SCIENCE FOUNDATIONS

Concentration and molarity

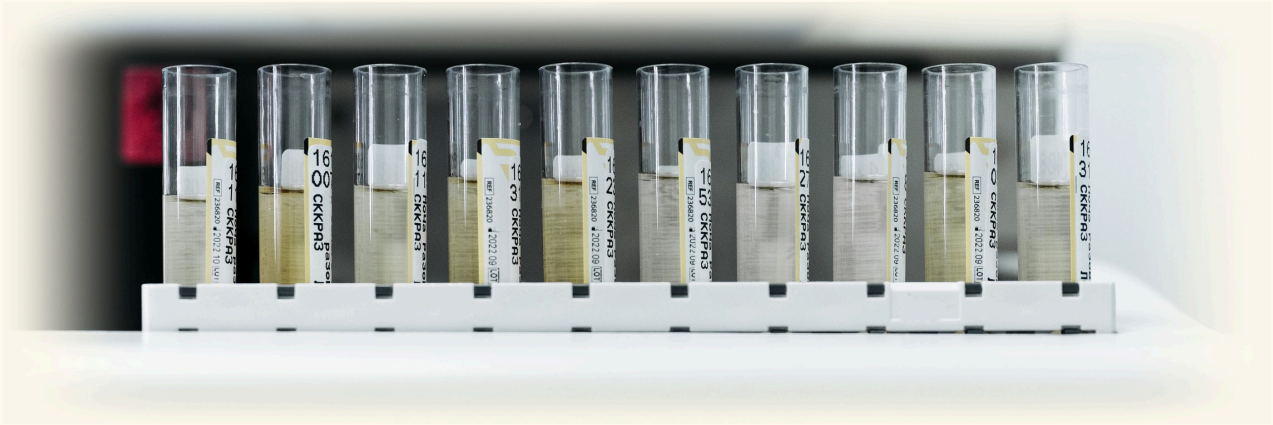
Difficulty level: Advanced

Science Foundations

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Overview of the concept

This is how you describe how strong a solution is, like how much salt is dissolved in a litre of water or how strong a medicine dose is. A nurse needs to know the strength of an IV drip, not just how much liquid is in the bag. A pool owner tests the chlorine concentration to keep the water safe without overdoing it. Knowing concentration lets you compare two mixtures properly and make one exactly as strong as you need.



Rule

Concentration and molarity: molarity $= \dfrac{\text{moles of solute}}{\text{volume of solution in litres}}$.

The volume must be in litres, so convert millilitres first.

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Worked examples

EXAMPLE 1

Q Find the molarity of 2.0 moles of salt in 4.0 L of solution.

SOLUTION

Write the rule:

molarity = moles ÷ litres

Substitute:

molarity = 2.0 ÷ 4.0 = 0.50 mol/L

Write the answer with mol/L.

The result is 0.50 mol/L.

EXAMPLE 2

Q Find the molarity of 3.0 moles of salt in 2.0 L of solution.

SOLUTION

Write the rule:

molarity = moles ÷ litres

Substitute:

molarity = 3.0 ÷ 2.0 = 1.50 mol/L

Write the answer with mol/L.

The result is 1.50 mol/L.

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Practice questions

1. 4.0 moles in 2.0 L: molarity?

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2. What volume, in litres, holds 1.2 moles at a molarity of 0.60 mol/L?

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3. 2.0 L of 3.0 mol/L solution is diluted to 6.0 L. What is the new molarity?

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4 Formula for molarity?

- A Moles divided by litres
- B Litres divided by moles
- C Moles times litres
- D Moles plus litres

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5 Units of molarity?

- A mol/L
- B mol
- C L
- D g/L

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6 **12 g of salt is dissolved in 2.0 L of water. What is the concentration in g/L?**

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7 **How many moles in 2.0 L of 3.0 mol/L solution?**

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8 **Convert 500 mL to litres.**

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9 What is the solute?

- A The dissolved substance
- B The liquid that does the dissolving
- C The whole mixture
- D The container it is in

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10 What is the solution volume in the formula?

- A The total solution volume, in litres
- B The volume of the solute only
- C The volume of the solvent only
- D The mass of the solution

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ANSWER KEY

1. 2.0 mol/L

2. 2.0 L

3. 1.0 mol/L

4. Moles divided by litres

5. mol/L

6. 6.0 g/L

7. 6.0 moles

8. 0.500 L

9. The dissolved substance

10. The total solution volume, in litres

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