

Exercise walk-through

3.8

Representations of Solutions

AP Chemistry

Solutions and solubility

A **solution** : **solute** dissolved in **solvent** .

Molarity and dilution

$$M = \frac{n}{V}, \quad M_1 V_1 = M_2 V_2$$

“Like dissolves like”: polar in polar,
nonpolar in nonpolar.



Solute and solvent make a solution

Drawing a particulate diagram of a solution

what it shows

the **solute** and **solvent** particles, at the particle level

an ionic solute

show it fully **dissociated** into **separate ions**, each surrounded by solvent molecules

the orientation

water's δ^- oxygen faces the cations, its δ^+ hydrogens face the anions

a molecular solute

show whole molecules, not fragments – sugar does not dissociate

a strong acid

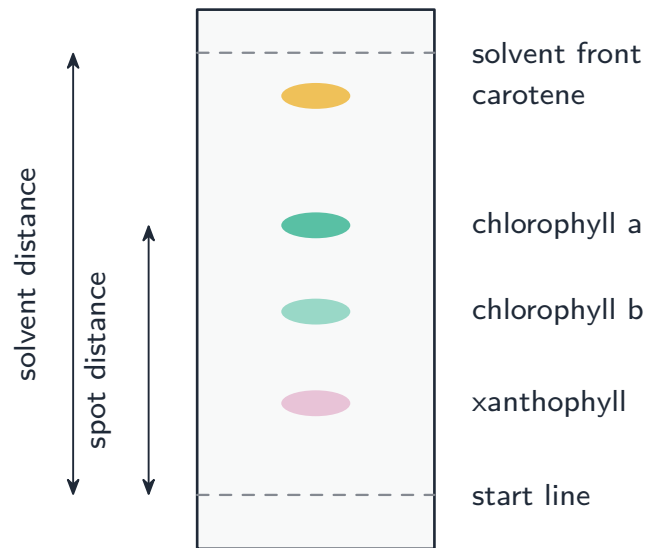
fully ionised: no intact HCl molecules should appear

the marks

come from correct **ratio**, **dissociation and orientation**, not from artistic quality

Count the particles you draw. A diagram showing the wrong stoichiometric ratio loses the mark however neat it is.

Separation of Solutions and Mixtures



Paper chromatography separates a mixture as the solvent rises up the paper

Exercises 2.1-2.3

2.1 What ions form when KBr dissolves?

[1]

2.2 How many ions are released per formula unit of Na_2SO_4 ?

[1]

2.3 Does a sugar solution conduct electricity? Give a reason.

[2]

Exercises 2.1-2.3

2.1 What ions form when KBr dissolves? [1]

2.1

- K^+ and Br^-
-

2.2 How many ions are released per formula unit of Na_2SO_4 ? [1]

2.2

- Three (two Na^+ and one SO_4^{2-})
-

2.3 Does a sugar solution conduct electricity? Give a reason. [2]

2.3

- No – sugar dissolves as neutral molecules, so there are no free ions to carry charge

Exercise 3.1

3.1 A particle diagram of dissolved NaCl should show

[1]

☐

A NaCl units floating together

B separate Na^+ and Cl^- ions

C Na and Cl atoms

D Cl_2 molecules

Exercise 3.1

3.1 A particle diagram of dissolved NaCl should show

[1]

☐

A NaCl units floating together

B separate Na^+ and Cl^- ions

C Na and Cl atoms

D Cl_2 molecules

3.1 B

- separate hydrated Na^+ and Cl^- ions

Exercise 3.2 (a)

3.2 0.20 mol of CaCl_2 is dissolved in water.

(a) Write the dissociation and the moles of each ion.

[2]

Exercise 3.2 (a)

3.2 0.20 mol of CaCl_2 is dissolved in water.

(a) Write the dissociation and the moles of each ion.

[2]

(a)

- $\text{CaCl}_2 \rightarrow \text{Ca}^{2+} + 2 \text{Cl}^-$; 0.20 mol Ca^{2+} and 0.40 mol Cl^-

Exercise 3.2 (b)

3.2 0.20 mol of CaCl_2 is dissolved in water.

(b) Find the total moles of ions in solution.

[1]

Exercise 3.2 (b)

3.2 0.20 mol of CaCl_2 is dissolved in water.

(b) Find the total moles of ions in solution.

[1]

(b)

- $0.20 + 0.40 = 0.60$ mol ions

Exercise 3.3

3.3 Explain why a solution of NaCl conducts electricity but a solution of glucose does not. [2]

Exercise 3.3

3.3 Explain why a solution of NaCl conducts electricity but a solution of glucose does not. [2]

3.3

- NaCl separates into mobile ions that carry charge; glucose stays as neutral molecules with no ions, so it cannot conduct