UDAAN

2025

Bharat Mata Ki Jai ♡

METALS AND NON-METALS

Introduction to Ionic Compound and Its Properties

CHEMISTRY | Lecture - 05

BY: SUNIL BHAIYA

Topics

to be covered

1. Introduction to Ionic/Electrovalent Bond ✓
2. Lewis Electron Dot/Cross Symbol of Ionic Compounds ✓
3. Properties of Ionic Compounds ✓


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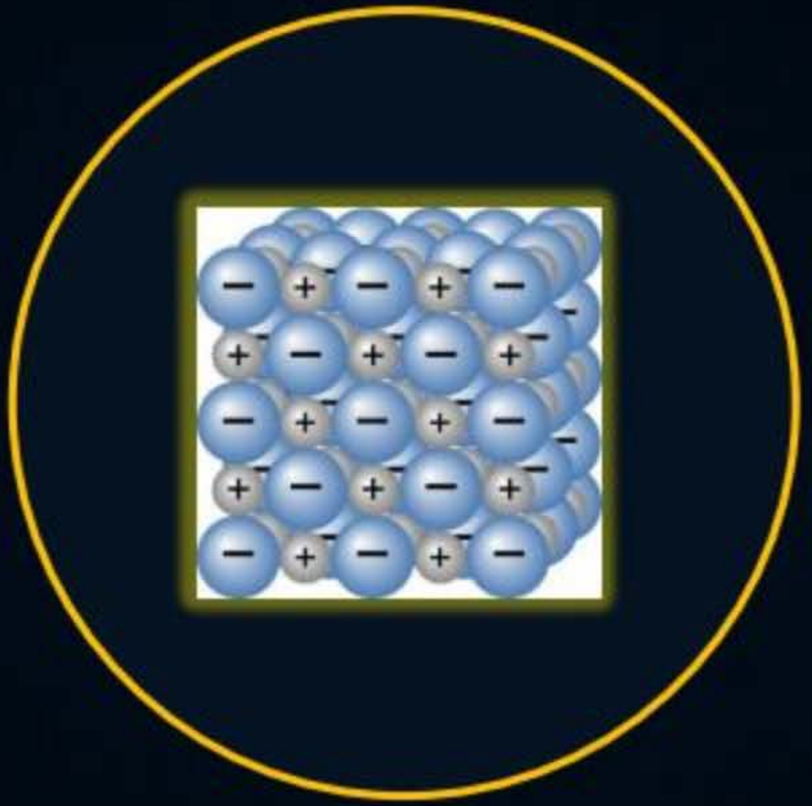
Knowledge Ride On

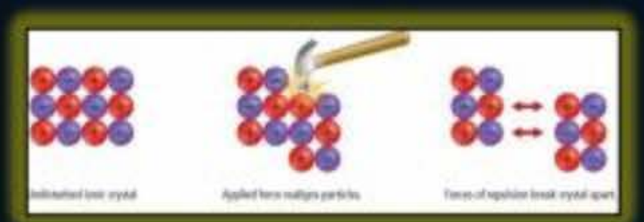


Introduction to Ionic/Electrovalent Bond

Knowledge Ride On

Lewis Electron Dot/Cross Symbol of Ionic Compounds

Knowledge Ride On



Properties of Ionic/Electrovalent Compounds

Knowledge Ride On

Insaniyat Ka Gyaan

RIDDLE WALLAH

Born in the ocean and white as snow. When I fall back to water I disappear without a trace. What am I?

Common Salt / Table Salt → (NaCl)

RIDDLE WALLAH

Born in the ocean and white as snow. When I fall back to water I disappear without a trace. What am I?

Udaanians be like

Advance Content → Separately Uploaded

↓

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Introduction to Ionic/Electrovalent Bond

Sunil Bhaiya Ki Relationship Ki Kahani

Introduction to Chemical Bond

सरल भाषा → 'LOVE'

(I) Kossel-Lewis → analysed electronic configuration of noble gases →

Inert gas	Atomic No.	Electronic configuration						No. of valence electrons
		K	L	M	N	O	P	
He	2	2						2
Ne	10	2	8					8
Ar	18	2	8	8				8
Kr	36	2	8	18	8			8
Xe	54	2	8	18	18	8		8
Rn	86	2	8	18	32	18	8	8

This is called *stable electronic configuration*.

(II) outermost shell → K → DUPLET

(III) outermost shell other than K → OCTET

(IV) Every element either *lose/gain/share electron(s)* to attain nearest noble gas configuration

(V)

- This is the cause of chemical combination.
- During this redistribution of electron(s), *a force of attraction develops between ions or within molecules* which is called *chemical bond*.

Relationship Story of Sunil Bhaiya – FUN WAY TO REMEMBER IONIC/ELECTROVALENT BOND

love to give gift(s)

love to accept gift(s)

ANALOGY

- Sunil Bhaiya : METAL
- Simaila : NON-METAL
- Gift : ELECTRON
- Love : IONIC BOND / Electrovalent Bond

love to give electron(s)

love to accept electron(s)

Metal → lose electron(s) → CATION (+vely charged ion)

Non-metal → gain electron(s) → ANION (-vely charged ion)

Electrostatic force of attraction → IONIC BOND / ELECTROVALENT BOND

Electrovalency and Formation of Ions

Element	Atomic or proton number	Number of electrons
Sodium (Na)	11	11

Element	Atomic or proton number	Number of electrons
Chlorine (Cl)	17	17

	K	L	M
Na	2	8	1

	K	L	M
Cl	2	8	7

gains this

1 electron lose

nearest noble gas :

Neon [2,8] (Ne)

Argon [2,8,8] (Ar)

K L
2 8

K L M
2 8 8

no. of e+ → 11
no. of e- → 10

+11 -10 → +1

no. of e+ → 17
-11 — e- → 18

-18 +17

Na^{1+} Cl^{1-}

-1

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Lewis Electron Dot/Cross Symbol of Ionic Compounds

→ We represent valence electrons of metal & non-metals using dot / cross to show formation of ionic / electrovalent

Electron Dot Structure of NaCl

no. of protons

Element	Atomic Number (Z)	Number of Electrons	Electronic Configuration (K, L, M)
Sodium (Na)	11	11	2, 8, 1 → will lose this 1 e⁻
Chlorine (Cl)	17	17	2, 8, 7 ← will gain this 1 e⁻

Lewis e⁻ dot / cross symbol

electrostatic force of attraction → IONIC BOND / ELECTROVALENT BOND

or NaCl

Ionic compound / electrovalent compound

Electron Dot Structure of $MgCl_2$

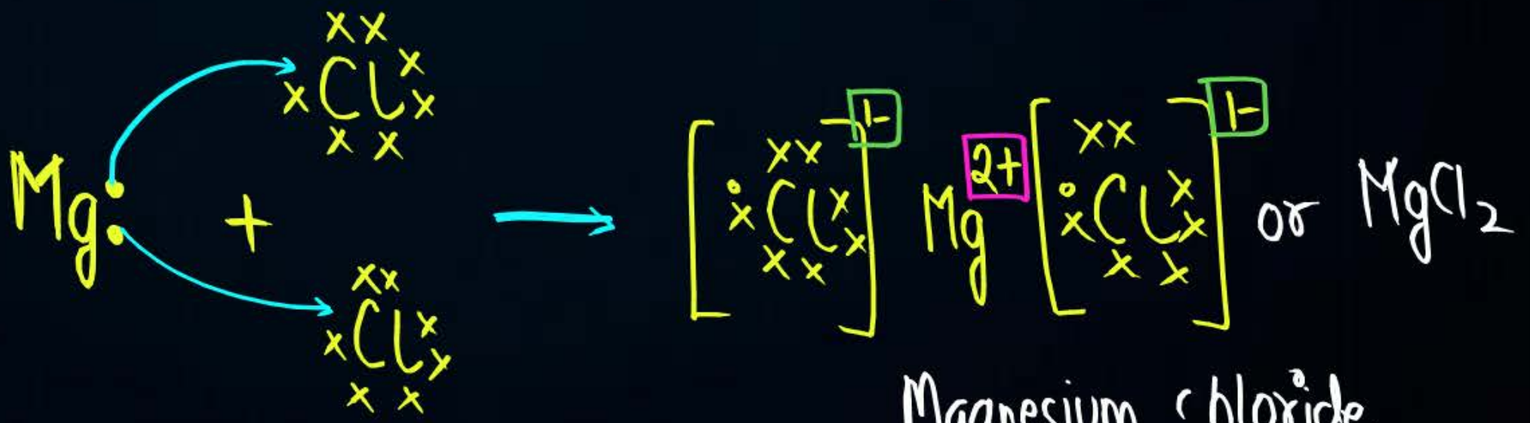
no. of ↓ protons

Element	Atomic Number (Z)	Number of Electrons	Electronic Configuration (K L M)
Magnesium (Mg)	12	12	2, 8, 2 → lose these electrons
Chlorine (Cl)	17	17	2, 8, 7 → 1 electron gain

6 electrons gain

nearest noble gas is Neon (Ne)
↓
It will lose 2 electrons.

Lewis e⁻ dot / cross symbol for $MgCl_2$



Magnesium chloride

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Properties of Ionic Compounds / Electrovalent Compounds

S.B.- Similar Couple

↓

Properties (गुण)

(I) **Physical nature**	Generally, brittle solids and breaks into pieces when pressure is applied.
(II) **Melting and boiling points**	High melting and boiling points as a sufficient amount of energy is required to break the strong electrovalent bonds. (ionic bonds)

(Simple Language)

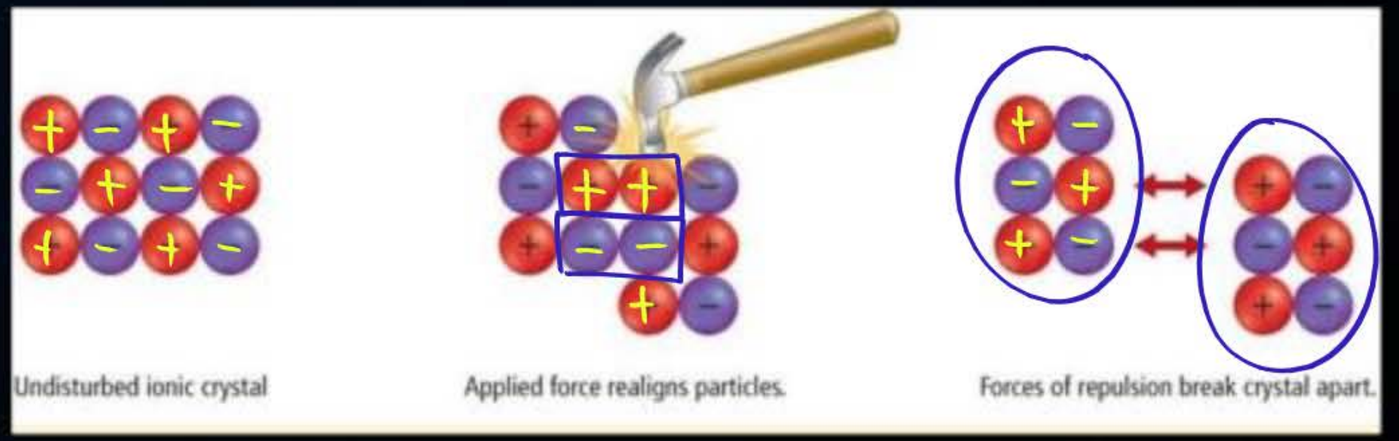
- Melting and boiling points
  - temp. at which solid → liquid
  - temp at which liquid → vapour (gas)

ionic bonds → strong electrostatic force of attraction btw. cations & anions.

SOLID

$Na^{1+}Cl^{1-}$ $Na^{1+}Cl^{1-}$ $Na^{1+}Cl^{1-}$ $\xrightarrow{800\,^{\circ}C}$ Na^{1+} Cl^{1-} Na^{1+} Cl^{1-} Na^{1+} Cl^{1-}

liquid form



Solubility (III)	Generally, Soluble in water and insoluble in solvents like kerosene, petrol and more.
Electrical conductivity (IV)	Conducts electricity in molten and aqueous form. It does not conduct electricity in solid form as the ions are immobile in the solid state.

exceptions are:
$BaSO_4$, $AgCl$, PbI_2, $CaCO_3$ etc.
↓
Precipitates

$NaCl(s) \xrightarrow{800\,^\circ C} NaCl(l)$
Molten / fused form

$NaCl(s) \xrightarrow{\text{dissolved in } H_2O} NaCl(aq)$
Aqueous form
Brine Soln

to move → Na^{1+} & Cl^{1-} ions are free

Na^{1+} → Cathode → gain of electron(s)

Cl^{1-} → Anode → loss of electron(s)

NCERT Activity Discussion

Activity 3.13

→ Take samples of sodium chloride, potassium iodide, barium chloride or any other salt from the science laboratory.

Q1 ▪ What is the physical state of these salts?

▪ Take a small amount of a sample on a metal spatula and heat directly on the flame (Fig. 3.7). Repeat with other samples.

Q2 ▪ What did you observe? Did the samples impart any colour to the flame? Do these compounds melt?

Q3 ▪ Try to dissolve the samples in water, petrol and kerosene. Are they soluble?

Q4 ▪ Make a circuit as shown in Fig. 3.8 and insert the electrodes into a solution of one salt. What did you observe? Test the other salt samples too in this manner.

Q5 ▪ What is your inference about the nature of these compounds? → IONIC COMPOUNDS

Q. DISCUSSION AND CONCLUSION

(i) What is the physical state of salt taken.

All the salts taken are found in solid state.

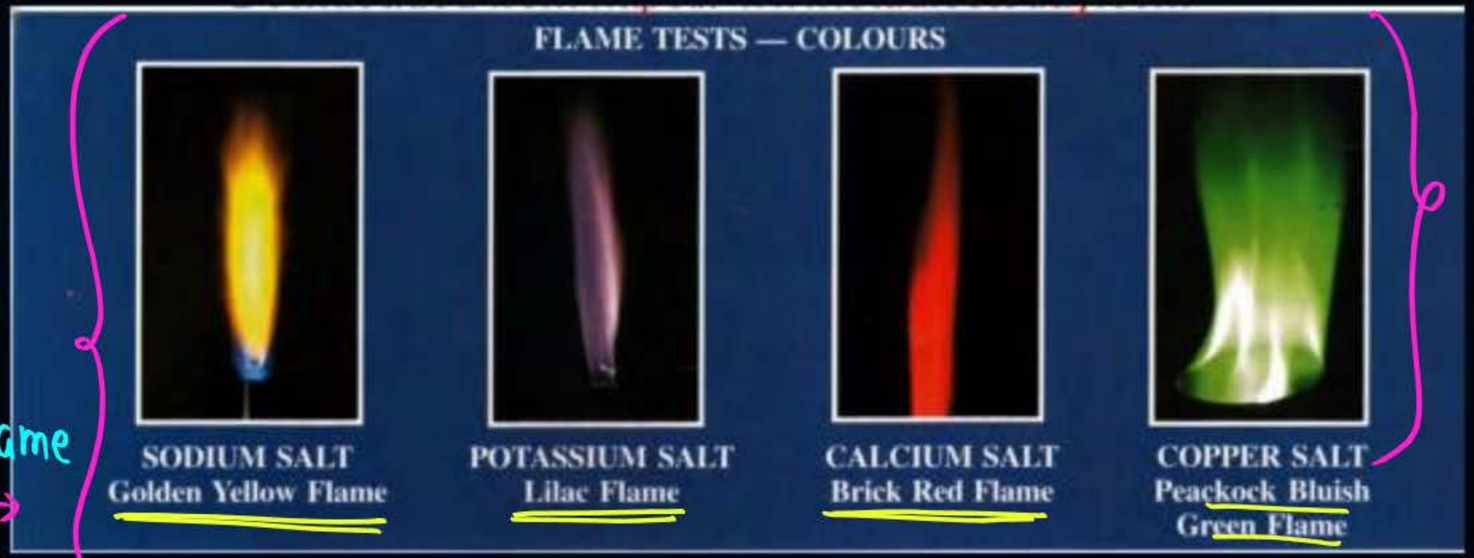
(ii) Did the samples impart any colour to the flame on heating?

Each salt impart a characteristic colour to the flame. (In syllabus)

Flame Test

↓

Clean Pt wire & put metal salt on it ↴ Place it in flame of burner. →



Q. DISCUSSION AND CONCLUSION

(iii) Did the compounds melt easily on heating?

Ionic compounds don't melt easily as they have high melting and boiling points due to strong electrostatic forces of attraction.

(iv) Are the compounds soluble in water?

~~Each salt impart a characteristic colour to the flame.~~

petrol & kerosene?

generally,
→ Soluble in H_2O
but insoluble in
kerosene & petrol

(v) Will an electric bulb glows on passing electric current through their salt solution?

The electric bulb will glow because ionic compounds are good conductors of electricity in molten/fused and aqueous state.

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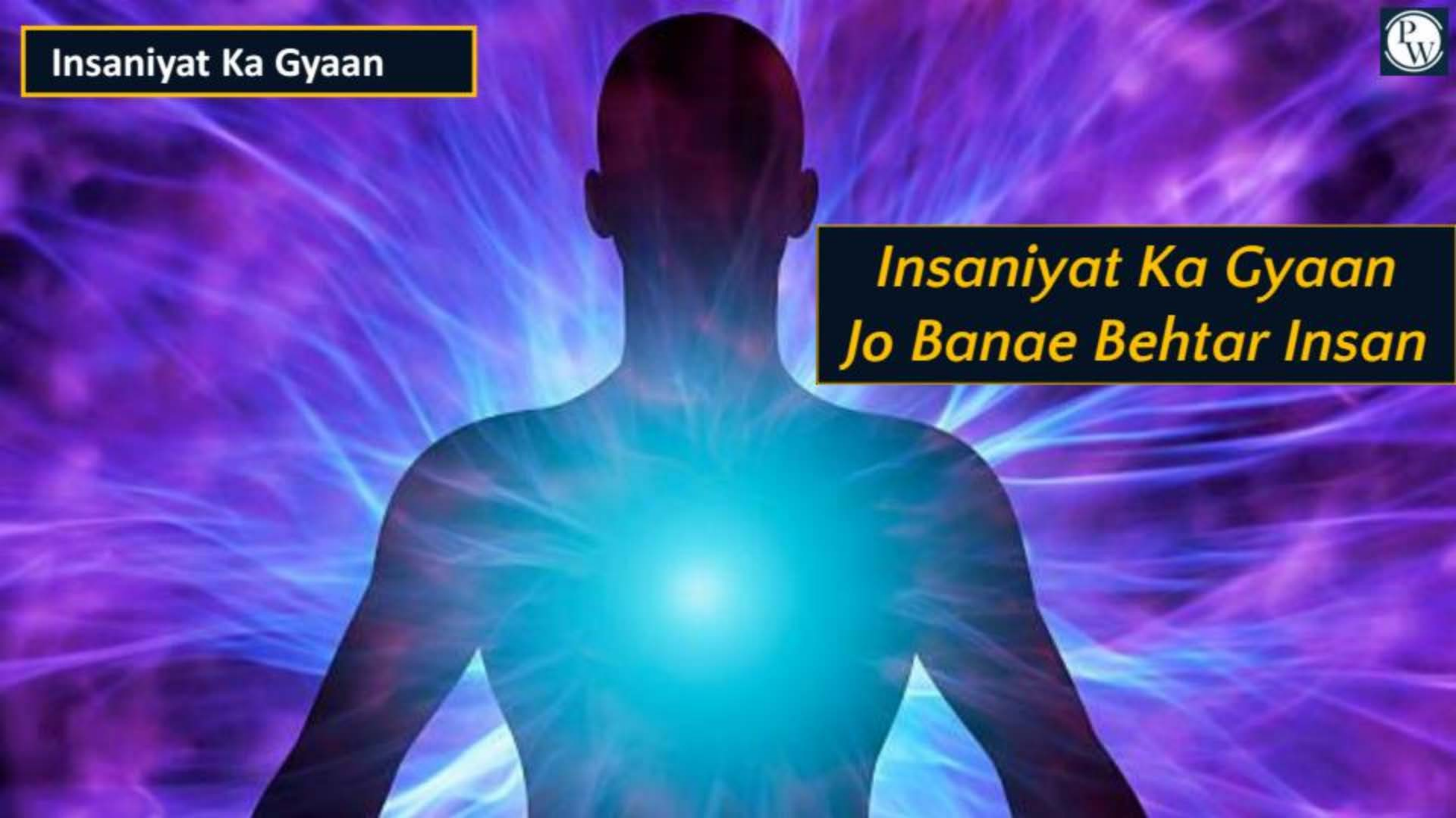
Concept Polish (गृहकार्य)

Electron Dot Structure of Na_2O

Element	Atomic Number (Z)	Number of Electrons	Electronic Configuration
Sodium	11	11	2, 8, 1
Oxygen	8	8	2, 6

Homework

Why Sodium / Potassium are stored in kerosene / mineral oil?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Jo Banae Behtar Insan


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THANK YOU