UDAAN

2025

Bharat Mata Ki Jai ♡

METALS AND NON-METALS

Occurrence and Extraction of Metals (Metallurgy) – Part I

CHEMISTRY | Lecture - 06

BY: SUNIL BHAIYA

Topics

to be covered

1. How Do Metals Occur in Nature?
2. Minerals and Ores


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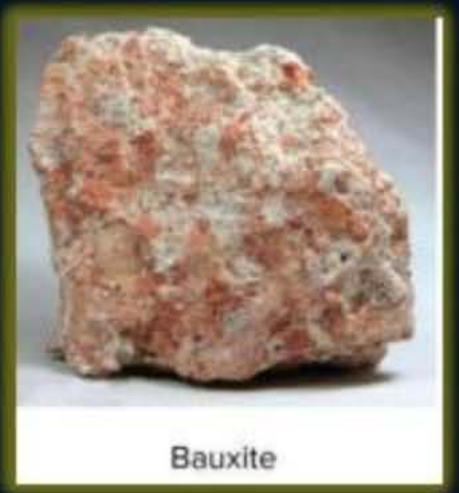
Knowledge Ride On

How Do Metals Occur in Nature?

Knowledge Ride On



Bauxite

Minerals and Ores

Knowledge Ride On

Insaniyat Ka Gyaan

RIDDLE WALLAH

Can you decode the below puzzle?

at

+

tom

⇒ ATOM

RIDDLE WALLAH

Can you decode the below puzzle?

Udaanians be like - - - - - - - →

Concept Polish (गृहकार्य) – Homework Discussion

Electron Dot Structure of Na_2O

no. of protons

Element	Atomic Number (Z)	Number of Electrons	Electronic Configuration (K L M)
Metal → Sodium (Na)	11	11	2, 8, 1 → lose this e^-
Oxygen (O)	8	8	2, 6 ← 2 electrons gain

Non-metal

$[Na]^{1+}\left[:\ddot{O}:\right]^{2-}[Na]^{1+}$ or $2[Na]^{1+}\left[:\ddot{O}:\right]^{2-}$

Na_2O

Give a Thought

Why sodium and potassium are stored in kerosene/mineral oil?

analogy

You : K & Na

Naughty dost : Oxygen or moisture

Parents : Kerosene / Mineral Oil

Give a Thought

Why sodium and potassium are stored in kerosene/mineral oil?

Sodium and potassium are 'highly reactive metals' and react with air (oxygen/moisture) and catches fire. To prevent the supply of air they are kept in kerosene/mineral oil.

'Imp. Baat'

'NCERT'

Lithium (Li) is also stored in kerosene / mineral oil.

'Out-of-box but true'

Density of Li < Density of kerosene or mineral oil

Lithium floats on surface of oil & still in contact with air & catches fire.

[Lithium is stored in paraffin wax]

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How Do Metals (धातु) Occur in Nature?

Give a Thought

(धातु)

The metals obtained from seawater are in:

A. Elemental form

B. Compound form ✓

Metals (minor source)

↓

Seawater

↓

metals are obtained from soluble salts (ionic compounds)

↓

NaCl, KCl, $CaCl_2$ etc.

Give a Thought

(Au) (Pt)

Metals like gold and platinum are always found in:

A. Elemental form

B. Compound form

Give a Thought

Metals like gold and platinum are always found in:
A. Elemental form
B. Compound form

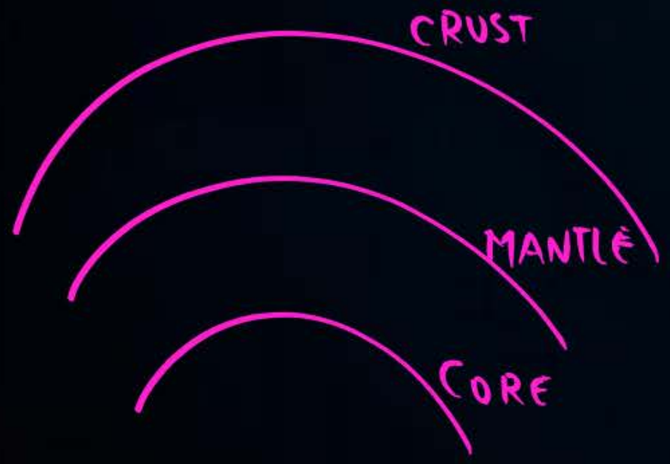
Conclusion

elemental form

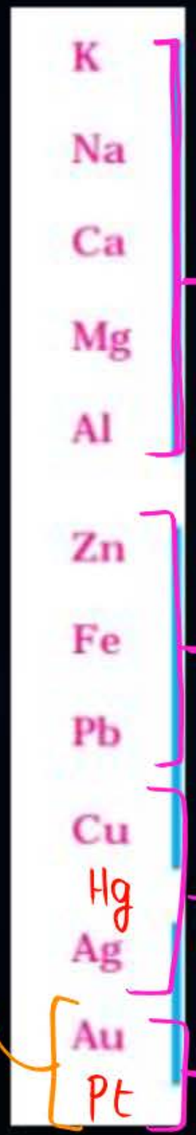
compound form

The major source of metals (*whether in the free state or the combined state*) is the Earth's crust. Some metals (Na, K etc.) which form soluble salts are also found to occur in the seawater in the form of their soluble salts.

(Minor source)



Conclusion



Metals of high reactivity → Exists In always Combined form

Metals of medium reactivity → —"— —"—

Metals of low —"— → Free as well as Combined form

Metals of least —"— → always free form

'Noble metals'

Important Facts to Remember

(Competitive Exams)

(i) Concentration of different gases in atmosphere: (sphere containing mixture of gases)

exists as N_2 — exists as O_2 — Ar — CO_2

Nitrogen (78.08%), Oxygen (20.95%), Argon (.93%), Carbon dioxide (.03%) and rest other gases (.01%).

(ii) Oxygen (non-metal) (अधातु) is the most abundant element in the earth's crust (Lithosphere). (LITHOSPHERE → Land)

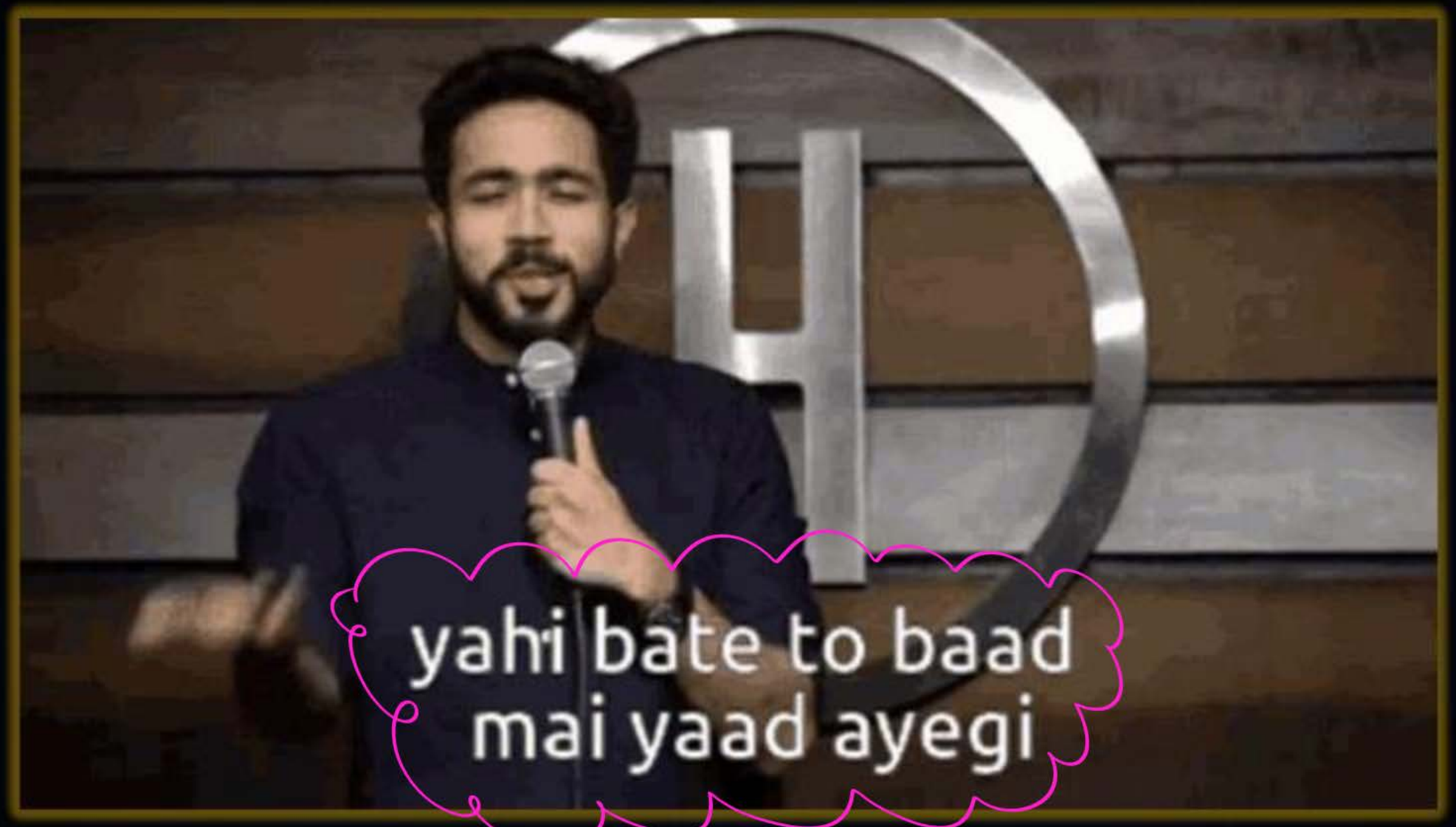
(iii) Silicon (metalloid) (उपधातु) is the second most abundant element in the earth's crust (Lithosphere).

(iv) Aluminium (metal) is the third most abundant element and most abundant metal in the earth's crust (Lithosphere).

Important Facts to Remember

(iv) Hydrogen (H) is the most abundant element followed by helium (He) and oxygen (O) in the universe.

(v) Astatine (At) is the rarest element in the earth's crust.


yahi bate to baad
mai yaad ayegi

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'Competitive Exam'

PYQs' Wallah

PW Ka Yodha!

NDA 2010 (I)

Which are the most abundant elements in universe?

A Oxygen and nitrogen

B Hydrogen and oxygen

C Hydrogen and helium

D Carbon and nitrogen

NDA 2010 (I)

Which among the following gases, present in the air near the surface of Earth has maximum concentrations?

A Oxygen (O_2)

B Hydrogen (H_2)

C Nitrogen (N_2)

D Methane (CH_4)

Minerals and Ores

Minerals and Ores

(i) Metals occur naturally in the form of elements or compounds in the earth's crust or seawater and are called minerals.

(Eg. free state, combined state)

major source, minor source

(ii) The earthly and rocky impurities that are associated with the mineral are called gangue or matrix.

Sand, limestone etc.

BACCHA LOGG BE LIKE

GANGU
GANGU

→ Dengue 'den gee'
'tung' ⟷ Tongue 'ton gee'
'gang' ⟷ Gangue 'gan gee'

put
but
cut

GANGUE BE LIKE

Minerals and Ores

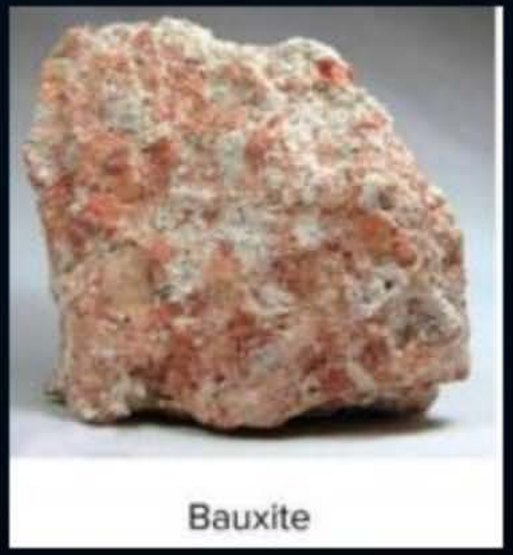
Let us consider two minerals:

(A) Clay (*contains Aluminium*)

(B) Bauxite (*contains Aluminium*)

From which mineral should I extract aluminium?

Clay



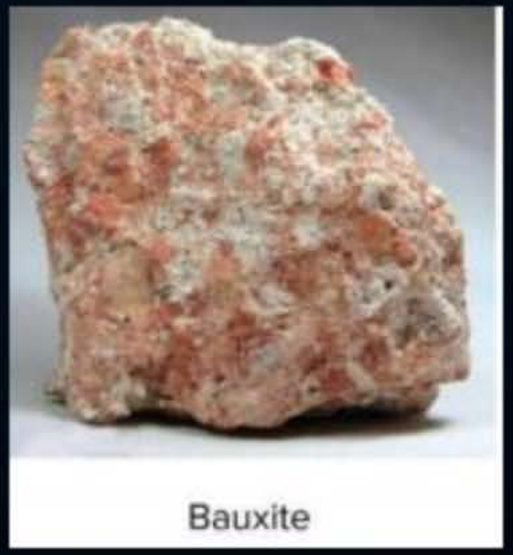
Bauxite

Minerals and Ores

Let us consider two minerals:

- Clay (*contains Aluminium)*
- Bauxite (*contains Aluminium) – Extraction is done from this only!*

Clay



Bauxite

Minerals and Ores

Metals are extracted from some minerals only because:

- process of extraction of metal from that mineral is not economical

we want as economical as possible!

- there are certain impurities that are difficult to remove. → Inconvenient ~~to remove~~ OR difficult to remove

Conclusion

	Mineral of Al	Ore of Al
Clay	✓	✗
Bauxite	✓	✓

Bauxite to Al: Teri ORE, Teri ORE, Teri ORE

The minerals from which metals can be extracted economically and conveniently are called ores.
Thus, all ores are minerals but all minerals are not ores.

Imp.

Note: It is interesting to note that the ores of most of the metals exist as oxides. This is because oxygen is a very reactive element and is abundantly ~~found~~ in the earth's crust.

most

Imp. for competitive & school exams

Metal	Name of the ore	Chemical formula of ore
(a) Sodium (Na)	Rock salt	NaCl
(b) Aluminium (Al)	Bauxite	$Al_2O_3.2H_2O$
(c) Zinc (Zn)	(i) Zinc blende (ii) Calamine	(i) ZnS (ii) $ZnCO_3$
(d) Iron (Fe)	(i) Haemetite (ii) Magnetite (iii) Iron pyrite (iv) Siderite	(i) Fe_2O_3 (ii) Fe_3O_4 (iii) FeS_2 (iv) $FeCO_3$
(e) Copper (Cu)	(i) Copper glance (ii) Cuprite (iii) Copper pyrite	(i) Cu_2S (ii) Cu_2O (iii) $CuFeS_2$
(f) Mercury (Hg)	Cinnabar	HgS
(g) Lead (Pb)	Galena	PbS

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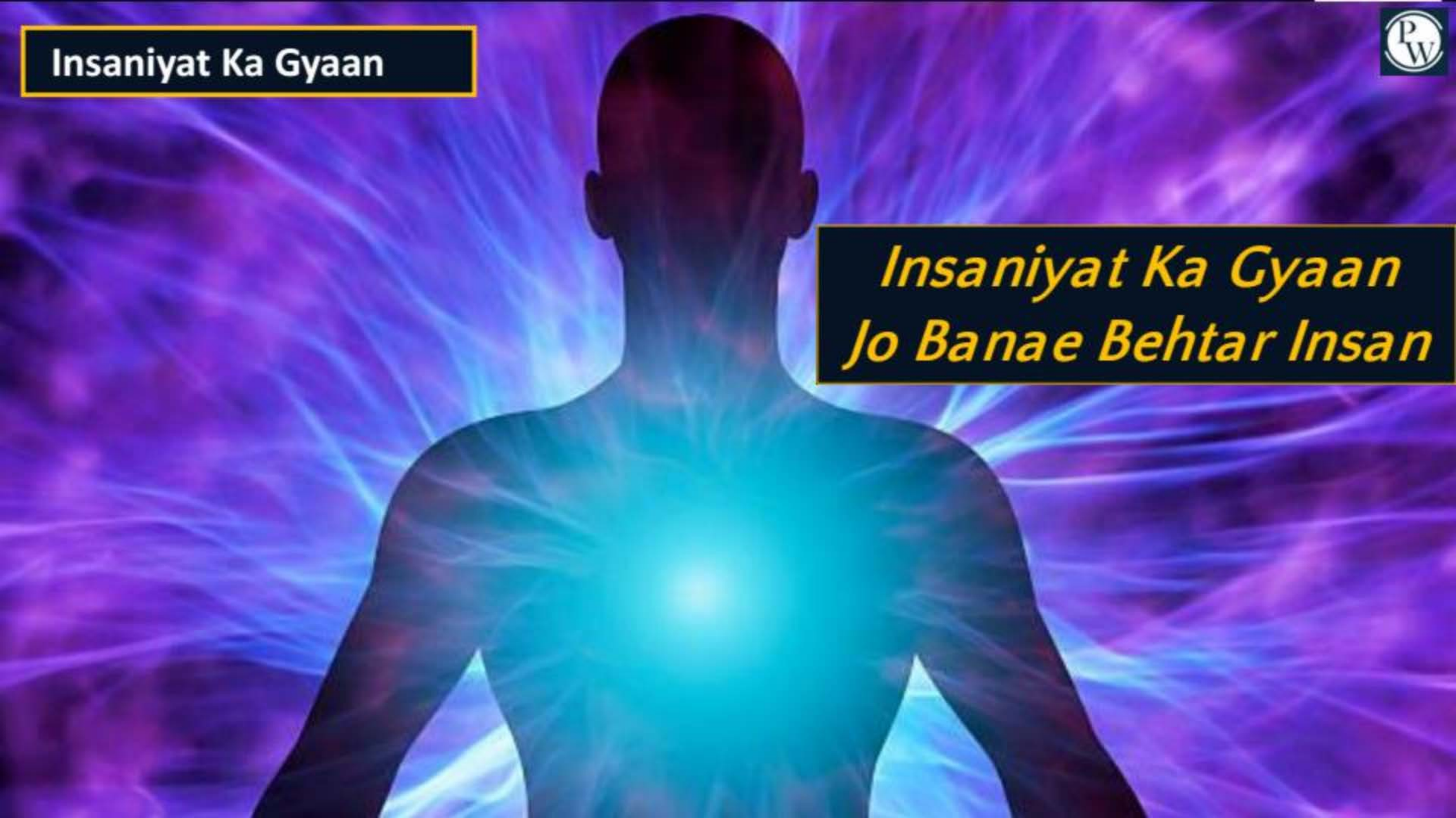
Concept Polish (गृहकार्य)

Beat Your Brains Out!

Can you draw a Venn diagram relationship btw. minerals & ores?

All ores are minerals but all minerals are not ores!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Jo Banae Behtar Insan


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#sbsathhai ✓

#pwsathhai ✓

THANK YOU