electron from other system.

Periodic Trends of Electron Affinity

Along a period :

on moving in a period from left to right electron affinity increase Because

i) Size of atom decreases ↓

ii) Nuclear charge increases. ↑

iii) No. of valence electron increase so that addition of electron become easier

Hence,

electron are attracted more towards the nucleus hence, electron affinity increase from left to right along a period.

Down a group :

Electron affinity decrease from top to bottom in any group of the periodic table.

(i) Atomic size increase due to addition of new shell

(ii) Effective nuclear charge decrease.

(iii) Screening effect increases

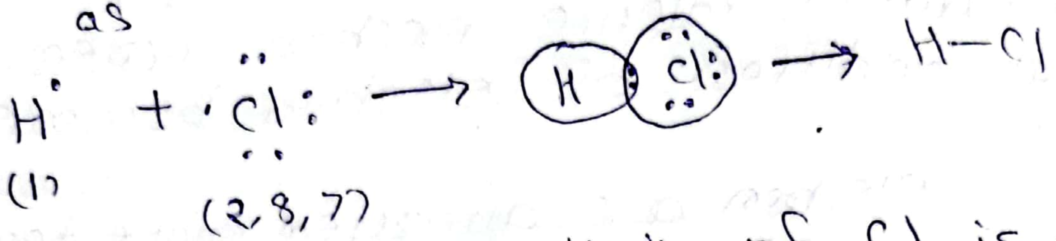
Hence,

Electron are less attracted towards nucleus. ∴ electron affinity decrease from top to bottom.

Electronegativity

Defⁿ :- "It is the tendancy of an atom to attract the shared pair of electron towards itself in a covalently bonded molecule." 3]

Ex :- Formation of H—Cl molecule take place as



4]

In this, electronegativity of Cl is more so shared pair of electron attracted towards Cl atom. Due to this polarities are developed i.e. Cl have δ- charge & hydrogen have δ+ charge as

$$\overset{\delta+}{H} \longrightarrow \overset{\delta-}{Cl}$$

* Factors affecting to electronegativi 5]

1] Atomic size :- Smaller the atom posse higher value of electronegativity as compared to larger atoms. (halogens)

2] Effective Nuclear charge :- Higher is the effective nuclear charge, greater will b its tendency to attract shared pairs of ele towards itself & hence has greater electroneg

Number of electron in last shell :→ Atom having nearly filled shells of electron (halogen) possess higher electronegativity than those are less electron.

Type of Hybridization :→ Electronegativity of atom also affected by type of hybridisation. Greater is S-character in hybrid orbital (close to nucleus) more will be its electronegativity.

Ex:

Molecule	Hybridization	S-character	Electronegativity
Acetylene	sp	50%	3.29
Ethylene	sp^2	33.3%	2.75
Methane	sp^3	25%	2.48

oxidation State :→ Higher is oxidation state of an atom, greater is its electronegativity

Ex:-

	Electronegativity
Fe^{+3}	1.96
Fe^{+2}	1.83

periodic Trends of Electronegativi

or

Variation of Electronegativity along a perio & along a group :-

I) Along a period :- As we move from left to right in any period

i) Atomic size decreceses
ii) Nuclear charge increase i.e. attractive Force increase.
iii) Electron added in same principle energy level.

Hence, electronegativity increases from left right.

II) Down a group :- As we move from to bttom in any group

i) Atomic size increase
ii) Nuclear charge increases.
iii) Screening effect or shielding eff increases.

Hence, due to increase in shielding effect attraction of electron is progressi weaker. overall effect electronegativi decrease on moving down a group.

Difference bet^n Electronegativity & electron Affinity.

Electron Affinity	Electronegativity
It is tendency of Isolated atom in gaseous state to attract electrons	1] It is tendency of an atom in a molecule to attract the bonded electrons.
It is absolute value of an atom	2] It is relative value of an atom
It does not change regularly in a period or a group	3] It change regularly in a period or group
It is measured in ev/atom, KJ/mol, Kcal/mole	4] It has no unit.

Paulings Electronegativity Scale

pauling define electronegativity is the power of atom to attract electron towards itself.

eg consider formation of A-B molecule from A_2 and B_2.

$$\frac{1}{2}(A-A) + \frac{1}{2}(B-B) = A-B \quad \text{———} \; ①$$

The bond dissociation energy of A-B is higher than mean bond dissociation energies of (A-A) & (B-B), & this difference in energies is Δ. Δ is releated to electronegativities of A & B.

∴ Difference in bond energy is given by

$$\Delta = E_{A-B} - \frac{1}{2}(E_{A-A} + E_{B-B}) \quad \text{———} \; ②$$

where

E_{A-B} = Bond dissociation energy of A-B
E_{A-A} = —"— —"— —"— of A-A
E_{B-B} = —"— —"— —"— —"— B-B

If X_A & X_B are electronegativity of A & B respectively & $X_B > X_A$ then according to pauling

$$X_B - X_A = K\sqrt{\Delta} \quad \text{———} \; ③$$

pauling Found K = 0.208 from eqⁿ-②

$$X_B - X_A = 0.208\left[E_{A-B} - \frac{1}{2}(E_{A-A} + E_{B-B})\right]^{1/2} \quad \text{———} \; (4)$$

pauling later take geometrical mean instead of arithmatic mean of

E_{A-A} & E_{B-B}. & suggested following formula,

$$X_{A} - X_{B} = 0.208\left[E_{A-B} - (E_{A-A} \times E_{B-B})^{1/2}\right]^{1/2} \text{ — } ⑤$$

Again value calculated by eq^n-⑤ is not very much successful in all cases. pauling produced new scale ([illegible])

$$X_{A} - X_{B} = 0.18\left[E_{A-B} - (E_{A-A} \times E_{B-B})^{1/2}\right]^{1/2} \text{ — } ⑥$$

This scale is not accepted universaly because bond dissociation energies can not be determine easily.

Application of electronegativity

1] % (percentage) of ionic character in covalent bond:

- Due to electronegativity difference betⁿ 2 hetero atom % of ionic character introduced in covalent bond.
- If electronegativity difference is 1.7 then bond is 50% ionic & 50% covalent while if zero then bond is 100% covalent.
- According to Hunay smith's eqⁿ % of ionic character is calculated by

$$\% \text{ ionic character} = 16(X_A - X_B) + 3.5(X_A - X_B)^2$$

Also

$$A + B \longrightarrow A - B$$

where X_A = electronegativity of A
X_B — " — " — B

2] Bond length :- If electronegativity difference is large, then bond length decrease, bond energy increases.

Problems

The bond energies of H, Cl, & HCl are 103.4 kcal/mole, 57.8 kcal/mole, 102.7 kcal/mole respectively. If electronegativity of H is 2.1 calculate the electronegativity of chlorine.

$$\Delta = E_{H-Cl} - (E_{H-H} \times E_{Cl-Cl})^{1/2}$$

$$= 102.7 - (103.4 \times 57.8)^{1/2}$$

$$= 102.7 - 77.3 \quad = 25.4$$

$$X_{Cl} - X_{H} = 0.18\sqrt{\Delta}$$

$$X_{Cl} - 2.1 = 0.18\sqrt{25.4}$$

$$= 0.18 \times 5.04$$

$$= 0.9072$$

$$X_{Cl} = 2.1 + 0.9072$$

$$X_{Cl} = 3.0072.$$

MCQ.

Which of the following has highest ionisation potential?

ⓐ Na ⓑ Al ⓒ Mg ⓓ K

Which of following has longest size.

ⓐ K^+ ⓑ S^{-2} ⓒ Ca^{+2} ⓓ Cl^-

Pauling electronegativity scale is based on experimental value of

ⓐ Atomic radius ⓑ Bond length ⓒ Bond energy ⓓ Electron Affinity.

Which of following maximum electronegativity?

ⓐ C ⓑ O ⓒ N ⓓ B