

A solution is a mixture (can be physically separated) that is **homogenous** (same throughout) at the molecular level. Most commonly solutions are liquids with compounds dissolved in them, but alloys (mixed metals, like 18 K gold) are also solutions.



Salt water is a solution. Salt (the **solute**) is dissolved in water (the **solvent**). It can be physically separated, by boiling off the water, leaving salt.

Solution Terms:

Soluble compounds *can* be dissolved.

Insoluble compounds *cannot* be dissolved.

Saturated: cannot dissolve more solute (full).

Unsaturated: can dissolve more solute (unfull).

Supersaturated: overfull; some solute will precipitate (fall) out. Made by cooling a saturated solution.

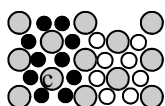
Dilute: to add liquid, reducing the concentration.

Increasing amount dissolved

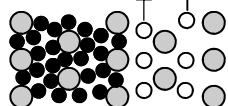
- More Pressure:** can force more gas into a liquid (CO₂ is pressurized into soft drinks. That's why they fizz when opened).
- Temperature:** Liquids expand just a bit with temperature. This expansion affects gases and solids differently.

More gas can be trapped in cold liquids. Gas molecules can escape easier in warm molecules are farther apart.

Cold liquid



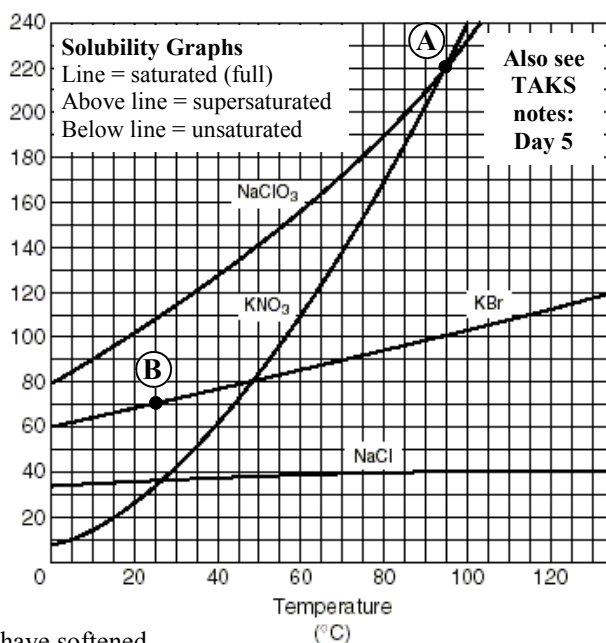
Warm liquid



More solid can be trapped in warm liquids, since there is more room for them to settle between them.

- Solid
- Gas
- Liquid (solvent)

Solubility (g/100 g of H₂O)



- Solution (y/n)? Sugar water ___; pure gold ___; oil and water ___; orange juice ___; alloys ___.
- A salt solution is too concentrated. How would you dilute it?
- Something is mixed in water and seems to dissolve. How can you prove if it was actually dissolved?
- Which one is the solvent in sugar water: the sugar or the water?
- A liquid is poured onto a piece of metal. Later on the metal seems to have softened.
 - Which is the solvent?
 - What is happening to the metal?
- Soluble or insoluble in water: ___ oil; ___ salt; ___ if it dissolves; ___ it falls to the bottom of the liquid and stays there.
- A solution can dissolve 82 grams of a liquid. Are the following amounts of solute saturated, unsaturated or supersaturated?
 - ___ 60 g; B. ___ 88 g; C. ___ 82 g.
- Which will dissolve faster: powdered sugar or sugar cubes; still water or stirred water; hot or cold water?
- Why do soft drinks fizz when opened?
- Which holds more dissolved gas: arctic oceans or tropical water?
- Why are there more fish in cold, northern oceans?
- Which can hold more dissolved solids: cold or hot liquids?
- Johnny's Burger Barn keeps their sweet tea cold. Bubba's Grill keeps their sweet tea hot. Which tea is sweeter?
- What will eventually happen to a supersaturated solution?
- (From the graph above) 100 g of water is at 95°C.
 - How much potassium bromide (KBr) can be dissolved at this temperature?
 - Would 140 g of KBr be saturated, unsaturated, or supersaturated in 100g of water at 95°C?
- At 50° C, how much KNO₃ can be dissolved in 200g of water?