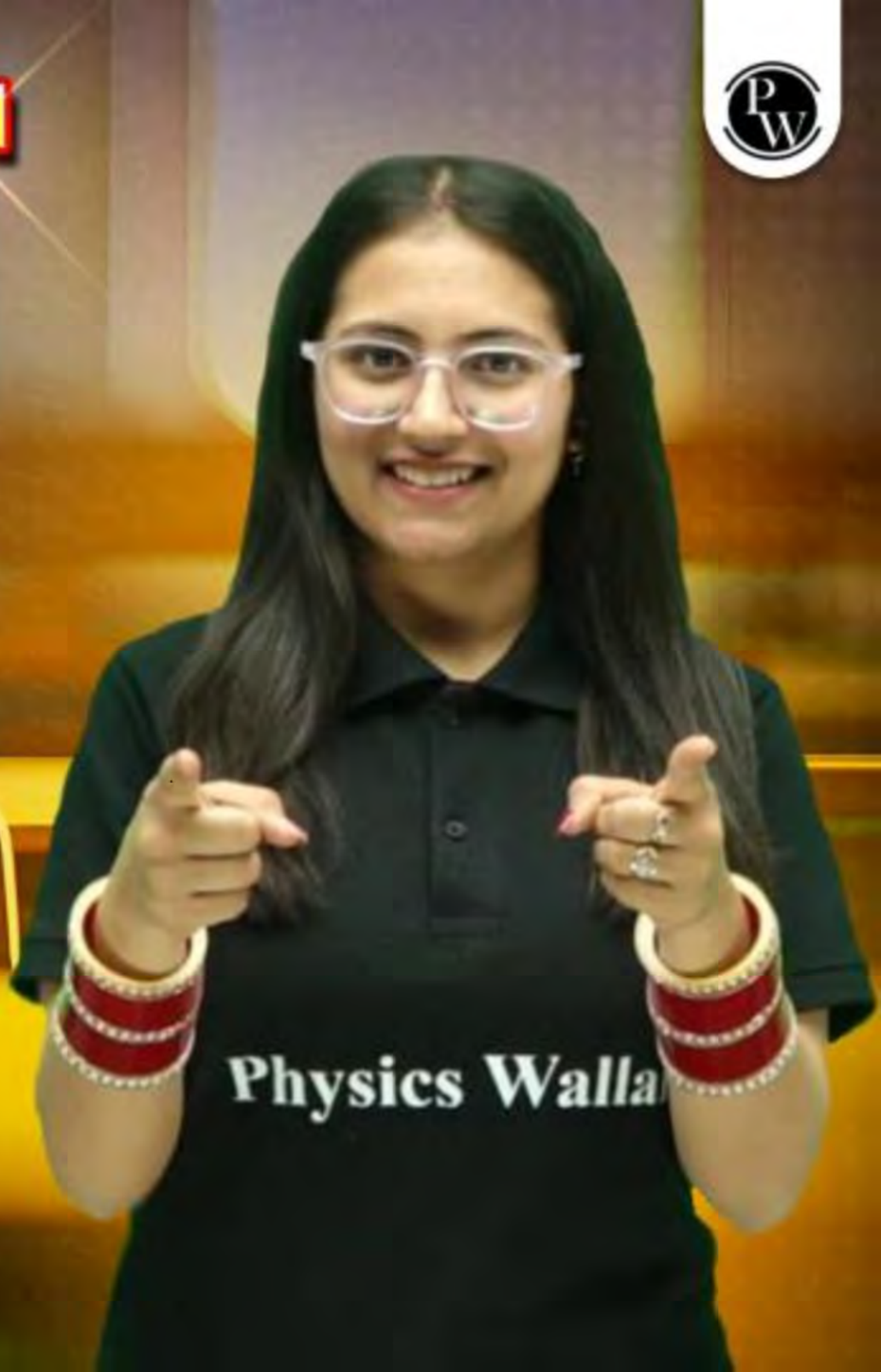
RADIANT 2026

Chemistry

Water

Lecture - 01

By- Bharti Ma'am



Topics *to be covered*

1. Physical state of water
2. Composition of water
3. Physical properties of water
4. Questions

Paani ka Basic

Water

1.) Water is most imp. chemical substance

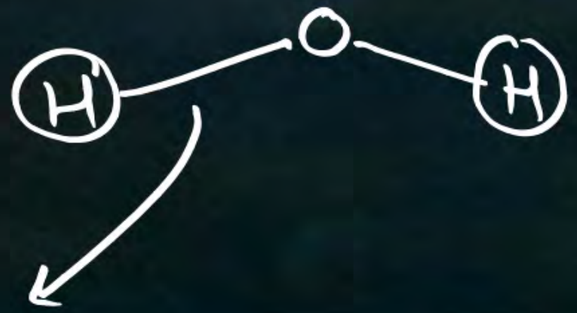
2.) Molecular formula of water = H_2O

3.) Molecular Mass of water = H_2O

$= 2 \times 1u + 16u$

$= 2u + 16u \Rightarrow 18u$

Structure of water (H_2O)



(Covalent Bond)

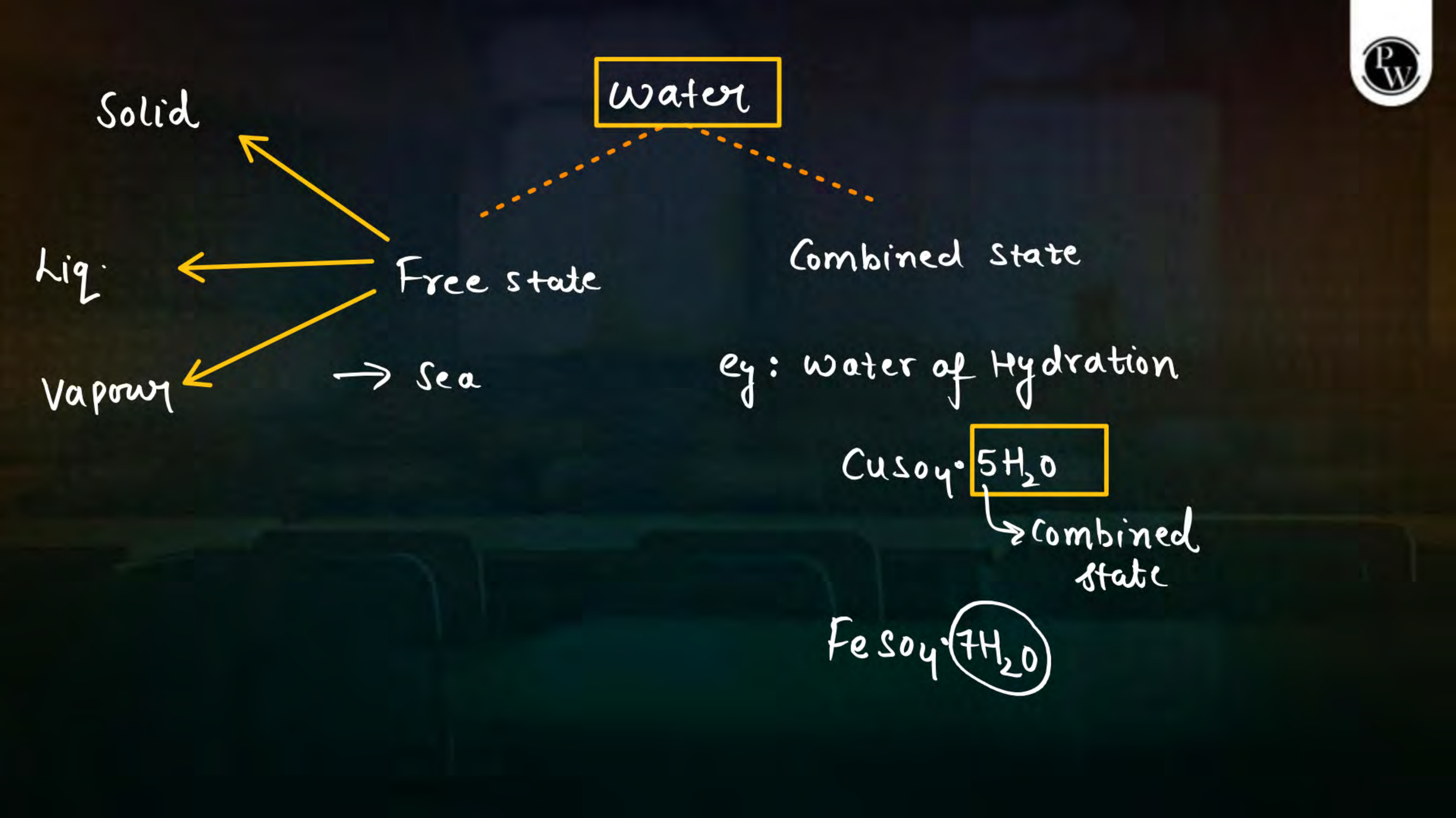
↳ (Next cha)

on earth 70% water

↓

Fresh water

(Approx. 2.5 %)


Water
Solid
Liq.
Vapour
Free state
→ Sea
Combined state
eg: water of Hydration
$CuSO_4 \cdot 5H_2O$
Combined state
$FeSO_4 \cdot 7H_2O$

Physical State of water

Solid state

eg: Ice

Liquid state

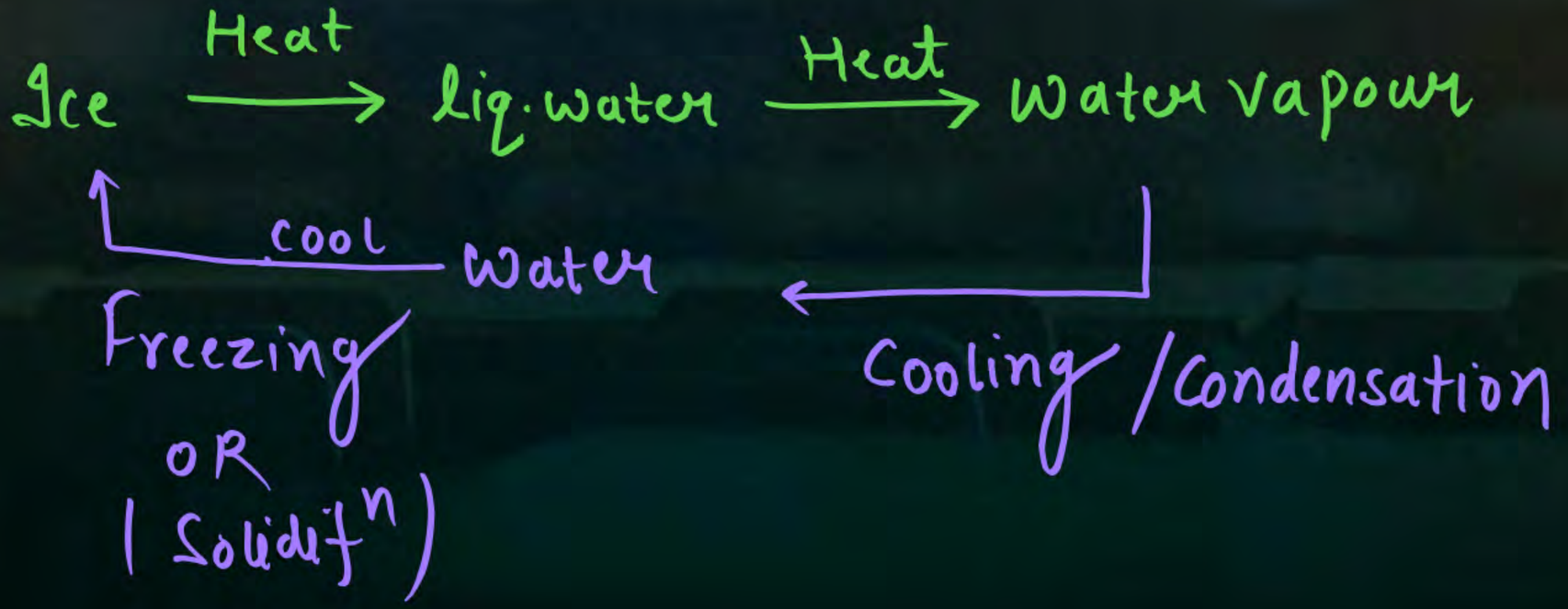
(R.T)

(Room temp.)

Vapour state

→ Steam

Conversion of physical State of water



Role of water

→ water is known as Universal 'solvent'

→ Photosynthesis in 'plant'

→ for Biochemical process in our Body

→ for Metabolic Rx^n

Existence of water in all the three state of matter

Water exists in all the three states in nature: 'Solid, Liq, Vapour'

(a) In vapour state: In atmosphere → 'water vapour'

(b) In liquid state: The most common state of water in rivers, wells, sea, etc.

(c) In solid state as ice: On poles and mountains.

Existence of water in all the three state of matter

Interconversion of these states at normal conditions can be achieved by :

Ice ⇌ (Fusion / Freezing) Water ⇌ (Evaporation / Condensation) Vapours

Ice ⇌ (Sublimation / Frosting) Vapours

Composition of water

Henry Cavendish showed that water can be synthsised by igniting a mixture of two volumes of hydrogen and one volume of oxygen. In 1783, A. Lavoisier confirmed that water is not an element but a compound.

(H_2O)

2 vol^m of H_2 and 1 vol^m of O_2 $\longrightarrow$ 'water' (Compound)

$2\,H_2(g) + 1\,O_2(g) \longrightarrow 2H_2O$

2 volm H_2 gas + 1 volm of oxy gas $\longrightarrow$ Water

2 : 1 by volume

Que Ratio By mass in water?

(A) 8:1 ✗

(B) 2:1 by volume

(C) 1:8

(d) 2:4

H_2O

~~2~~ : ~~16~~

1:8 by mass

Composition of water

density of water = fix

The combination of H_2 and O_2 is exothermic in nature. → Heat produce

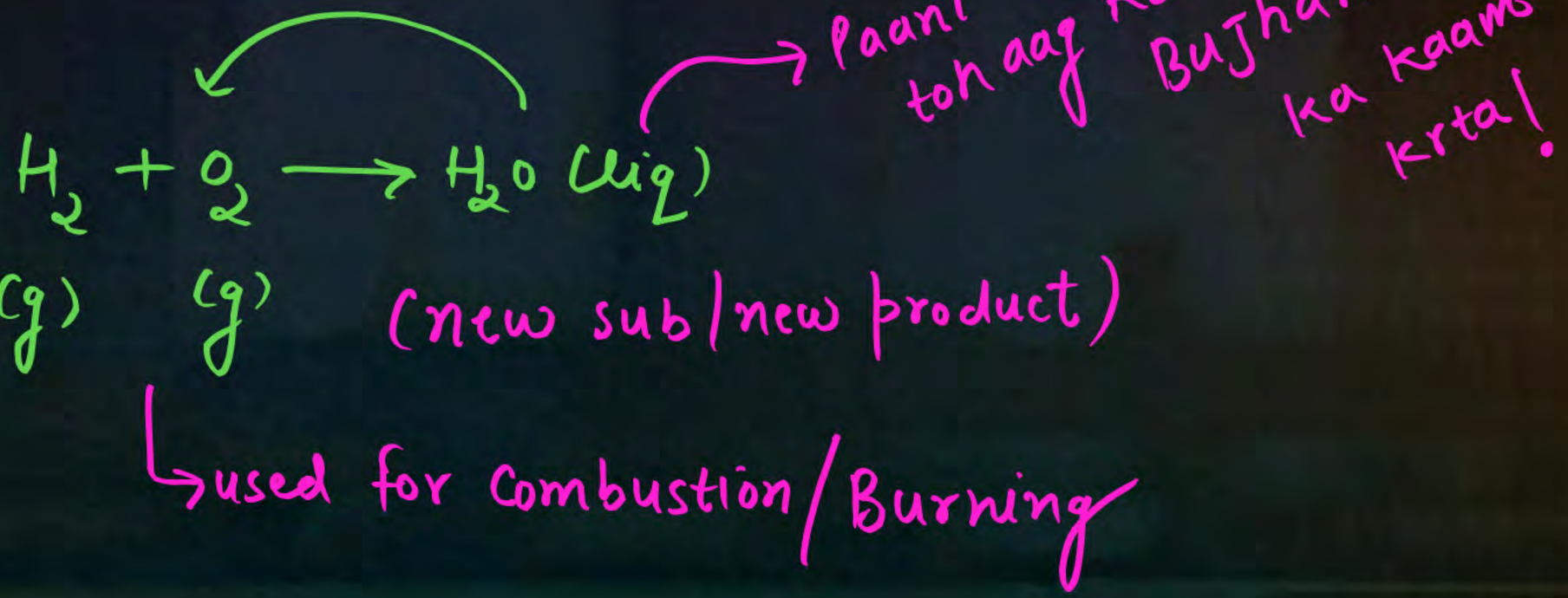
(i) Water is homogeneous liquid in nature and possesses definite physical properties like melting point, boiling point, density, dielectric constant, molar mass, refractive index, etc. 'fix'

↳ deals with solubility

(ii) The properties of water are different from those of its constituent elements H_2 and O_2. (H_2O)

$$\text{density} = \frac{\text{mass}}{\text{Volm}}$$

m.p = 0°C
B.p = 100°C
} m.p/B.p (phy. Property)


$H_2 + O_2 \longrightarrow H_2O$ (liq)
Paani toh aag ko Bujhane ka kaam krta!
(g) (g)
(new sub/new product)
↳used for Combustion/Burning

(Homo : same)

Homogeneous sub :- uniform composition

Heterogeneous sub : non-uniform composition

(Hetero : diff)

Composition of water

water is Bad Conductor

(iii) When electric current is passed through water (containing a few drops of sulphuric acid added to make it conducting), hydrogen and oxygen are obtained in the ratio 1 : 8 by mass or 2 : 1 by volume. This clearly indicates that water is a chemical compound composed of two elements, hydrogen and oxygen.

$$2H_2O \xrightarrow[\text{Elec. Current}]{\text{Electrolysis}} 2H_2 + O_2$$

Electrolysis → Break down

(Electric Current)

Conduction ..... Free ion ✓

..... free e^- ✓

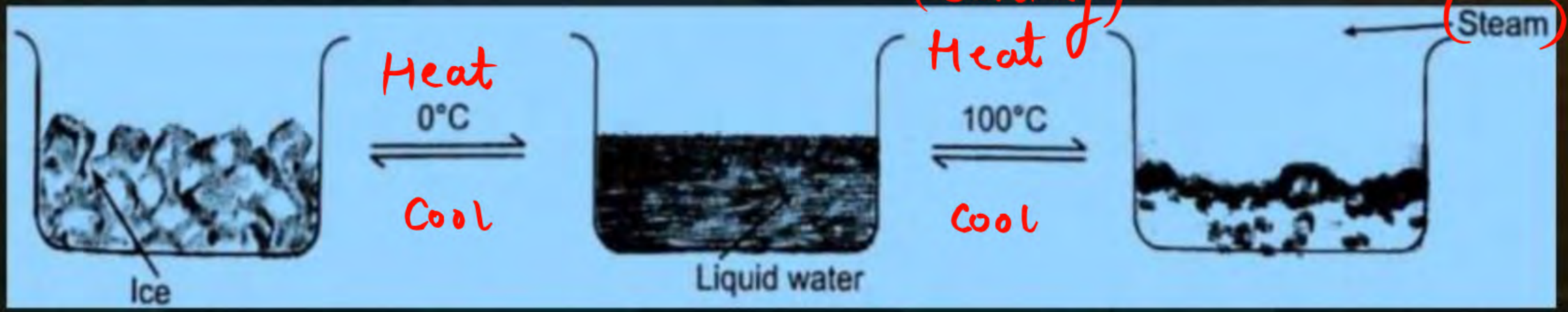
B.M Vision

Pure water is Bad Conductor

↳ Pure water + Acid (free ion) ⟶ Conduction Inc. ↑

Physical Properties of water

1. Physical states of water:



(Boiling)

Steam/Vapour

Physical Properties of water

2. Colour, odour and Taste

Colorless

Odourless

tasteless

Physical Properties of water

Note: with Inc.↑ in pressure; Boiling point also Inc.↑

Imp

3. Boiling point:

The boiling of water is considerably affected by a change in pressure. The boiling temperature of water increases with an increase m pressure and vice-versa. This is why a pressure cooker, cooks food earlier. In a pressure cooker, water boils at a temperature above 100°C due to high pressure and provides more heat to the food to get it cooked earlier. In the hilly regions where atmospheric pressure is much lower than 760 mm Hg, water boils at temperatures below 100°C, This is why food takes a longer time to get cooked in the hills. Therefore, pressure cookers are more useful there.

Physical Properties of water

Volatile = Jiske Vapour ✓
↳ Nail paint Remover: Acetone

3. Boiling point:

Boiling of water is also affected by the presence of non-volatile solutes dissolved in it. The dissolved salts increase the boiling point of water. For example, sea water boils at higher temperature than that of distilled water.

Non-Volatile: Jisk-Vapour asani se Nhi Bnte

NaCl, Sugar → non-volatile Solute

Boiling point:-

1.) Pressure ↑ $\propto$ B.p ↑

2.) Non-Volatile solute ↑ $\propto$ B.p ↑

↳ (NaCl) + H_2O

KAUN BANEGA
Chemoपुत्र
KAUN BANEGA

Question

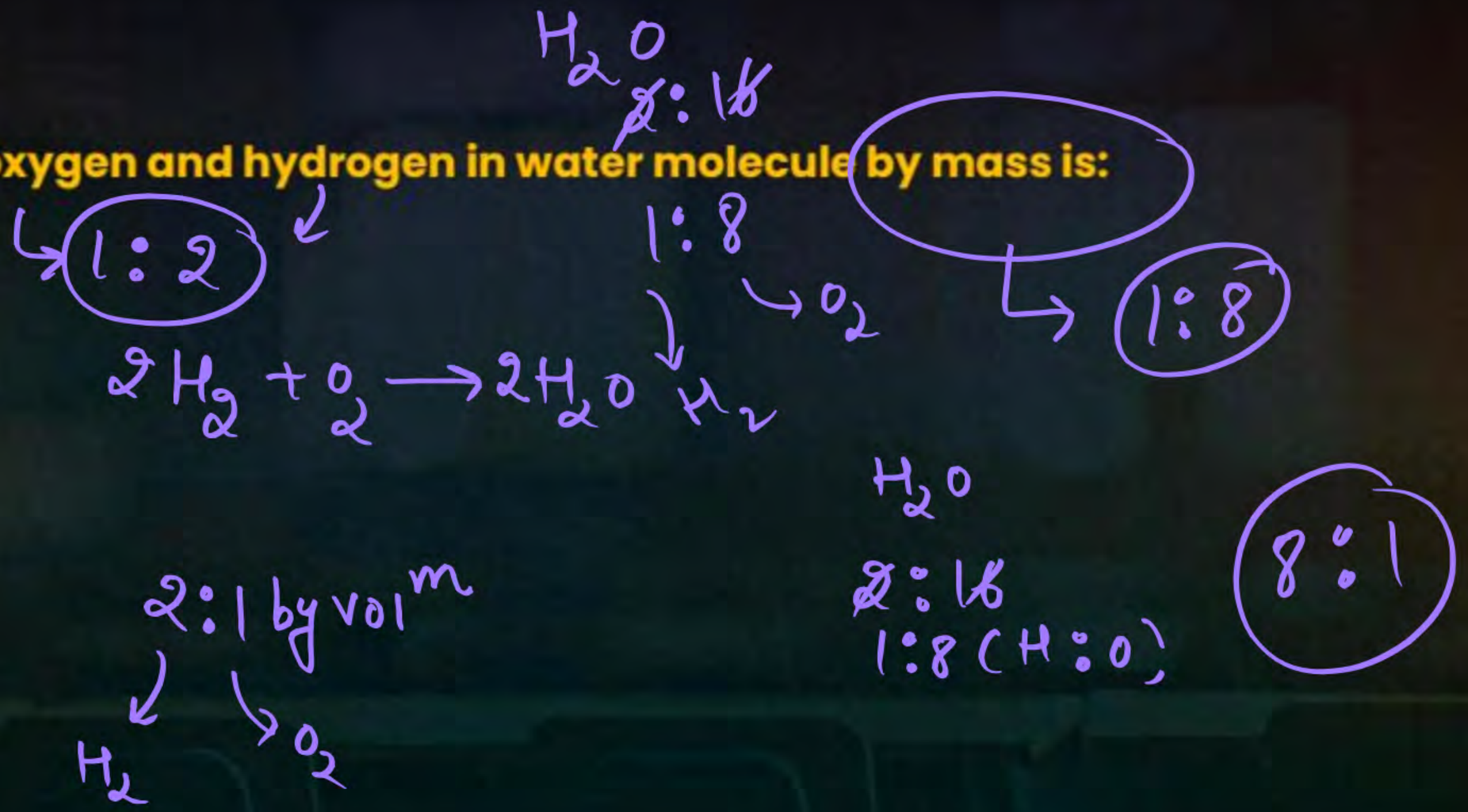
The Ratio of oxygen and hydrogen in water molecule by mass is:

A 1:8

B 2:1

C 8:1

D 1:2



Question

Which of the following statement is incorrect?

A. Water freezes at 0°C

B. Ice is lighter than water

C. Ice floats on water

D. Water boils at 0°C

H.W

Question

Pure water freezes at

A 0°C

B 273 K

C 100 K

D Both (A) and (B)

Todo list
Not to do list
9-9:30
wed
3:30 pm
3:30pm
extra class
wed
4:00
1hr
4hr
1.5hr
1hr
3hr
Rd
(55 min)
Thank you