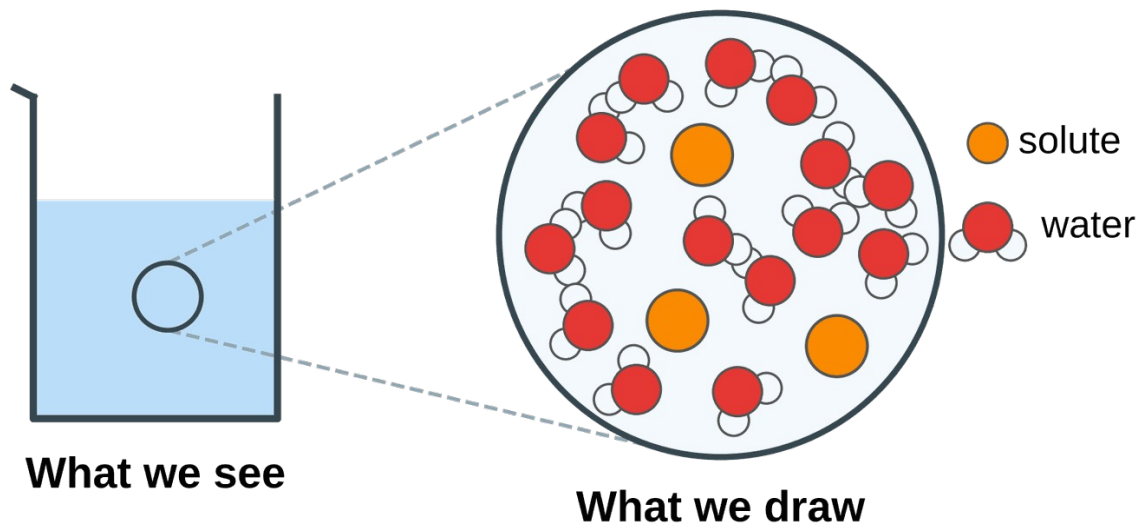


Essential Question

How can we draw what a solution looks like at the particle level?

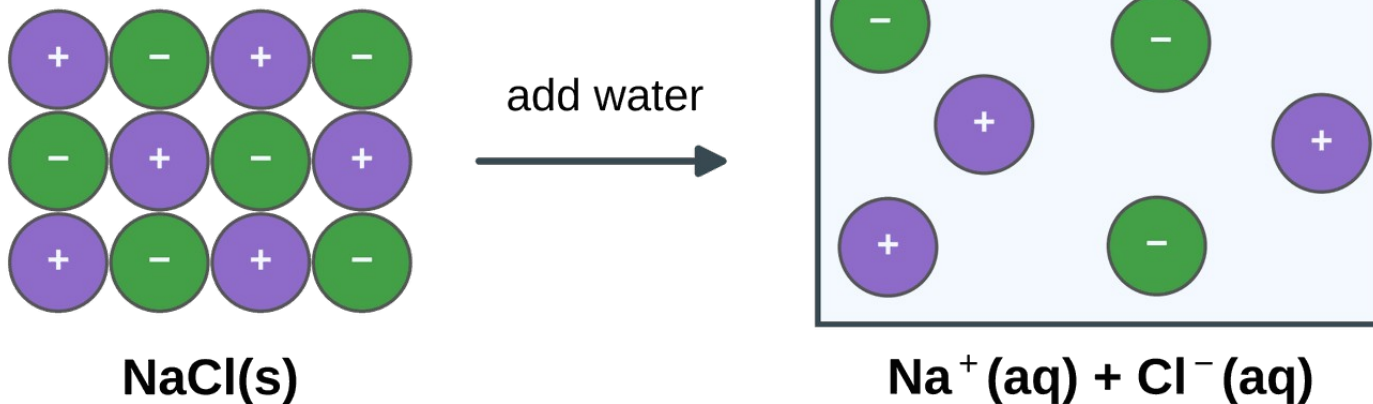
Particulate Diagrams

- Zoom in from the beaker to the particles
- Show which particles, how many, and how they interact



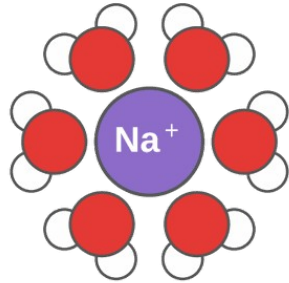
Ionic Solutes Dissociate

- The ions separate from each other in water
- $\text{NaCl(s)} \rightarrow \text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})$

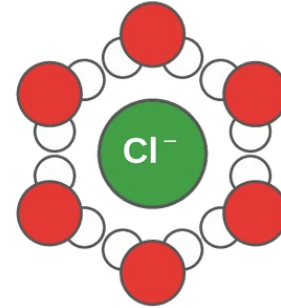


Water Surrounds Each Ion

- Ion-dipole attractions turn the water molecules



O end (δ^-) points IN

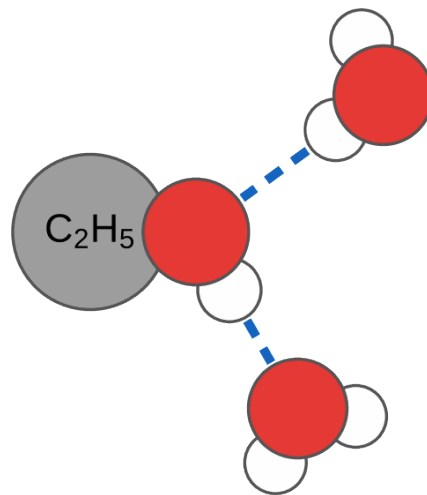


H end (δ^+) points IN

Molecular Solutes Stay Whole

- No ions form
- Molecules spread out in the water
- Show IMFs with dashed lines

ethanol molecule stays whole



- - - hydrogen bond

Mix or Separate?

- Similar IMFs mix, different IMFs form layers



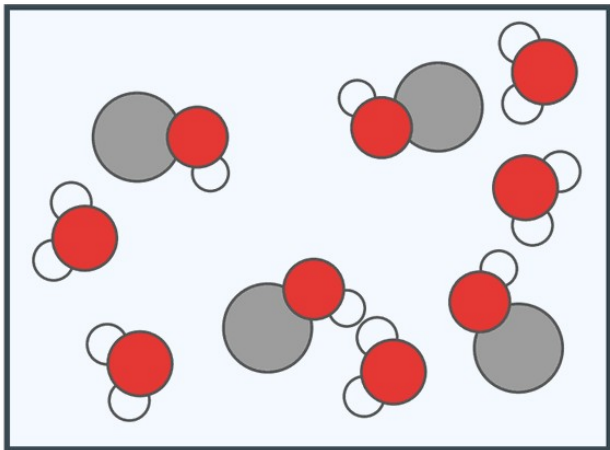
ethanol



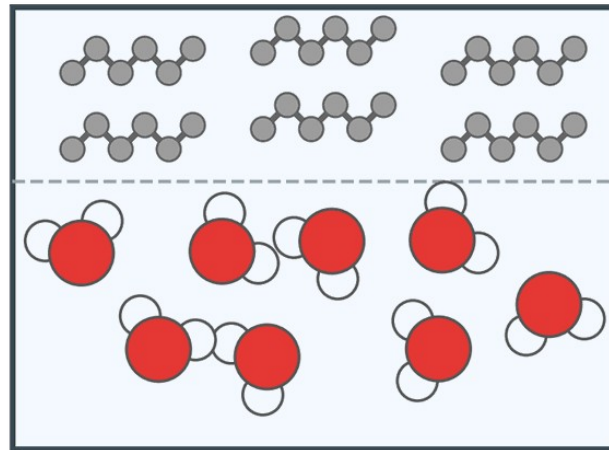
hexane



water



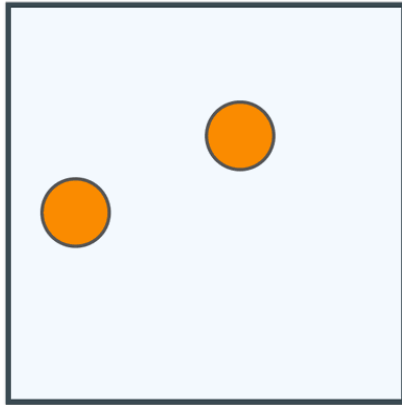
ethanol + water: mixes



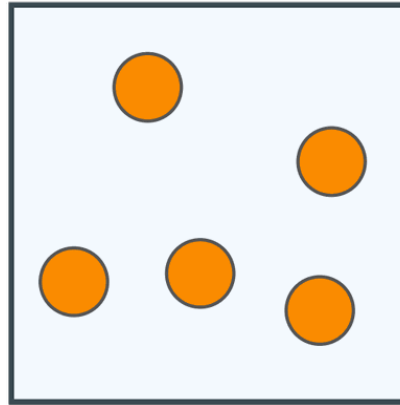
hexane + water: layers

Showing Concentration

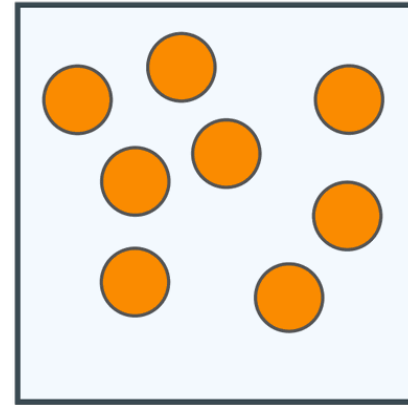
- Same volume + more solute particles = higher molarity



2 particles



5 particles

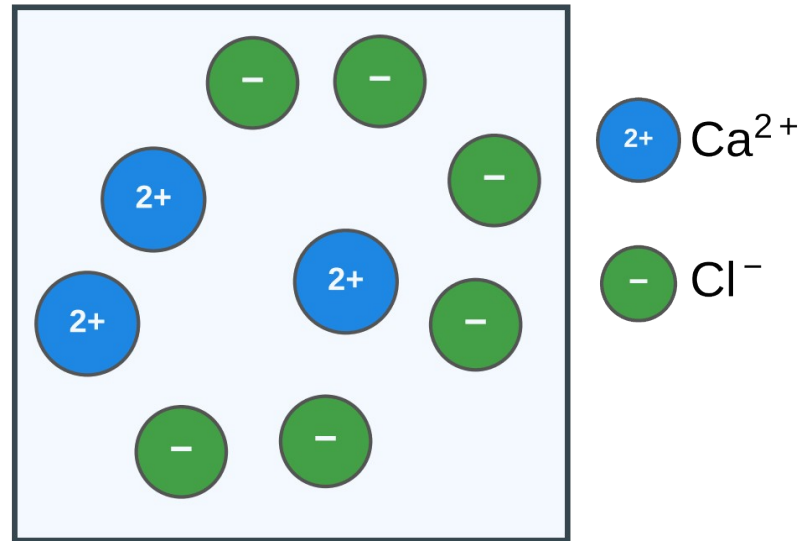


10 particles



Draw the Correct Ion Ratio

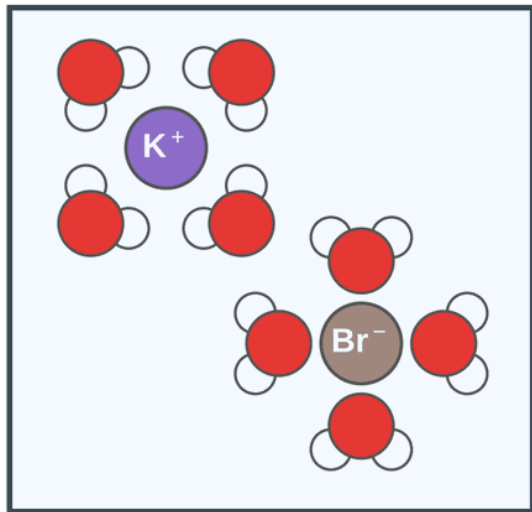
- $\text{CaCl}_2 \rightarrow \text{Ca}^{2+} + 2 \text{Cl}^-$
- 2 Cl^- for every Ca^{2+}
- Charges add up to zero



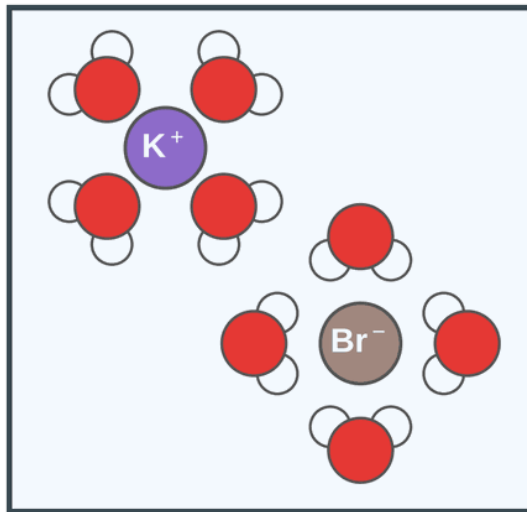
Example 1

Which diagram best represents KBr(aq) ?

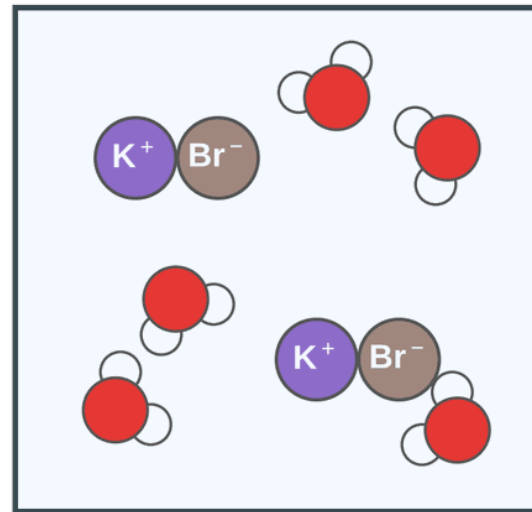
A



B



C

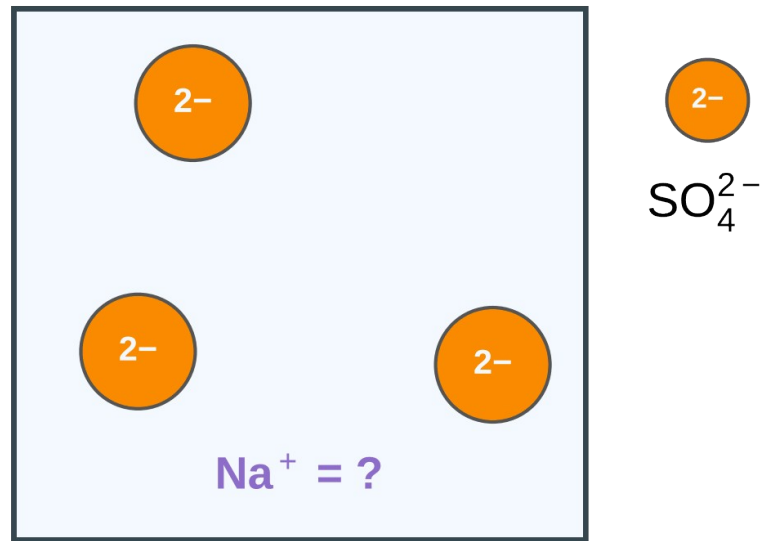


Example 2

The box shows the SO_4^{2-} ions in a 0.25 M Na_2SO_4 solution.

(a) How many Na^+ ions should be drawn?

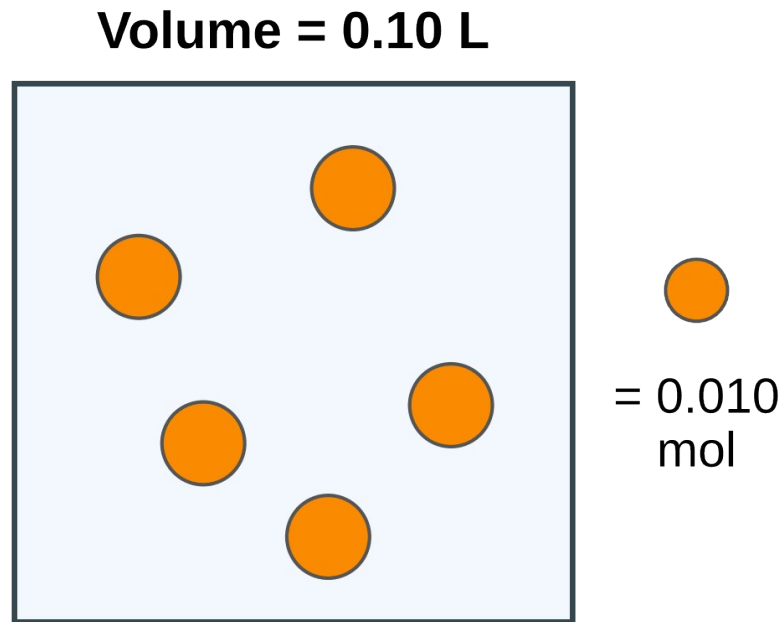
(b) What is $[\text{Na}^+]$?



Example 3

Each particle represents 0.010 mol of solute.

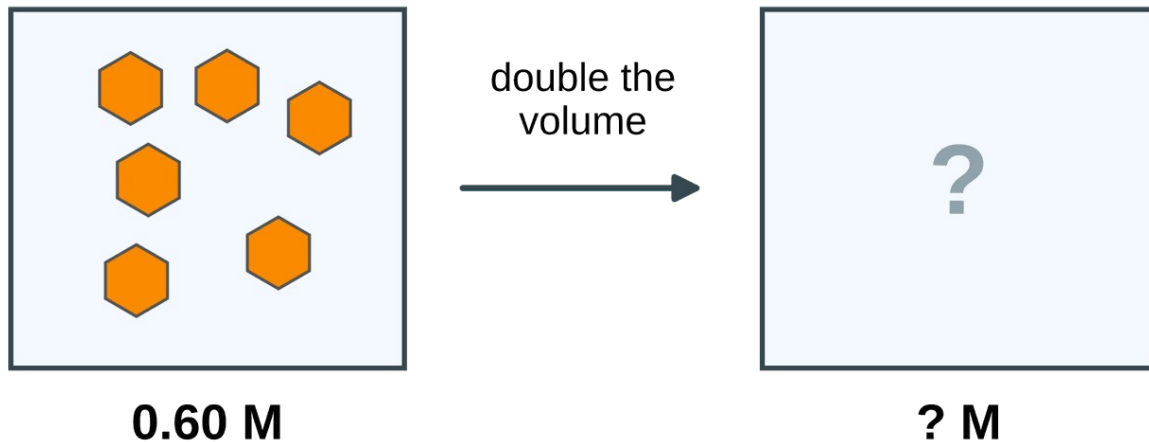
What is the molarity of the solution?



Example 4

A 0.60 M glucose solution is diluted to twice its volume.

How many particles belong in the same-size box? What is the new molarity?



Drawing Checklist

- **Particles:** ions apart, molecules whole
- **Ratio:** match the formula
- **Amount:** more particles = more concentrated
- **Orientation:** opposite charge faces the ion