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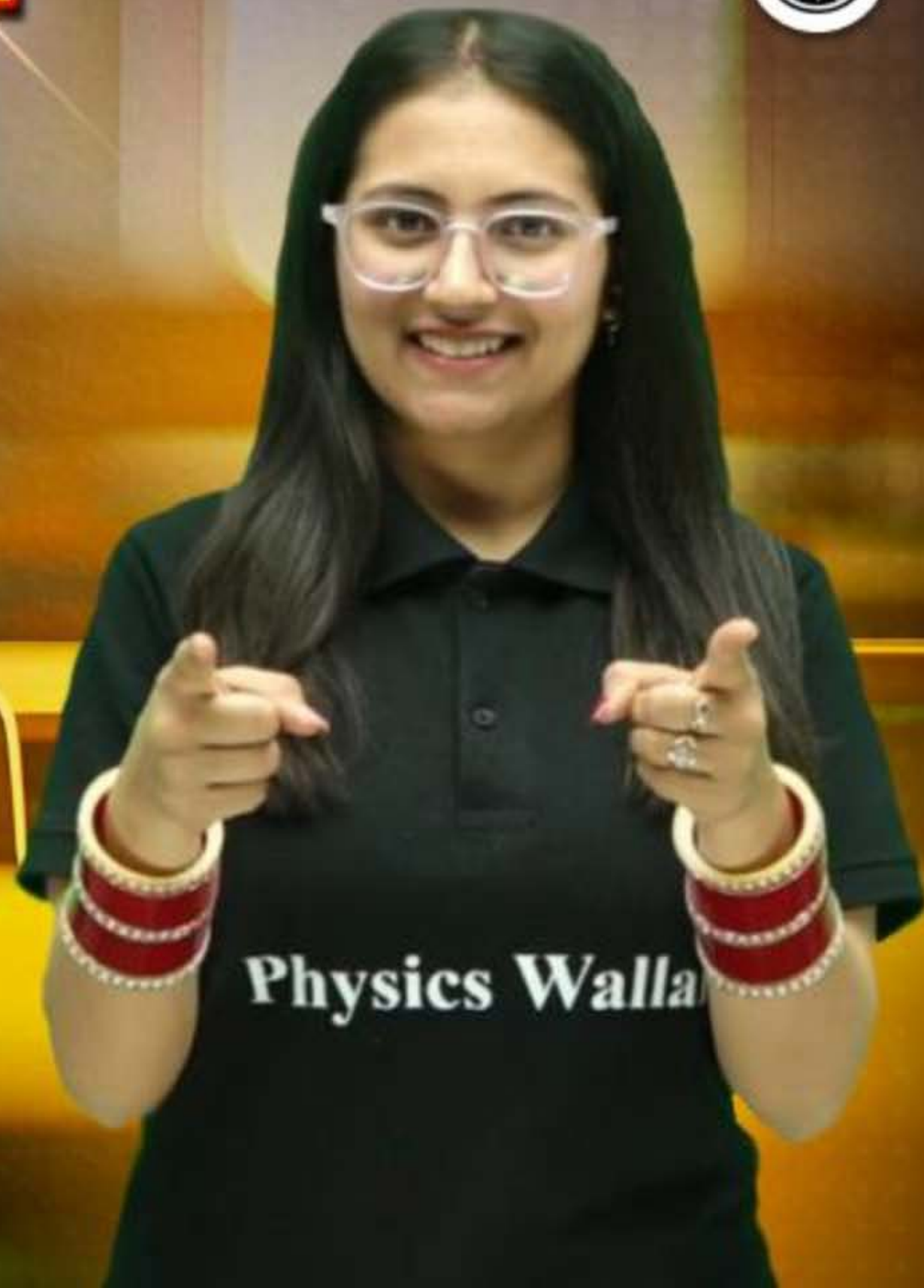
2026

Chemistry

Water

Lecture - 02

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Topics *to be covered*


- 1 Property of water
- 2 Solution
- 3 Type of solution
- 4 Con/ and concentration and concentration terms



one more chem.

aq. solⁿ of Base (Baking soda)
(white) → + H₂O

Tindo ♡

 'Haldi + Alconal'
↪

(Quick-Revision)



Physical Properties of Water



B.P → Pressure

(Non-volatile solute)
NaCl

1. Boiling point:

The boiling of water is considerably affected by a change in pressure. The boiling temperature of water increase with an increase in pressure and vice-versa. This is temperature above 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 lower than 760 mm Hg, water boils at temperature below 100°C , This is why food takes a longer time to get cooked in the hills. Therefore, pressure cookers are more useful there.

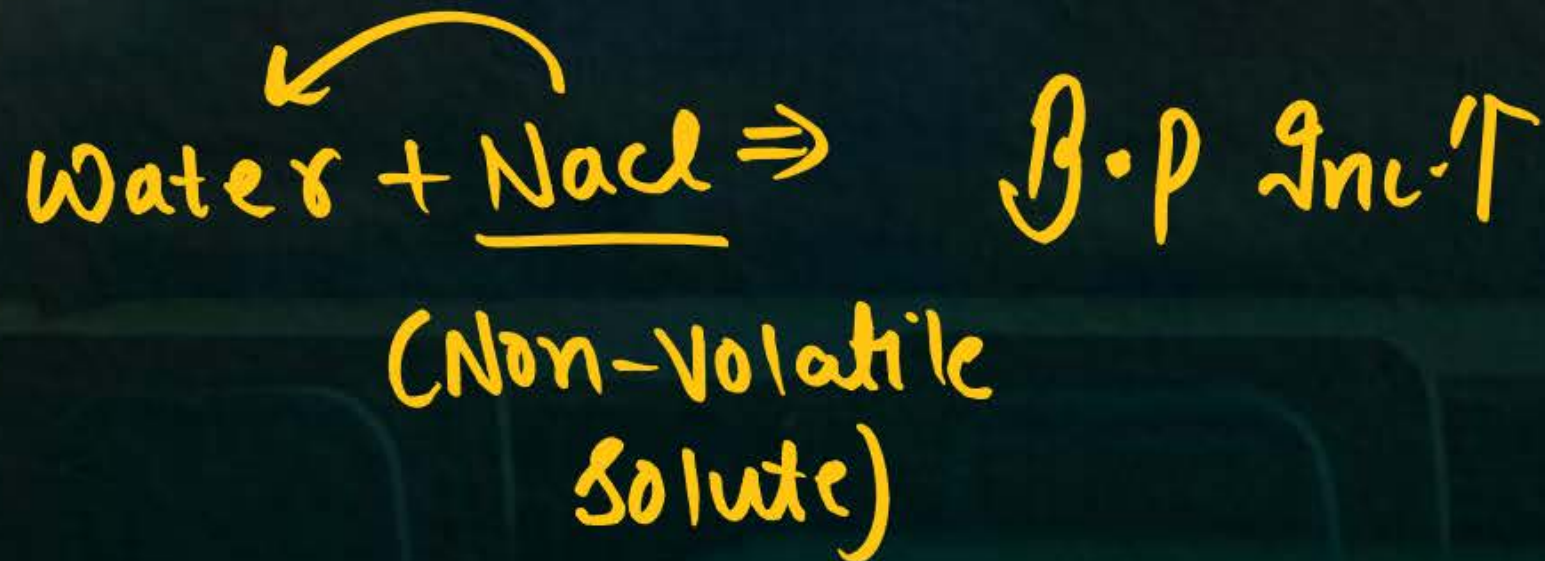


Physical Properties of Water



2. 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 distilled water.





Physical Properties of Water



$B.p \propto \text{Pressure}$ ✓

3. Freezing point: 0°C

The freezing point of water decreases with increase in pressure. That is why snow appears on mountain or hilly region.

$\text{Pressure} \uparrow (\text{Inc}) = \text{F.P} (\downarrow \text{dec})$

$\downarrow \text{F.P} \propto \frac{1}{\text{Pressure} \uparrow}$



Physical Properties of Water

$$1 \text{ g/ml OR } 1 \text{ g/cm}^3 \checkmark \checkmark$$

$$\text{ml} = \text{cm}^3 \star$$

4. Density

Water has a maximum density (1 g cm^{-3}) at 4°C The density of ice is lower than that of liquid water. This is why ice floats on water.

$$\text{density} = \frac{\text{Mass}}{\text{Vol}^m}$$

$$\frac{\text{g}}{\text{ml}} = \frac{\text{g}}{\text{cm}^3} \Rightarrow \text{g/cm}^3 \text{ OR } \text{g}\cdot\text{cm}^{-3}$$

Ice \rightarrow (Solid)
 \downarrow
 H_2O (Hydrogen Bonding)



B.p of water = 100°C

m.p of water = 0°C

Density = 1g/ml OR
(water) 1g/cm^3



Physical Properties of Water



v.v. jump

4°C → 0°C

(particles close)

5. Anomalous expansion:

1. In case of most of the liquids, the volume decreases on cooling. The behavior of water is quite different.

2. When water is cooled, it first contracts and attains a minimum volume at 4°C (this is why water has maximum density at 4°C). On cooling further, water starts expanding till 0°C when it changes into ice (this is why ice a lower density as compared to water). Thus, water has minimum volume at 4°C.

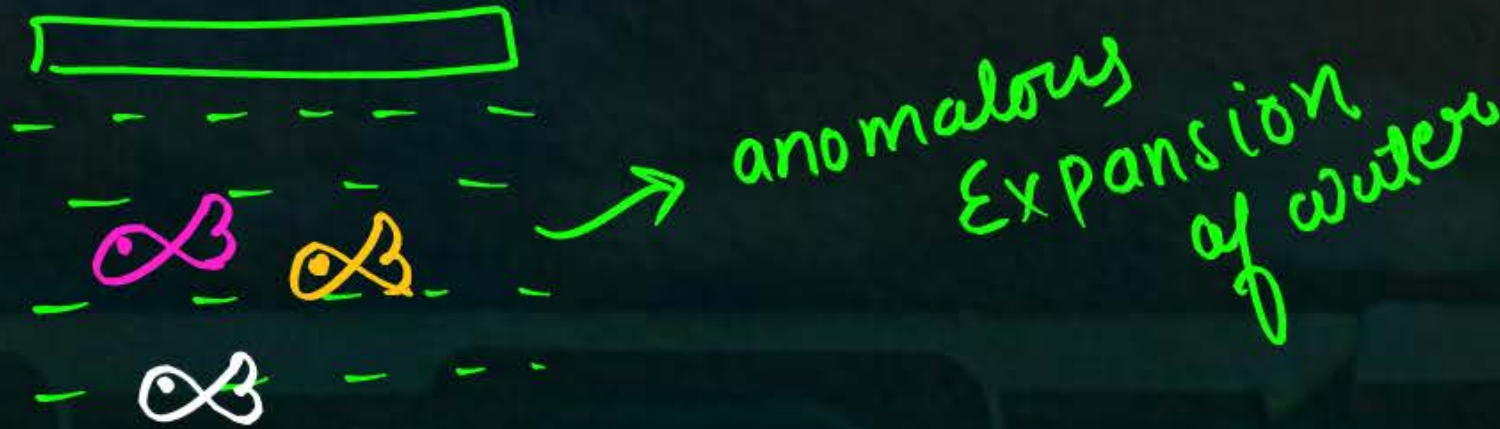
at 4°C (min. vol^m)



Physical Properties of Water



3. The anomalous expansion of water is boon to aquatic animals in winter which can survive even in a froze lake or lake or sea because there is always present water of 4°C beneath the top layer of ice in the frozen lake.





Physical Properties of Water




Imp

1. Specific heat capacity:

The specific heat capacity of a substance is defined as the amount of heat required to raised temperature of the substance by 1°C .



 } 1°C temp \uparrow
temp? Heat

1°C inc. in temp.



Physical Properties of Water



gmp

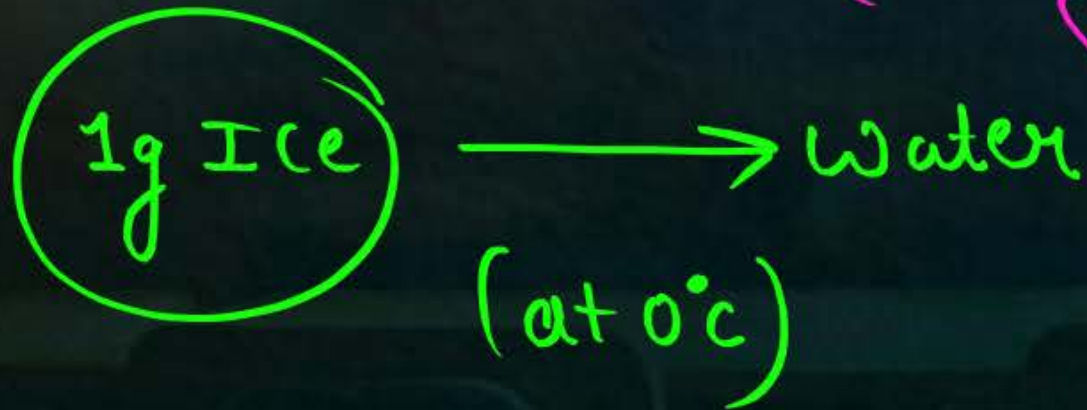
→ (चुपि ही Heat)

6. Latent heat of fusion of ice:

The amount or heat required to change 1 g of ice into water at 0° C is called specific latent heat of fusion of ice. The latent heat of fusion of ice is 336 Jg⁻¹ or 80 cal g⁻¹.

→ (melting)

1g of ice → water

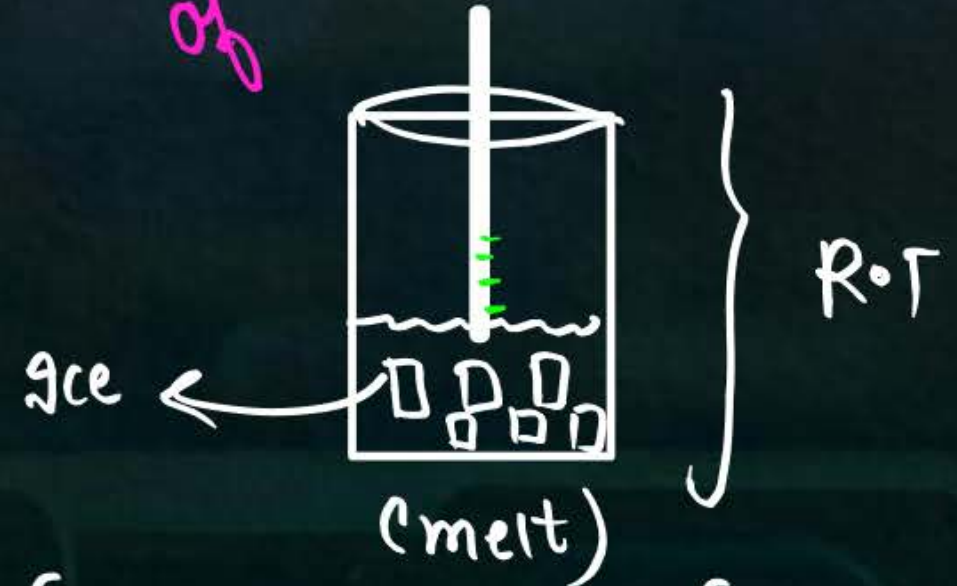


Latent Heat (Temp. remain same)

Help in changing physical state of water

Latent Heat

Use to overcome the force of attraction B/w particles



(5 to 7 min) ~~~~~ (Ice + water)

0°C $\xrightarrow{5\text{min}}$ No change in temp.



Physical Properties of Water

↓ 10 Imp



7. **Latent heat of Vaporisation:** (Formation of water vapour)

The amount of heat required to change 1 g of water into steam at 100°C is called specific latent heat of vaporisation of water.



(100°C)



Physical Properties of Water



Imp.

8. Conductance:

Pure water is a very poor conductor of heat and electricity. The presence of dissolved salts increases its electrical conductance.

Pure water = Bad conductor

Pure water + Salt/Acid = Good conductor

free ion



Solutions



A homogeneous mixture of two or more substances, whose relative amounts may be changed within certain limits, is called a solution.

✓ Sugar solution
✓ Salt solution

True solution
uniform composition

H_2O } $H_2O + mud$ } Heterogeneous mix.
mud

Que: Parts/Component of solution?

- (A) Solute
- (B) Solvent
- (C) Both a, b

Component of solution

Solute
(present in
less amount)

Solvent
(present in
large amount)

Que In salt solution, salt is?

present
in less
amount

(A) Solvent

~~(B) Solute~~

(C) Solⁿ



Matter

Pure substance
(one type of particles)
(elements, compounds)

Homo: same
Hetero: diff

Mixtures

Homogeneous
mixture

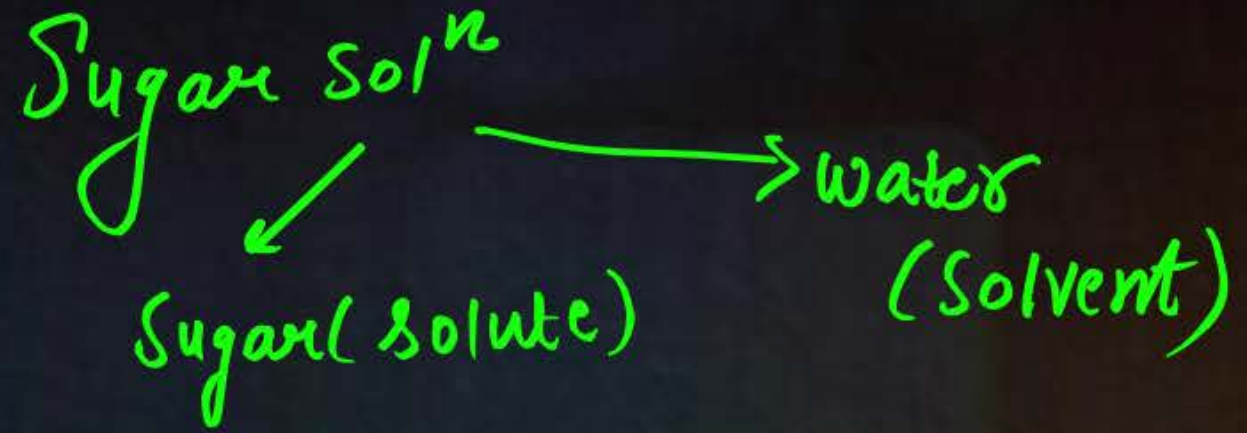
→ uniform composition

Heterogeneous mixture

→ non-uniform composition



Solute and Solvent



1. Solute:

The solid substance which get dissolved or disappears in the liquid solvent to form a solution is called a solute.

2. Solvent:

The liquid (water or any other medium) which allows the solute to dissolve in it order to form a homogenous mixture is called a solvent.

Question



At 0°C water has _____ volume but _____ density.

A Maximum, minimum

B Minimum, Maximum

C Maximum, zero

D Zero, maximum

4°C temp } $\text{Vol}^{\text{m}} \text{ min.}$
density max

4°C → 'low'
 0°C
(Expansion)

0 0 0 0 0
6 6 6 6 6
6

Question



Pure water freezes at

- A** 0°C ✓
- B** 273 K ✓
- C** 100 K
- D** Both (A) and (B)

Thank You

