# UDAAN

## 2025

Bharat Mata Ki Jai ♡

# METALS AND NON-METALS

## How Reactivity Series Was Built? – Part I (WITH LIVE EXPERIMENTS)

CHEMISTRY | Lecture - 02

BY: SUNIL BHAIYA

# Topics

*to be covered*

1. Conditions for Considering a Metal More Reactive
2. Reaction of Metals with Oxygen


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Knowledge Ride On

# Conditions for Considering a Metal More Reactive

# Knowledge Ride On

Reaction of Metals with Oxygen

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Insaniyat Ka Gyaan

# RIDDLE WALLAH

**Hasmukhlal:** Simaila tujhe pyaar se tre gharwaale kya bulate hai?
**Simaila:** Woh bolte hai _____(word formed by chemical symbols of nitrogen, oxygen nitrogen and iodine) aaja beta.
**Hasmukhlal:** Arre vah aur mre gharwaale mjhe pyaar se _____(word formed by chemical symbols of nitrogen, oxygen nitrogen and uranium) bulate hai.
**Baccho btao dono ka naam kya hua?**

'NONI'

'NONU'

# RIDDLE WALLAH

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**Baccho btao dono ka naam kya hua?**

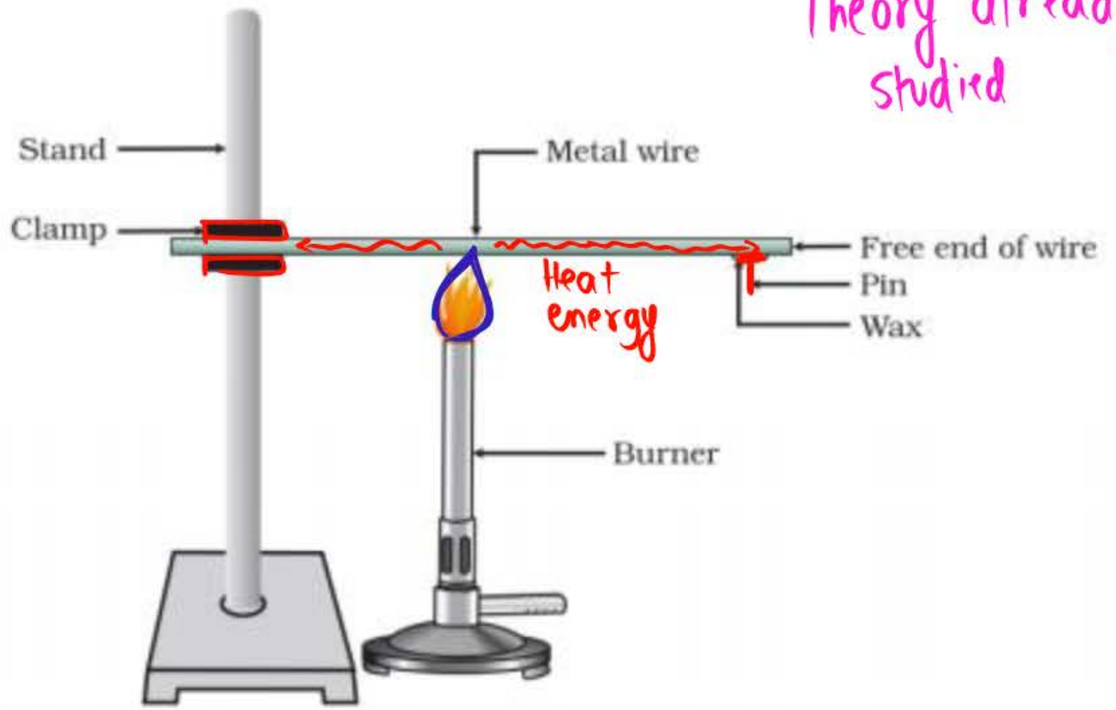
*Sundar Balak/Sundar Kanya Be Like*

# Concept Polish (गृहकार्य)

Homework Discussion

# NCERT Activity Discussion

Theory already studied




application of theory

## 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? I
- Note your observations. Does the metal wire melt? II

# Q. DISCUSSION AND CONCLUSION

**(i) What do you observe after sometime and does metal wire melt?**

(i) We observe that on heating the wire near the clamp, after some time the pin falls down. This shows that the heat flows through the wire and melts the wax. Further, the wire does not melt even after heating for a long time. This shows that metals have high melting points.

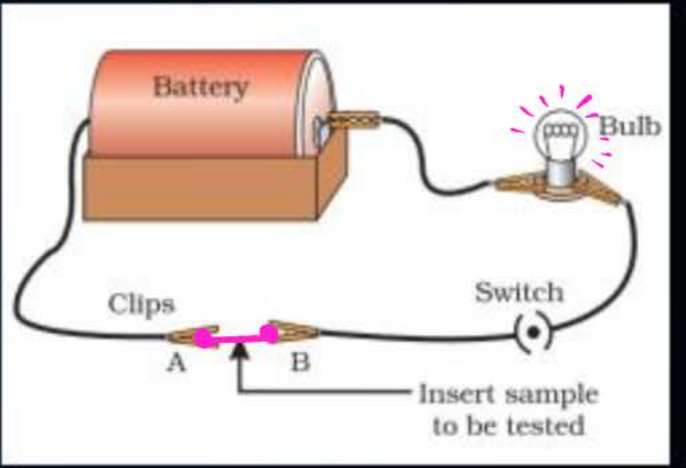
I

II

# NCERT Activity Discussion

## Activity 3.6

- 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?



# Q. DISCUSSION AND CONCLUSION

**(i) Will the bulb glow? What does this indicate?**

(i) The bulb glows. This shows that electric current flows through the metal. → Metals are good conductors of electricity.

**(ii) Why are electric wires coated with PVC?**

(i) PVC or any other rubber like material is used because they are poor conductors of electricity.

Polyvinyl chloride (PVC) → coating of wire [insulator] → metal wire [good conductor of electricity]

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# Let's Practice

PW Ka ChemStar!

**Question** (NCERT Exemplar)

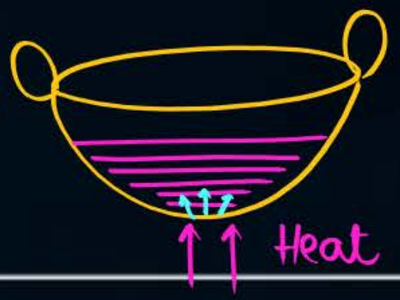
Aluminium is used for making cooking utensils. Which of the following properties of aluminium are responsible for the same?

(i) Good thermal conductivity [Good Heat Conduction]

(ii) Good electrical conductivity

(iii) Ductility → NOT REQUIRED HERE

(iv) High melting point




A i and ii

B i and iii

C ii and iii

D i and iv

## Give a Thought

Reactivity series/activity series of metals is man-made or natural.

A. Natural

B. Man-made

This order is present naturally but it was DECODED by humans & all metals were placed in accordance from high to low reactivity.

# Give a Thought

Reactivity series/activity series of metals is man-made or natural.

A. Natural

B. Man-made

Humans performed chemical rxn & placed metals in order from high to low reactivity on basis of:

(i) Reaction with oxygen → (ii) Reaction with water → (iii) Reaction with dilute acids → (iv) Reaction with salt solutions of other metals

# Conditions For Considering a Metal More Reactive

# True or False

(I) The metal which is more reactive than another metal lose electron(s) easily.

A. True

B. False

A is more reactive metal than B

↓

A loses electron(s) more easily than B

# True or False

II The metal which reacts at a lower temperature than the one which doesn't react/react slowly is more reactive. Is this true or false?

A. True

B. False

# True or False

The metal which reacts at a lower temperature than the one which doesn't react/react slowly is more reactive. Is this true or false?

A. True

B. False

Suppose metal A reacts at lower temperature than metal B, it means A is a more reactive metal than B.

# True or False

III The metal which reacts more vigorously (faster) and generates large amount of heat and light energy than another metal when reacting with a same substance at same condition is more reactive.

A. True

B. False

# True or False

The metal which reacts more vigorously and generates large amount of heat and light energy than another metal when reacting with a same substance at same condition is more reactive.

A. True

B. False

At same conditions, two metals A and B react with the same substance C as:

Metal A + Substance C → Product(s) + heat + light

Metal B + Substance C → Product(s) + heat + light

*The speed of reaction and amount of energy released in case A > B. It means A is more reactive metal than B.*

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# Reaction of Metals with Oxygen

# Reaction of Metals with Oxygen (20.95% in air)

Almost all metals combine with oxygen to form metal oxides.

Metal + Oxygen (from air) → Metal oxide

On Heating → $2Cu(s) + O_2(g) \rightarrow 2CuO(s)$

(25°C)

**Room temp. or low heating**

| Metal | Product formed | Colour of product | Colour of flame |
|---|---|---|---|
| Potassium → | $K_2O$ → | Yellow | Lilac / Pale purple |
| Sodium → | $Na_2O$ → | White | Orange / Golden yellow |
| Calcium → | CaO | -"- | |
| Magnesium → | MgO | -"- | |
| Aluminium → | $Al_2O_3$ | -"- | |
| Zinc → | ZnO | -"- | |
| Iron → | $Fe_3O_4$ ($FeO.Fe_2O_3$) | Black | |
| Lead → | PbO | Yellow | |
| Copper → (low heating) | CuO ✓ | Black | |
| Silver, Gold And Platinum | NO REACTION | | |

I — Highly reactive

II — After K & Na

III — Least reactive

NO LIGHT ENERGY (Flame) is generated

## Remember

Metals like Ca, Mg, Al, Zn, Fe, Pb forms a protective layer of metal oxide on them when reacts with $O_2$ (present in air) at room temp.

**Strongly heating in presence of oxygen**

HIGHLY VIGOROUS (very fast)

Vigorous (fast rxn)

(moderate speed of rxn)

| Metal | Product formed | Colour of product | Colour of flame |
|---|---|---|---|
| Potassium | $K_2O$ | Yellow | Lilac / Pale purple |
| Sodium | $Na_2O$ | White | Orange / Golden yellow |
| Calcium | CaO | —"— | red at top ← White flame |
| Magnesium | MgO | —"— | White dazzling flame |
| Aluminium | $Al_2O_3$ | —"— | —"— |
| Zinc | ZnO | —"— | Light Blue |
| Iron (Fe) | $Fe_3O_4$ ($FeO.Fe_2O_3$) | Black | 'Sparkles' (No flame) |
| Lead | PbO | Yellow | No flame |
| Copper | CuO | Black | |
| Silver, Gold And Platinum | NO REACTION | | |

# CONCLUSION

(i) Potassium and sodium are most reactive but which is more reactive between both of them.

(ii) Silver, Gold and Platinum are least reactive but which is more reactive amongst all of them.

Zn, Fe, Pb, Cu,

less reactive than K & Na but more reactive than , Ag, Au & Pt

(iii) Calcium, Aluminium and Magnesium are reactive metals but which is more reactive amongst all of them.

& more reactive than Ag, Au & Pt

(iv) Zinc, Iron, Lead and Copper are less reactive than K, Na, Ca, Mg and Al. Zinc and iron are more reactive than lead and copper but which is more reactive between lead and copper.

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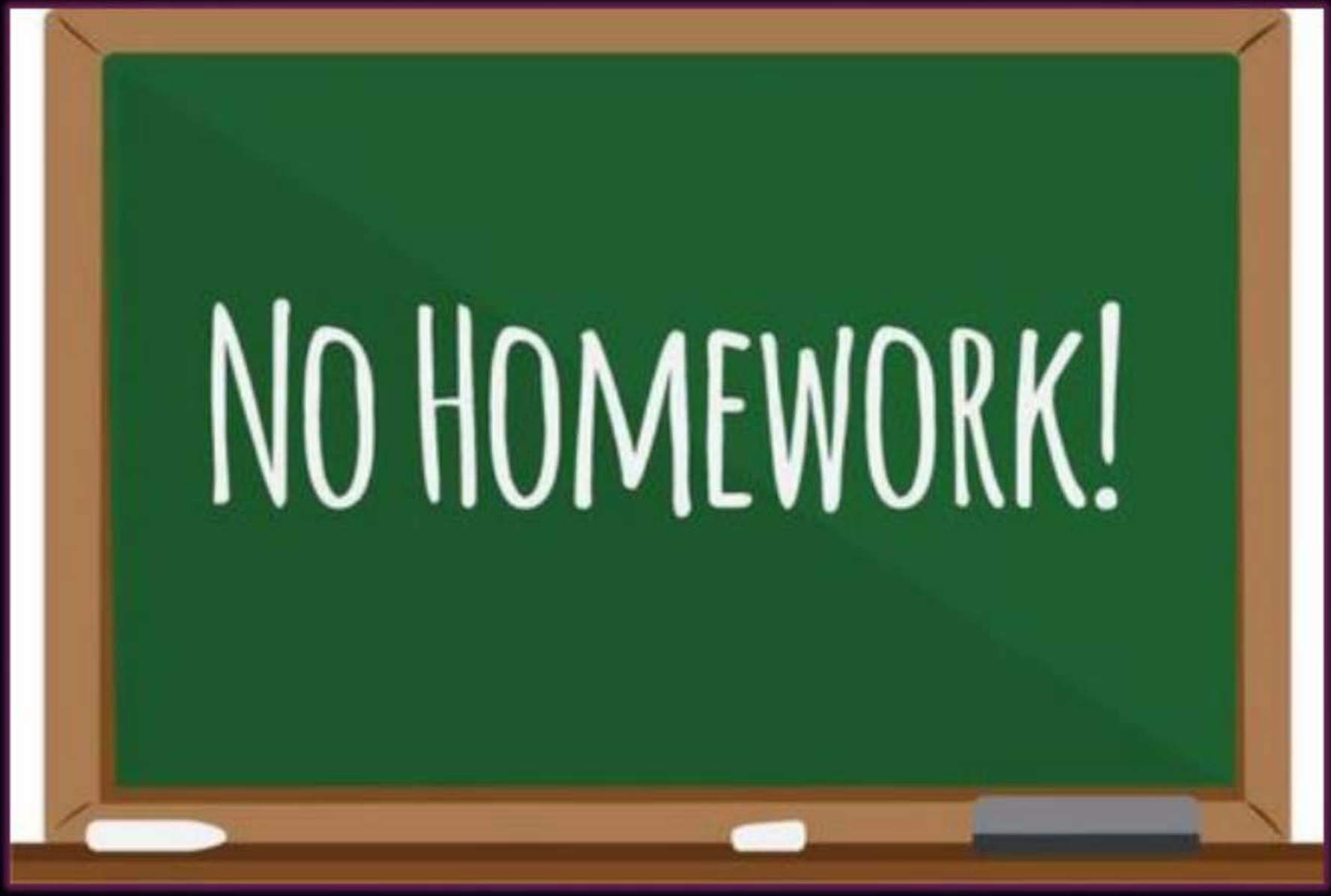
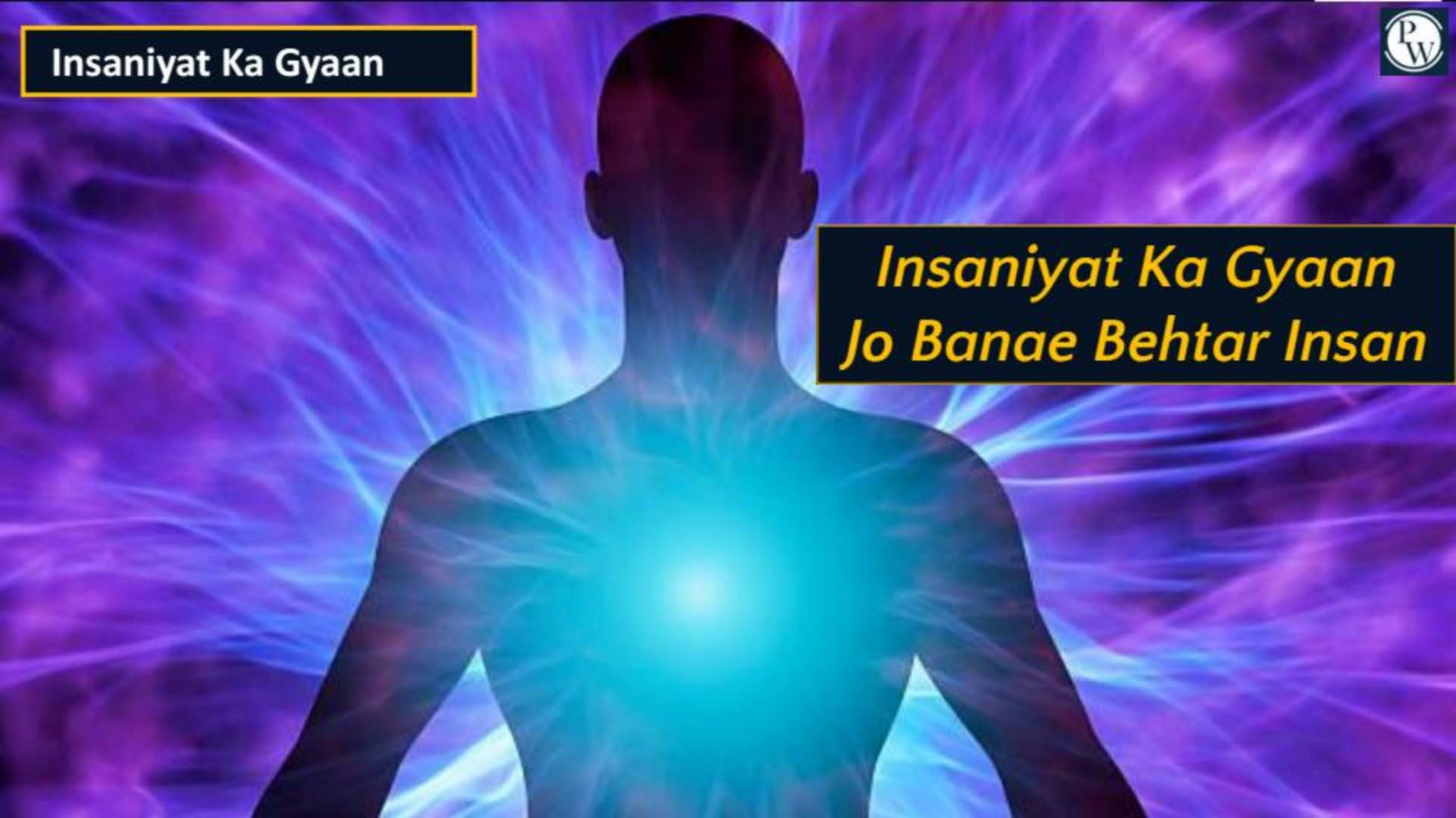
# Concept Polish (गृहकार्य)


NO HOMEWORK!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#sbsathhai (✓)

#pwsathhai (✓)

# THANK YOU