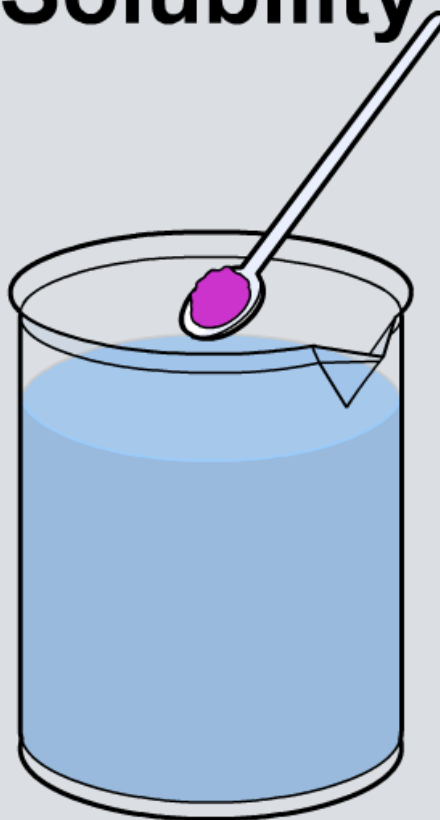
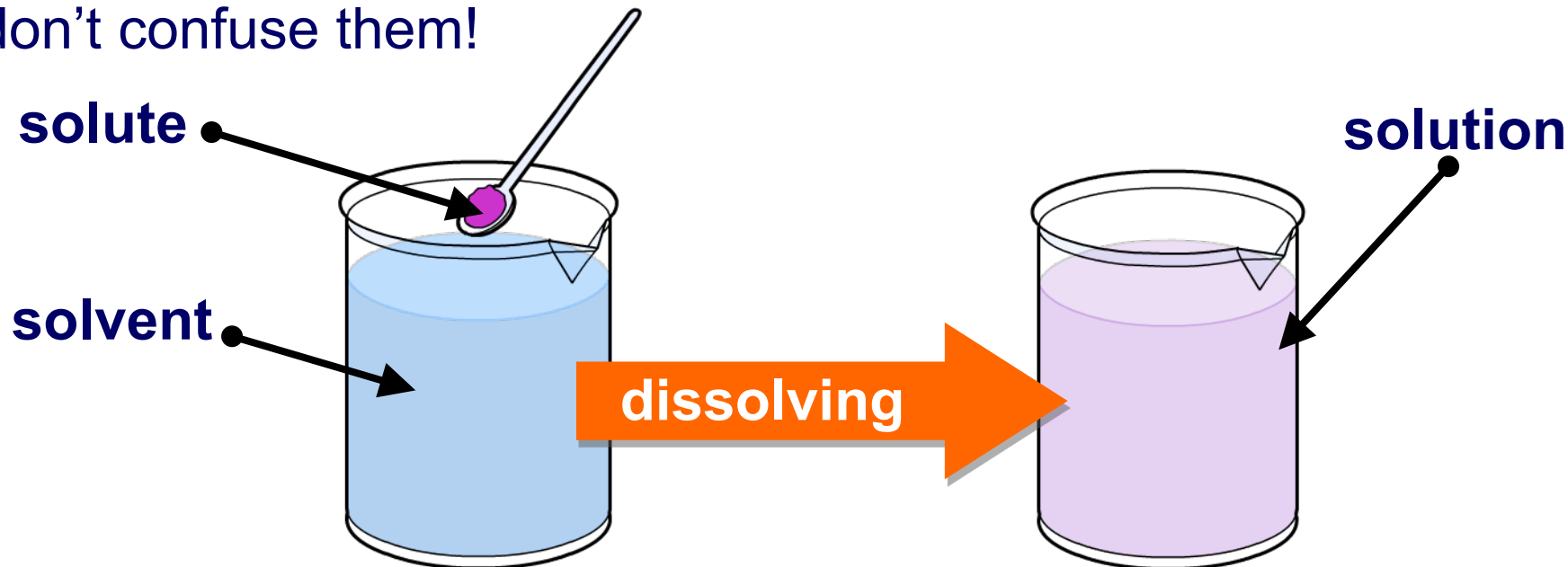


Solubility



Dissolving words

There are many words to do with solubility – make sure you don't confuse them!



Can you fill in the missing words in the sentences below?

If a substance CAN be dissolved it is called _____.

If a substance CANNOT be dissolved it is called _____.



What is solubility?

Solubility is defined as:

the amount of a substance that will dissolve in 1 dm³ of water at 25°C (1 dm³ = 1000 cm³ = 1 liter)

For example, the solubility of sodium chloride is 360 g/dm³.

Q1) What would happen if you added more than 360 g of sodium chloride to 1 dm³ of water?

Q2) What mass of sodium chloride would dissolve in 2 dm³ of water at 25°C?

Q3) What mass of sodium chloride would dissolve in 500 cm³ of water at 25°C?



An experiment was carried out to determine the solubility of a number of solid chlorides. Here are the results:

chloride	volume of water	mass of chloride that dissolved
CuCl_2	200 cm^3	151 g
MgCl_2	150 cm^3	80 g
KCl	100 cm^3	30 g
NaCl	200 cm^3	72 g
ZnCl_2	150 cm^3	618 g

How can you use the results to calculate the solubility in g/dm^3 of each solid?



How to calculate solubility

How is the solubility of solid chlorides calculated?

Click "play" to find out.

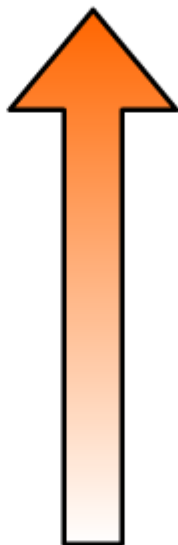
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NaCl	200 cm^3	72 g
ZnCl_2	150 cm^3	618 g



Which chloride is the most soluble?

Arrange the solids into order of solubility

most soluble



least soluble



solve



Solubility and temperature

The solubility of a substance depends on the temperature of the solvent. This table summarizes the effect of temperature on the solubility of four different solids:

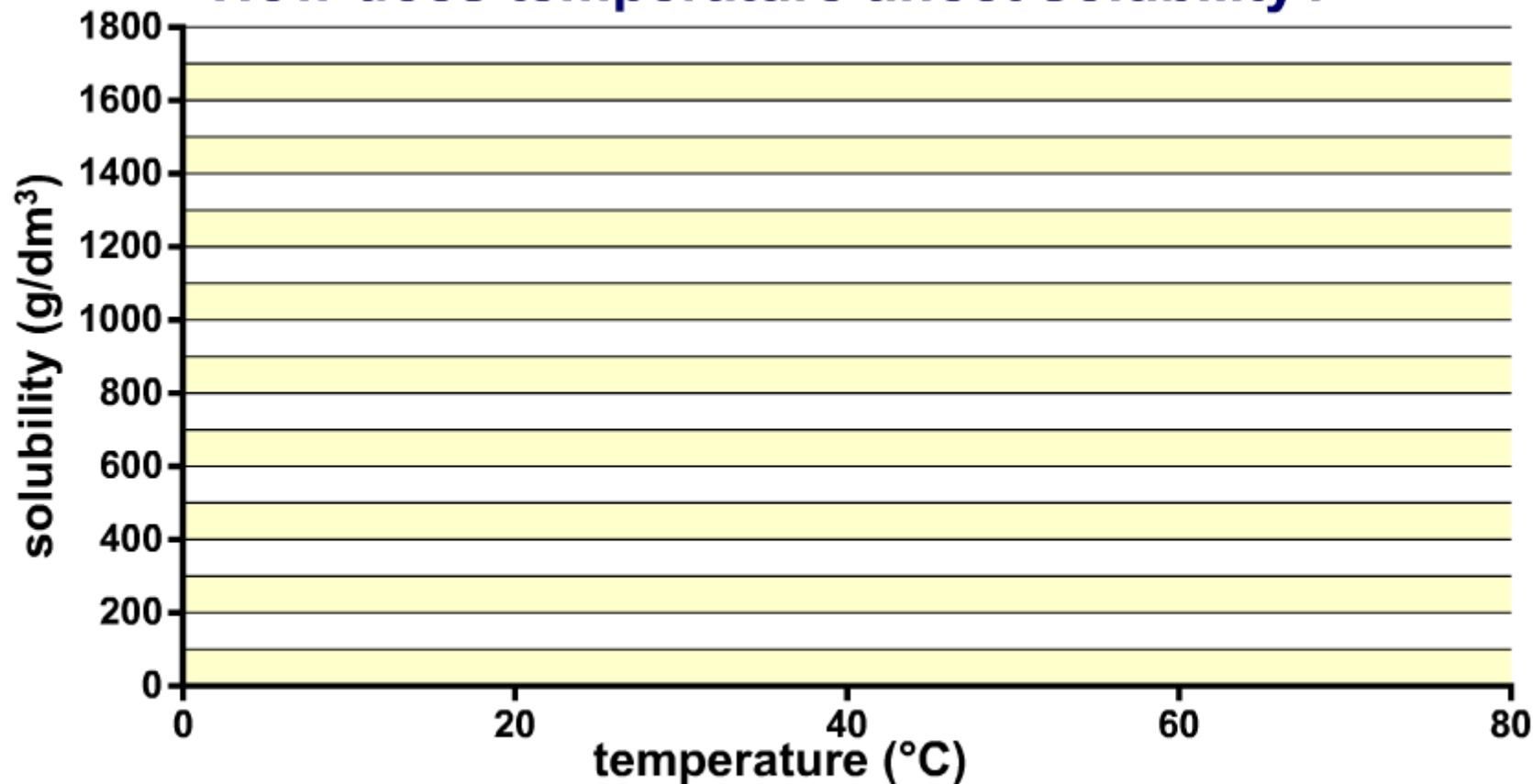
	temperature				
	0 °C	20 °C	40 °C	60 °C	80 °C
solid:	solubility (g/dm³)				
potassium chloride	280	342	401	458	513
sodium chloride	357	359	364	371	380
sodium nitrate	730	876	1020	1220	1480
potassium nitrate	139	316	613	1060	1670

How would you carry out this experiment?



Solubility and temperature graph

How does temperature affect solubility?



KCl

NaCl

KNO₃

NaNO₃



Saturation and crystallization

Solutions become **supersaturated** when they contain more solute than they would normally be able to dissolve.

This can happen when a saturated solution is cooled, or another change in conditions occurs that causes solubility to decrease.

The solute will stay in solution until a “seed” crystal is added. This causes it to crystallize out of the solution very quickly.

When it does this, it gives out heat energy.



Solubility of gases

Many gases are soluble in water. For example, fish can breathe because of the oxygen dissolved in water.

Carbonated drinks contain carbon dioxide that has been dissolved into them under pressure.



When the pressure inside the container is released, the carbon dioxide gas comes out of the solution, producing bubbles.



Solubility of gases and temperature

What happens to the solubility of gases as the temperature increases?

	temperature		
	0 °C	20 °C	50 °C
gas:	solubility (g/dm ³)		
nitrogen	0.029	0.019	0.012
oxygen	0.069	0.043	0.027
carbon dioxide	3.35	1.69	0.76

If you leave a glass of soda for a few days, it goes flat.

If you left one glass of soda in the refrigerator and another beside the radiator, which is likely to go flat first?



Solubility: true or false?

