

High Weightage

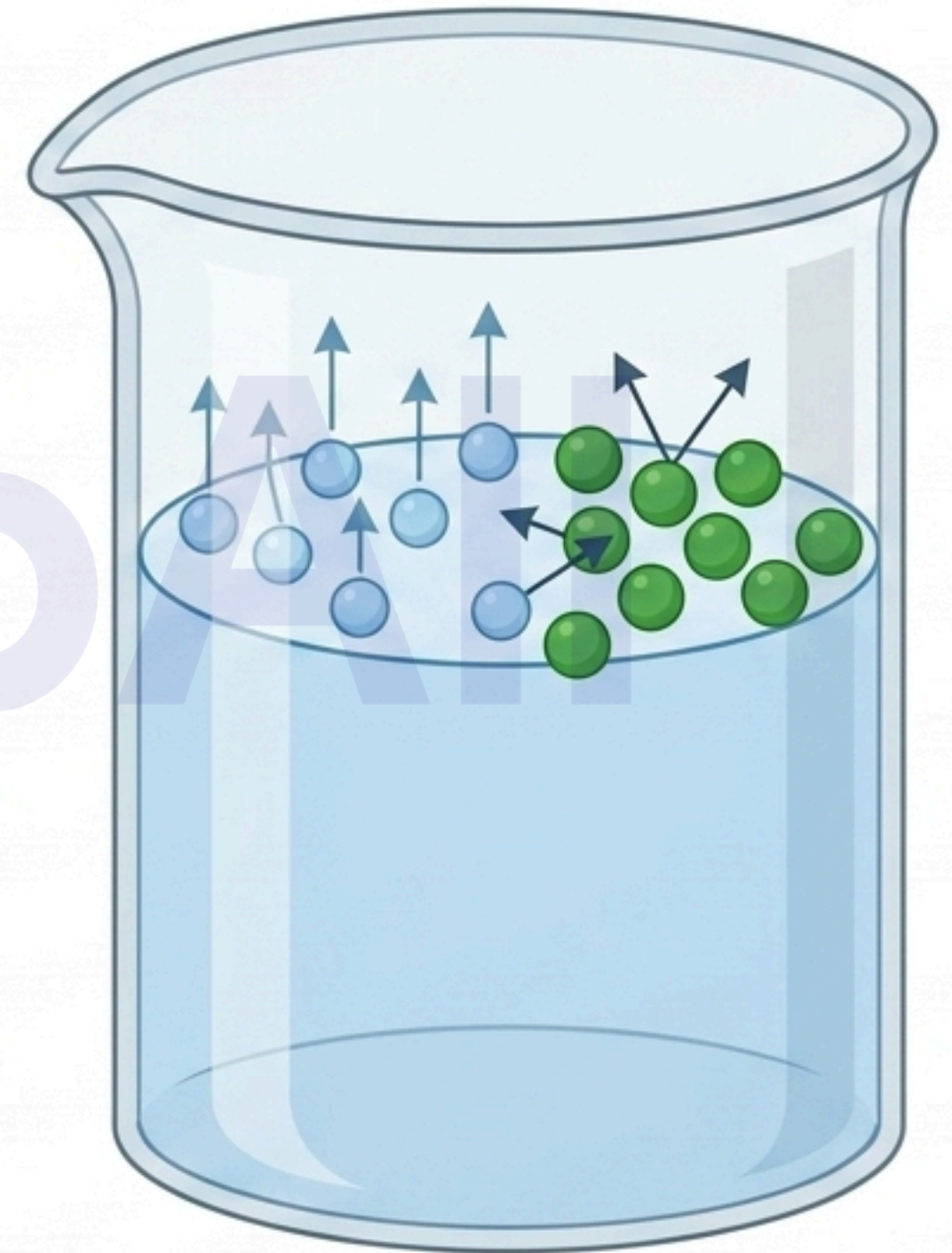
Relative Lowering of Vapour Pressure

One formula finds the molar mass of any unknown non-volatile solid.

The Core Engine

The relative lowering of vapour pressure is equal to the mole fraction of the solute.

$$\begin{aligned} \frac{p_1^\circ - p_1}{p_1^\circ} &= x_2 \\ &\approx \frac{n_2}{n_1} \text{ (dilute solution)} \\ &= \frac{w_2 \times M_1}{M_2 \times w_1} \end{aligned}$$



Decode the Formula

1

1 = Solvent (known)

The volatile liquid (e.g., Water, Benzene).

Variables: p_1^o , w_1 , M_1

2

2 = Solute (unknown, what you're solving for)

The non-volatile solid added to the solvent.

Variables: w_2 , M_2



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$$E=mc^2$$



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Blueprint in Action (NCERT Ex 1.6)

Given: $p_1^\circ = 0.850$ bar, $p = 0.845$ bar

$w_2 = 0.5$ g solid in $w_1 = 39.0$ g benzene ($M_1 = 78$ g/mol)

$$\frac{0.850 - 0.845}{0.850} = \frac{0.5 \times 78}{M_2 \times 39}$$

Result: **$M_2 = 170$ g/mol**

Trap: Swapping w_1/w_2 or M_1/M_2 .

Always confirm subscript 1 = solvent, subscript 2 = solute before touching the formula. An upside-down ratio is the most common cause of negative marking on this topic.

Master this trap by writing your variables down first.

Mathematical Boundary Condition

Valid only for **DILUTE** solutions where $n_2 \ll n_1$.

If the solution is highly concentrated, you cannot ignore n_2 in the denominator of the mole fraction ($x_2 = \frac{n_2}{n_1 + n_2}$). The simplified formula assumes $n_1 + n_2 \approx n_1$.

Key Takeaways

- Apply the relative-lowering formula directly for molar mass problems.
- Keep solvent (1) and solute (2) subscripts consistent throughout.
- Confirm the dilute-solution approximation before using the simplified formula.



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