

SCIENCE • CLASS 9

CHAPTER 5

Exploring Mixtures and their Separation

NCERT SOLUTIONS



MASS AND VOLUME PERCENTAGES

Pause and Ponder - Questions 1 and 2

Question 1:

Talcum powder contains 4% m/m zinc oxide. How much zinc oxide is present in 300 g of powder?

Solution:

4% m/m means 4 g of zinc oxide in 100 g of powder.

$$\text{Mass of zinc oxide} = \frac{4}{100} \times 300 \text{ g} = 12 \text{ g}$$

Answer: 12 g of zinc oxide.

Question 2:

Two tablespoons of orange juice concentrate are diluted with water to make 150 mL of juice. Each tablespoon holds 15 mL. Find the % v/v of concentrate.

Solution:

$$\text{Volume of concentrate} = 2 \times 15 \text{ mL} = 30 \text{ mL}$$

$$\begin{aligned} \% \text{ v/v} &= \left(\frac{\text{volume of concentrate}}{\text{final volume of juice}} \right) \times 100 \\ &= \left(\frac{30 \text{ mL}}{150 \text{ mL}} \right) \times 100 = 20\% \end{aligned}$$

Answer: 20% v/v.

DILUTING ACETIC ACID

Pause and Ponder - Question 3

Question: Vinegar contains 5% v/v acetic acid.
How can a 5% solution be prepared from glacial acetic acid, taken as 100% acetic acid?

Solution: Choose a final solution volume of 100 mL.

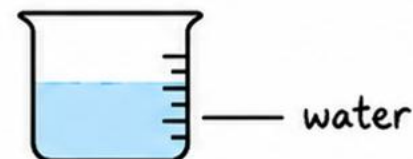
$$\text{Volume of acid} = \left(\frac{5}{100} \right) \times 100 \text{ mL} = 5 \text{ mL}$$

$$\text{Check: } \left(\frac{5 \text{ mL}}{100 \text{ mL}} \right) \times 100 = 5\% \text{ v/v}$$

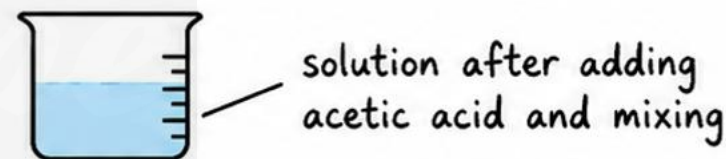
Answer: Dilute 5 mL of acid to 100 mL of solution.

A supervised laboratory preparation:

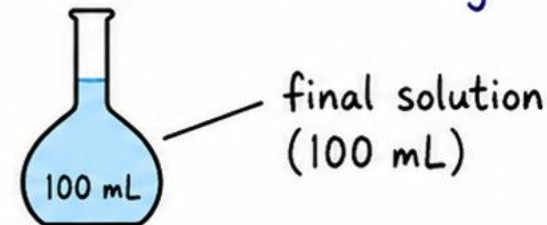
- ① Place some water in a suitable container.



- ② Slowly add 5 mL of acetic acid to the water and mix.



- ③ Allow it to cool. Add enough water to make the final volume exactly 100 mL.



Important: This is a calculation and supervised lab procedure, not a food recipe.
Glacial acetic acid is corrosive. Add acid to water, never water to concentrated acid.

COOLING AND CRYSTAL SIZE

Pause and Ponder - Questions 4 and 5

4. Equal masses of hot saturated solutions A and B are cooled from 80°C to 60°C . Using the given solubility curves, which deposits more solid?

Answer: Solution B.

Reason: Over this temperature fall, B's solubility decreases much more sharply than A's. For the given curves, a larger fraction of the original B solution crystallizes out. A also deposits some solid, but less.

Comparison of solubility change ($80^{\circ}\text{C} \rightarrow 60^{\circ}\text{C}$):

A

Small fall in solubility

Less solid separates

B

Large fall in solubility

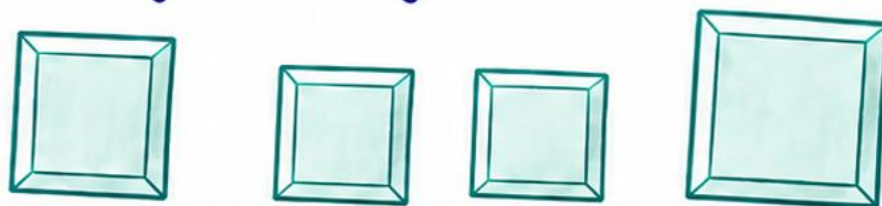
More solid separates

5. How does increasing or decreasing the rate of evaporation affect the size of common salt crystals?

Faster evaporation: Usually many small crystals form. There is less time for orderly crystal growth.



Slower evaporation: Usually larger, better-formed crystals grow because particles have more time to join the crystal.



SEPARATION: TRUE OR FALSE

Pause and Ponder - Question 6

Question: State True or False and correct each false statement.

- (i) Salt can be separated from salt solution by evaporation or distillation.

TRUE.

Evaporation leaves salt behind. Distillation collects water and leaves salt in the flask.

- (ii) Distillation can separate two liquids even if they have the same boiling point.

FALSE.

Ordinary distillation needs a suitable difference in boiling points; equal boiling points do not allow this separation.

- (iii) In paper chromatography, the solvent level should start above the sample spot.

FALSE.

The solvent level must be below the sample spot, so the sample does not dissolve directly into the liquid at the bottom.

- (iv) Evaporation and crystallization are the same processes.

FALSE.

Evaporation removes solvent as vapour. Crystallization forms solid crystals from a solution.

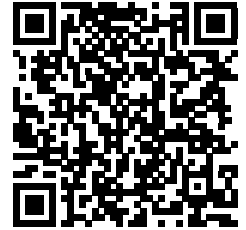


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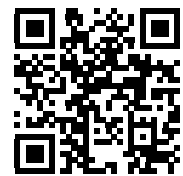


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