

UPDAAN



2025

Bharat Mata Ki Jai ♡

METALS AND NON-METALS

Physical Properties and Magical
Facts of Metals and Non-metals

CHEMISTRY

Lecture - 01

BY: SUNIL BHAIIYA



Topics

to be covered

- 1 Introduction to Types of Elements
- 2 Physical Properties of Metals and Non-metals





SUNIL BHAIYA

JOIN MY OFFICIAL TELEGRAM CHANNEL





Knowledge Ride On



Physical Properties of Metals and Non-metals

Knowledge Ride On



Insaniyat Ka Gyaan ✓

RIDDLE WALLAH



My mother is a chemist~~y~~ while my father is a mathematician. They gave me a name Iron59. Can you decode this?

↓
↓
'FeLIX'



My mother is a chemistry while my father is a mathematician. They gave me a name Iron59. Can you decode this?

Bacche Be Like



Introduction to Types of Elements

(प्रकार)
(तत्त्व)



Types of Elements

① Metals (एतद्)

Non-metals

Metalloids

Noble Gases

(i) Some common metals are:
Lithium (Li), Sodium (Na), Potassium (K), Magnesium (Mg), Calcium (Ca), Aluminium (Al), Copper (Cu), Zinc (Zn), Silver (Ag), Gold (Au) etc.

(ii) Mercury (Hg) → only metal found in liquid state at room temp. (25°C)



Types of Elements

Metals

(ii) **Non-metals** ✓ (अधातु)

Metalloids

Noble Gases

Non-metals are:

Carbon (C), Phosphorus (P), Sulphur (S), Selenium (Se), Iodine (I),
Hydrogen (H), Nitrogen (N), Oxygen (O), Fluorine (F), Chlorine (Cl),
Bromine (Br)

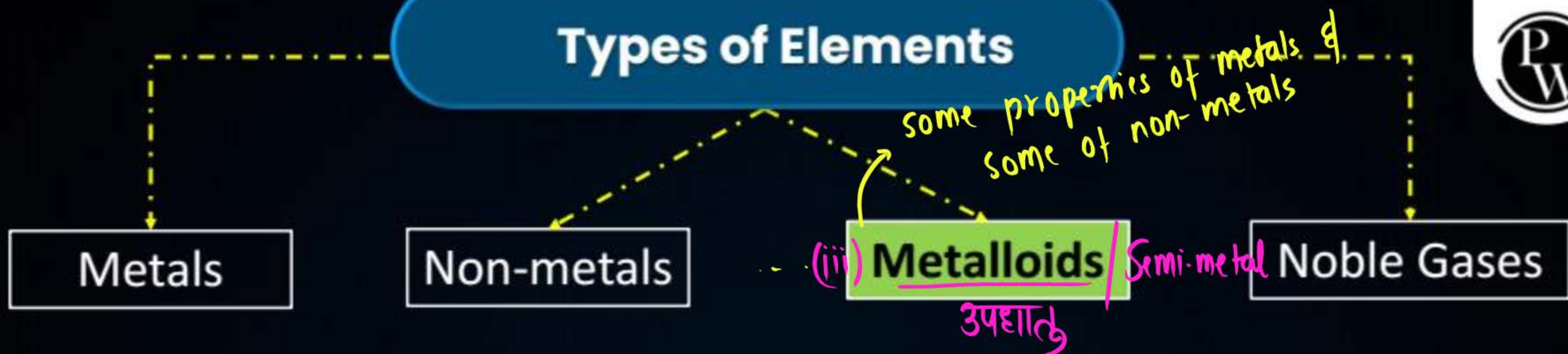
only non-metal found in
liquid state at room temp. (25°C)

gaseous state at room temp. (25°C)

solid state at room temp. (25°C)



Types of Elements



Common recognised metalloids are:

Boron (B), Silicon (Si), Germanium (Ge), Antimony (Sb), Arsenic (As),
Tellurium (Te)

Antimony (Sb) Silicon (Si)

B A A G Sunil aur Teena

Boron (B) Arsenic (As) Germanium (Ge) Tellurium (Te)

Types of Elements



completely unreactive

Till 1900s'

(a) Inert Gases/

(iv) Noble Gases (b)

1960s' - Compounds of (Xe) & (Kr)

Noble gases are:

Helium (He), Neon (Ne), Argon (Ar), Krypton (Kr), Xenon (Xe) and Radon (Rn)

Heena
↓
Helium

Neena
↓
Neon

Ar
↓
Argon

Kareena Ka
↓
Krypton

X-Ray
↓
Xenon

Rangun
↓
Radon (Rn)

little reactivity

(c) Also, called rare gases → low concentration in atmosphere because of

KYA BOLTI PUBLIC



भौतिक गुण

Physical Properties of Metals and Non-metals

(धातु) (अधातु)

Hasmukhlal
↓
BIODATA

Simaila
↓
BIODATA

Metal
↓
Biodata

Non-metal
↓
Biodata

(Physical Properties)



Yes or No



Are ^(Hg)mercury and ^(Br)bromine found in liquid state at room temperature (25 °C)?

- ✓ A. Yes
- B. No



Physical Properties of Metals and Non-metals

The resistance offered by a substance against cutting or scratching.

(डाक्टरोच)

(पदार्थ)

(काटना)

(घिसना)

Property	Metals	Non-metals
(i) <u>Hardness</u> (कठोरता)	<u>Generally, hard</u> Exception: <u>Lithium, Sodium</u> <u>Mercury (Hg)</u> and <u>Potassium</u>	<u>Generally, soft</u> Exception: <u>Diamond</u>
(ii) <u>Lustre</u> (धातुिक चमक)	<u>Lustrous</u>	<u>Generally, non-lustrous</u> Exception: <u>Iodine and Graphite</u>

only defined for solids substances
(ठोस पदार्थ)

most of the cases

soft metals

form of C
(non-metal)
(hardest naturally occurring substance)

(easily cut with a knife)

or dull

(form of C)

The ability of metals to reflect light due to which they have a shiny surface.

(धातु)



Example of Hard & Lustrous Objects

Hammer,
bridges, bullets etc.

← metal

Diamond

Ring,

Diamond cutter etc.

← non-metals



metals:

jewellery

[made of gold,
platinum, silver]

non-metals: Core of pencil
(made of graphite)



Physical Properties of Metals and Non-metals

(इतर)
The ability of metals to be converted into thin sheets on application of compressive forces.



Compressive Force (दबाव)

(THIN SHEET)

Property	Metals	Non-metals
(iii) <u>Malleability</u>	<u>Generally, malleable</u> Exception: <u>Mercury</u> (Hg)	<u>Non-malleable</u>
(iv) <u>Ductility</u>	<u>Generally, ductile</u> Exception: <u>Mercury</u> (Hg)	<u>Generally, non-ductile</u> Exception: <u>Carbon fibre</u>

breaks into pieces when force is applied

brittle at room temp. (25°C)

Zinc (Zn)

Zinc (Zn)

(Hg)



Tensile force (खिंचाव)

(THIN WIRE)

The ability of metals to be converted into thin wires on application of tensile forces. (खिंचाव)



Physical Properties of Metals and Non-metals



Example of Malleable and Ductile Objects



VARAK of gold/silver foil



aluminium foil



Aluminium wire



Copper wires



Physical Properties of Metals and Non-metals



Produce deep ringing sound when struck hard

Property	Metals	Non-metals
④ <u>Sonority</u>	<u>Sonorous</u> <small>ex: School bell</small>	<u>Non-sonorous</u>
⑤ <u>Electrical conductivity</u>	<u>Good electrical conductors</u>	<u>Generally, poor electrical conductors</u> Exception: Graphite

They have free delocalised electrons
↓
Responsible for electric current

(form of C)

KYA BOLTI PUBLIC





Give a Thought



Heat conduction in any substance takes place only because of free electrons. Is it true or false?!

A. TRUE

☒ B. FALSE

Solids → Conduction of heat → Vibration of atoms

↓
PHONONS

↓
PHONONIC HEAT TRANSFER



Physical Properties of Metals and Non-metals



Property	Metals	Non-metals
(vii) Thermal conductivity Heat Conduction	Generally good thermal ^{heat} <u>conductors</u> Exception: Lead (Pb) & Mercury (Hg)	Generally, poor thermal ^{heat} <u>conductors</u> Exception: <u>Diamond</u>
(viii) <u>Melting point</u> / Fusion point	<u>High melting point</u> Exception: <u>Gallium</u> and <u>Caesium</u> , <u>mercury</u>	<u>Generally, low melting point</u> Exception: <u>Diamond</u> , <u>Graphite etc</u>

(Temp. at which solid converts to liquid)

Metal	R.T. (25°C)
① Mercury (Hg)	Liquid
② Gallium (Ga)	Solid
③ Caesium (Cs)	Solid

Melting point

↓
-38°C

29.7°C

28.4°C

melts on human palm



(Best conductor of heat)



FUN FACT



(Au)

- ✓ Gold is the most malleable metal.
 - ✓ Platinum is the most ductile metal. (Gold according to NCERT)
 - ✓ Diamond is the best conductor of heat.
 - ✓ Silver is the best conductor of heat in case of metals followed by copper.
- form of ✓ Order of electricity conduction in case of metals will be:
- Silver > Copper > Gold > Aluminium

KYA BOLTI PUBLIC





Let's Practice



PW Ka **ChemStar!**

Question

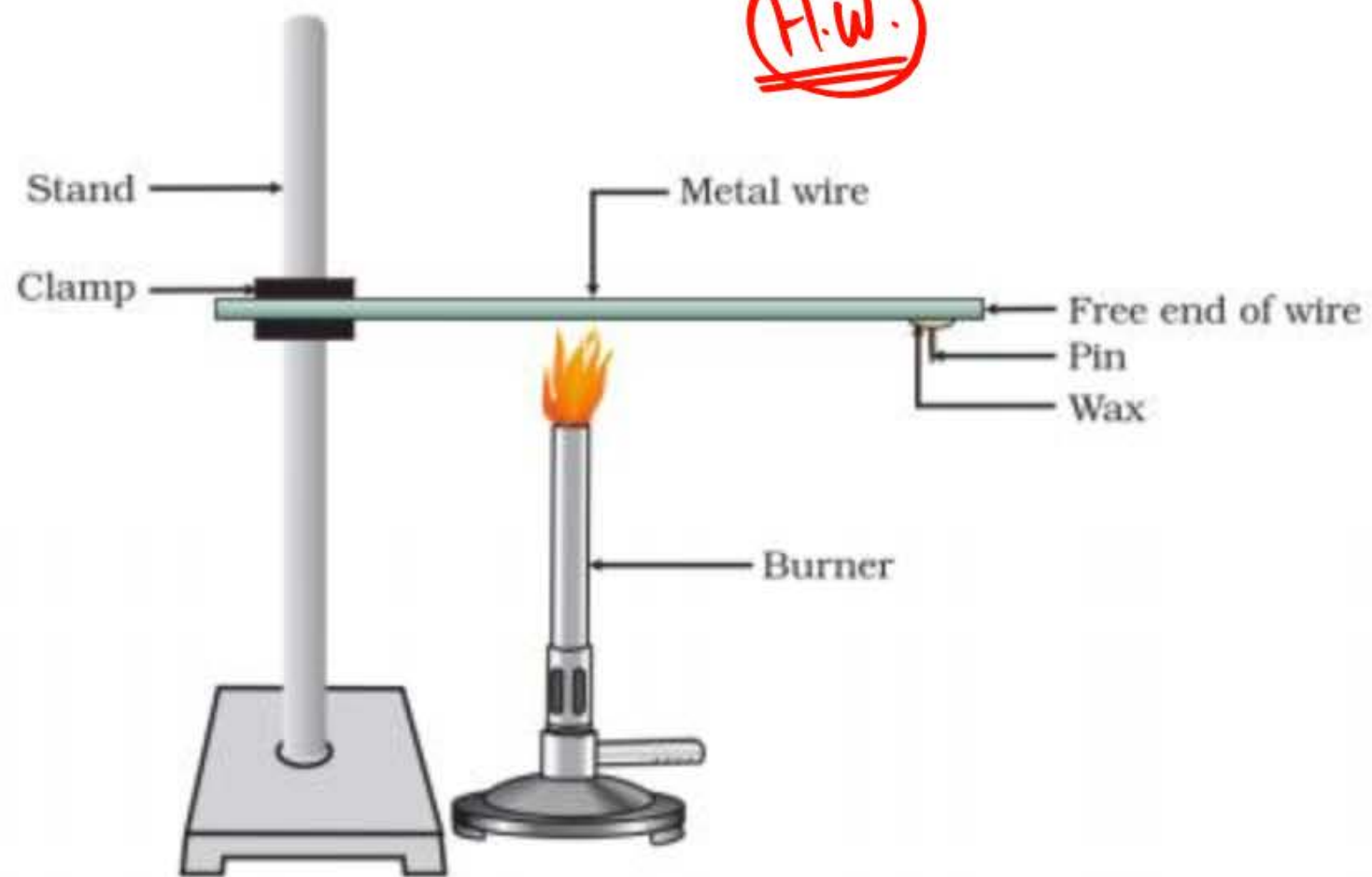
Which among the following set of physical properties of a non-metal is incorrect?

- A** Graphite: Greyish black in colour, Lustrous
- B** Phosphorus: Solid at room temperature, Lustrous
- C** Diamond: Hard, Good conductor of heat
(Best)
- D** Iodine: Solid at room temperature, Lustrous

Concept Polish (गृहकार्य)



NCERT Activity Discussion



Activity 3.5

- Take an aluminium or copper wire. Clamp this wire on a stand, as shown in Fig. 3.1.
- Fix a pin to the free end of the wire using wax.
- Heat the wire with a spirit lamp, candle or a burner near the place where it is clamped.
- What do you observe after some time?
- Note your observations. Does the metal wire melt?



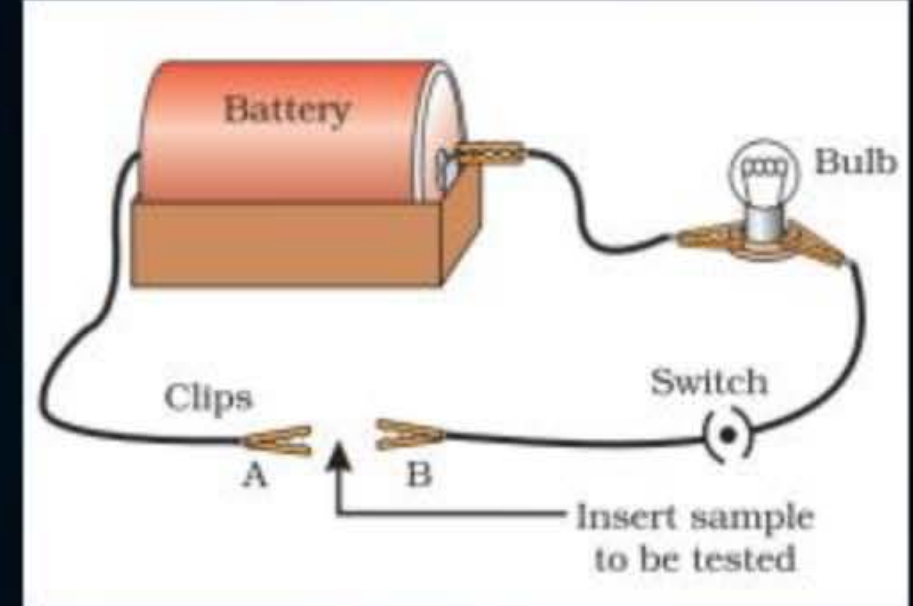
NCERT Activity Discussion



Activity 3.6

H.W.

- Set up an electric circuit as shown in Fig. 3.2.
- Place the metal to be tested in the circuit between terminals A and B as shown.
- Does the bulb glow? What does this indicate?



Insaniyat Ka Gyaan

***Insaniyat Ka Gyaan
Jo Banae Behtar Insan***





I love you

I love you

I love you

I love you

I love you

I hate you **

I love you

I love you

$$8 \times 1 = 8 \checkmark$$

$$8 \times 2 = 16 \checkmark$$

$$8 \times 3 = 24 \checkmark$$

$$8 \times 4 = 32 \checkmark$$

$$8 \times 5 = 40 \checkmark$$

$$8 \times 6 = 48 \checkmark$$

$$\boxed{8 \times 7 = 55} \checkmark$$

$$8 \times 8 = 64 \checkmark$$

$$8 \times 9 = 72 \checkmark$$

$$8 \times 10 = 80 \checkmark$$



SUNIL BHAIYA

JOIN MY OFFICIAL TELEGRAM CHANNEL



SUNIL BHAIYA IS ALWAYS THERE FOR YOU.

#sbsathhai (✓)

#pwsathhai (✓)



**THANK
YOU**

