FREE NOTES · NCERT + JEE/NEET LEVEL

Classification of Elements & Periodicity

Classification ka itihaas, Mendeleev ki table, modern periodic law, naye elements ka naamkaran, s, p, d, f blocks, aur atomic radius, ionisation enthalpy, electron gain enthalpy, electronegativity aur valence ke trends.

01 Shuruaati koshishein
02 Mendeleev ki periodic table
03 Modern periodic table
04 Z > 100 wale elements ka naam (IUPAC)
05 s, p, d, f blocks
06 Atomic & ionic radius
07 Ionisation enthalpy (IE)
08 Electron gain enthalpy, electronegativity, valence
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01 Shuruaati koshishein

- **Döbereiner's triads:** 3 milte-julte elements ke group; beech wale ka atomic mass ≈ baaki do ka average (Li, Na, K; Cl, Br, I).
- **Newlands' law of octaves:** (atomic mass ke order me) har 8va element pehle jaisa, sangeet ke sur ki tarah. Sirf Ca tak chala.
- **Lothar Meyer:** atomic volume vs atomic mass ka graph; periodicity dikhayi.

02 Mendeleev ki periodic table

Periodic law: elements ki properties unke **atomic masses** ka periodic function hain.

- Na mile elements ke liye **khaali jagah** chhodi aur unki properties pehle hi bata di: eka-aluminium (gallium), eka-silicon (germanium).
- Kuch atomic masses sudhaare; properties ke hisaab se Te (127.6) ko I (126.9) se pehle rakha.
- Kamiyan: hydrogen ki jagah, isotopes, ulte pairs (Ar/K, Co/Ni).

03 Modern periodic table

Moseley ne dikhaya X-rays ka $\sqrt{\nu} \propto$ atomic number. **Modern periodic law:** properties **atomic number** ka periodic function hain.

- 18 groups (khade), 7 periods (aade). Period number = sabse bahari shell ka principal quantum number.
- Har period me elements: 2, 8, 8, 18, 18, 32, 32.
- Lanthanoids aur actinoids neeche alag rakhe.

04 Z > 100 wale elements ka naam (IUPAC)

0	1	2	3	4	5	6	7	8	9
nil	un	bi	tri	quad	pent	hex	sept	oct	enn

Roots jodo aur "-ium" lagao. 120 = un-bi-nil-ium = **Unbinilium (Ubn)**; 114 = Ununquadium (Uuq, ab Flerovium).

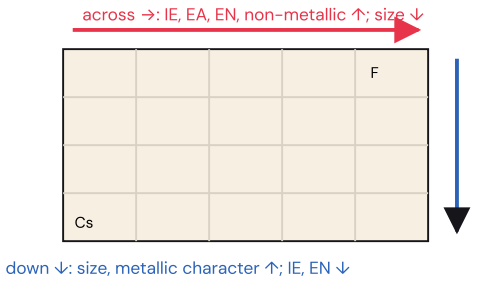
05 s, p, d, f blocks

Block	Groups	Outer configuration	Nature
s	1, 2	ns^{1-2}	Reactive metals, kam IE, ionic compounds (Li, Be chhod ke)
p	13–18	$ns^2\ np^{1-6}$	Metals, non-metals, metalloids; group 18 noble gases
d	3–12	$(n-1)d^{1-10}\ ns^{0-2}$	Transition metals: rangeen ions, variable valency, catalysts
f	Lanthanoids, actinoids	$(n-2)f^{1-14}\ (n-1)d^{0-1}\ ns^2$	Inner transition; actinoids radioactive

p-block element ka group = 10 + valence electrons (ns + np). Metalloids: B, Si, Ge, As, Sb, Te.

06 Atomic & ionic radius

- **Period me aage: ghatta** (nuclear charge badhta, shell same).
- **Group me neeche: badhta** (nayi shell judti).
- Covalent radius < metallic radius < van der Waals radius.
- **Cation** apne atom se **chhota**; **anion bada**.
- **Isoelectronic species:** zyada protons ⇒ chhota. $O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$.



Periodic table ke general trends

07 Ionisation enthalpy (IE)

Akele gaseous atom se sabse bahari electron nikalne ki energy: $X(g) \rightarrow X^+(g) + e^-$. Hamesha positive. $IE_1 < IE_2 < IE_3$.

- Period me badhti; group me neeche ghatti.
- Depend: nuclear charge, size, **shielding**, penetration (s > p > d > f) aur configuration ki stability.

PERIOD 2 AUR 3 KE DO ZAROORI EXCEPTIONS

Be > B (2s, 2p se zyada penetrate karta, aur $2s^2$ bhara hua) aur **N > O** (N ka half-filled $2p^3$ stable; O ke $2p^4$ me ek paired electron repel karta). Waise hi Mg > Al, P > S.

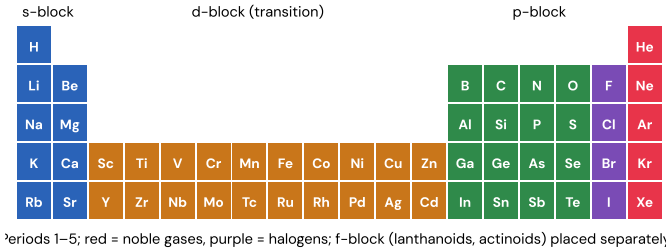
08 Electron gain enthalpy, electronegativity, valence

- **Electron gain enthalpy ($\Delta_{eg}H$):** atom ke electron lene pe energy change. Zyada tar negative; period me aur negative, group me neeche kam negative.
  Sabse negative Cl ka (F nahi: F bahut chhota, naya electron repel hota). Noble gases, Be, Mg, N ka positive ya zero ke paas. Doosra electron lena hamesha positive.
- **Electronegativity:** bond me juda atom shared electrons ko kitna kheenchta (unit nahi; Pauling scale). Period me badhti, group me ghatti. F (4.0) sabse zyada.
- **Metallic character** period me ghatta, group me badhta. Oxides: left = basic (Na_2O), beech = amphoteric (Al_2O_3), right = acidic (Cl_2O_7).
- s/p-block ki **valence** = valence electrons ya 8 - valence electrons.
- 2nd period ke elements (Li, Be, B ...) agle group ke period 3 element se **diagonal relationship** dikhate (Li–Mg, Be–Al, B–Si).

09 JEE Extra + Tricks

JEE LEVEL

- Diagonal relationship: Li–Mg, Be–Al, B–Si (milta-julta charge/size).
- Ionisation enthalpy ke apvaad: IE(N) > IE(O) (half-filled p^3), IE(Be) > IE(B) (bhara $2s^2$).
- Electron gain enthalpy: sabse negative Cl (F nahi, F chhota, electrons me repulsion). Noble gases aur N, Be: positive.
- Isoelectronic species: nuclear charge badhe to size ghate: $N^{3-} > O^{2-} > F^- > Na^+ > Mg^{2+} > Al^{3+}$.
- Inert pair effect aur lanthanoid contraction (Zr ≈ Hf size) JEE ke pasandida kaaran.
- JEE me p-block (Groups 13–18) bhi: pehle element ka anomalous behaviour, inert pair effect (Tl^+, Pb^{2+}, Bi^{3+} stable), period me oxides ki acidity.



Periodic table (pehle paanch periods) blocks ke saath

10 Solved questions

Q1. Size ke order me lagao: Mg^{2+}, O^{2-}, Na^+, F^-, N^{3-}.

Sab me 10 electrons: $N^{3-} > O^{2-} > F^- > Na^+ > Mg^{2+}$.

Q2. N ki IE O se zyada kyun?

N $2p^3$ (half-filled, extra stable); O $2p^4$ me paired electron aasani se nikalta.

Q3. Element 107 ka IUPAC naam aur symbol.

un-nil-sept-ium ⇒ **Unnilseptium, Uns** (official naam Bohrium).

Q4. [Ar] $3d^{10}$ $4s^2$ $4p^5$: block, period, group?

p-block, period 4, group 17 (bromine).

11 Mistakes & practice

- Kehna ki F ki electron gain enthalpy sabse negative (Cl ki hai).
- Kehna ki period me IE hamesha badhti (Be/B aur N/O exceptions).
- Electronegativity (bonded atom) aur electron gain enthalpy (akela atom) me confusion.

1. Kisne kaha properties atomic number pe depend?
2. Sabse electronegative element?
3. Kaun bada: Na ya Na^+?
4. Al_2O_3 ka nature?
5. Eka-silicon ab kya kehlata?

ANSWERS

1) Moseley · 2) Fluorine · 3) Na · 4) Amphoteric · 5) Germanium

12 Quick revision: exam se 5 minute pehle

ITIHAAS

- Döbereiner triads, Newlands octaves.
- Mendeleev: atomic mass, khaali jagah.
- Moseley: atomic number.

PERIOD ME AAGE

- Size ↓, IE ↑, EN ↑.
- Be > B, N > O (IE).
- Oxides: basic → acidic.

GROUP ME NEECHE

- Size ↑, IE ↓, EN ↓.
- Metallic character ↑.
- Cl ka $\Delta_{eg}H$ sabse negative.

IONS

- Cation < atom < anion.
- Isoelectronic: zyada Z, chhota.
- Naam: nil un bi tri quad pent hex sept oct enn.

Koi doubt? padhaiadda.netlify.app pe AI Doubt Solver se poocho, ya is chapter ka mock test do.