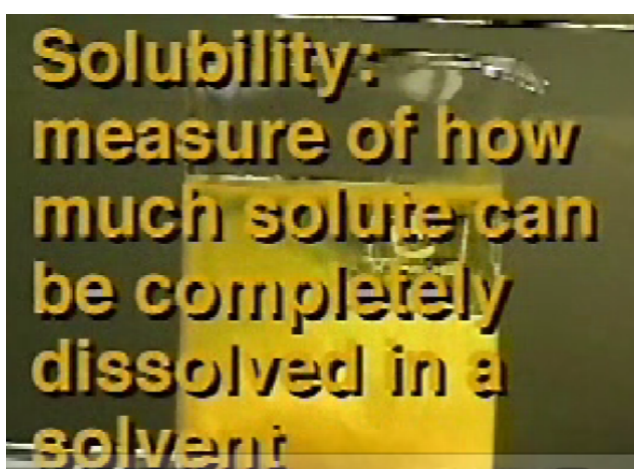


Recall



- there is a limit to how much solute can dissolve in a solvent

A solvent can only dissolve a certain amount of solute (like sugar) before sugar begins to form at the bottom of a beaker or cup.

Saturated Solutions

Every Solution has a limit to how much solute the solvent can dissolve

Saturated solution refers to solution in which no more solute will dissolve at the same temperature

Unsaturated Solutions

Every Solution has a limit to how much solute the solvent can dissolve

Unsaturated solution is one in which more of the solute could dissolve at the same temperature

Solubility

Every Solution has a limit to how much solute the solvent can dissolve

Solubility refers to the mass of a solute that can dissolve in a given amount of solvent for a saturated solution (at a given temperature)

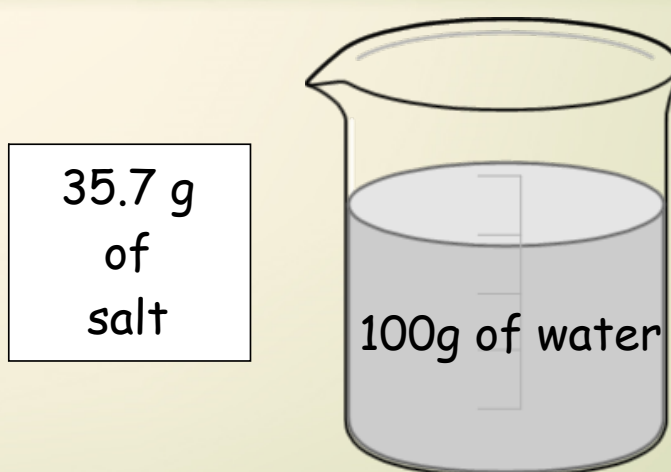
100g of water can only dissolve 35.7g of salt at 0°C

terms of solutions



Particle Theory explaining Solubility

100g of water can only dissolve 35.7g of salt



At this limit the solution is saturated - meaning that no more solid particles will dissolve because all of the water particles are already attracted to as many salt particles as it can be.

This chart shows how many grams of each substance can dissolve in 100ml of water

Substance	State	Solubility (g/100 g of water)
alum	solid	11.4
baking soda	solid	6.9
bluestone	solid	31.6
canola oil	liquid	insoluble
carbon dioxide	gas	0.34
Epsom salts	solid	70.0
ethyl alcohol	liquid	unlimited
limestone	solid	0.0007
nitrogen	gas	0.003
oxygen	gas	0.007
salt (sodium chloride)	solid	35.7
sugar (sucrose)	solid	179.2

Pause & Reflect

Imagine that you are conducting a test for saturation. Add a small amount of solute to a solution. In your Science Log, explain what the following results would tell you, using the words "saturated," "unsaturated," and "supersaturated."

- The crystal of solute dissolves.
- The crystal of solute does not dissolve.
- Many more crystals form.

Beyond the Limit: Supersaturated Solutions

It is possible to pass the saturation limit in some solutions. A solution that contains more solute than would normally dissolve at a certain temperature is called a supersaturated solution. You can prepare a supersaturated solution from some solutes by making a saturated solution, then cooling it without stirring. The solute stays dissolved for a short time. When a small crystal of solute is added, the extra solute quickly becomes crystals, as shown in Figure 6.3.

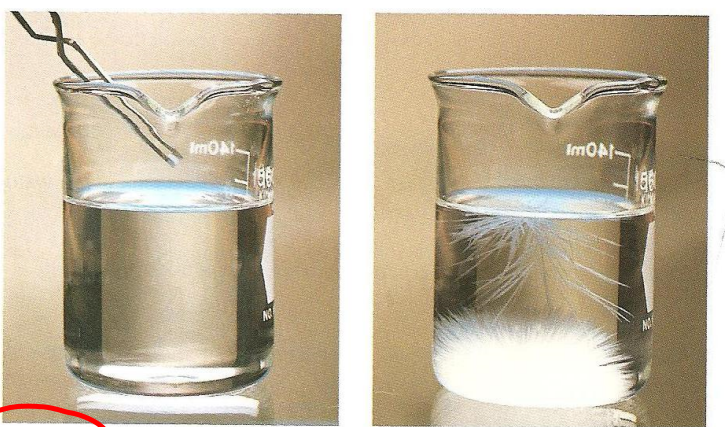


Figure 6.3 The solution of sodium acetate on the left is still homogeneous. No solid crystals have come out of the solution — at least, not yet. When a single crystal enters the supersaturated solution shown on the right, the excess solute crystallizes almost instantly.

<http://www.stevespanglerscience.com/experiment/00000078>

solubility-supersaturated

DidYouKnow?

Have you ever wondered what "dew point" means when you hear it on a weather report? Dew point is related to saturation. All air contains some dissolved water vapour. The dew point is the temperature at which the air is saturated with water vapour. If the air gets colder than the dew point, it will not be able to keep as much water vapour in solution. The water that cannot stay dissolved will turn into droplets of rain or flakes of snow.



13.3 Factors Affecting Solubility

- What causes different solubilities?
- General Rule: “Like dissolves like”
- The definition of “like” involves the nature of the bonding and structure of solute and solvent: ionic or polar covalent vs. non-polar covalent
- The solution process involves making and breaking ionic bonds and/or intermolecular forces (IMF).

1. What is the reason for the "at the same temperature" in both saturated and unsaturated solutions?

A. particles only dissolve at room temperature



B. the rate of dissolving is altered if the temperature is changed



C. liquid particles cannot dissolve solids or gases



2. What would happend to a mixture of salt and water that was concentrated at 40g of salt to 100g of water?

A. Unsaturated - too little solute



B. Saturated - just right



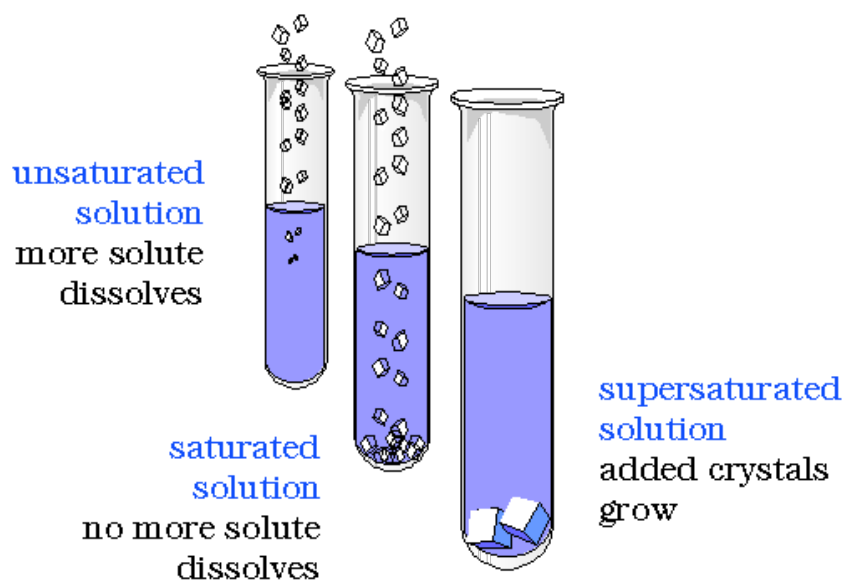
C. Over Saturated - too much solute



Solutions to

1)B 2) C

Saturated Solutions



<http://antoine.frostburg.edu/chem/senese/101/reactions/slides/img003.GIF>



1 When solute is added to a solvent and there is the potential for more solute to be dissolved the solution is said to be what?

- saturated
- unsaturated
- supersaturated
- hyposaturated

2 Ezkiel is making some coffee and he likes his coffee sweet. He is not sure how much to add so he adds a lot. When he is finished his cup of coffee he looks in the bottom of the cup and sees that there is some granuals of sugar in the bottom. What does this tell us about how Ezkiel's coffee solution?

- saturated
- unsaturated
- supersaturated
- hyposaturated

3 Which of the following is the most reasonable answer as to why solubility is measured in Mass.

- Because solids cannot be measured in litres because they are a solid
- Because liquid does not have the ability to be measured without a container and the containers can only be measured with mass
- Because the particles of the solids and liquid both have mass and the rates depend on the particles and the mass of the particle - mass is more precise
- Solubility is measured in ml rather than grams

4 Why is it important to consider that solutions must be at "the same temperature" in order to correctly compare them?

- particles move faster when they are cooled down and this would not be fair to the solutions
- Particles move faster when they are heated and this would not be fair to the solutions
- Particles move the same regardless of temperature, temperature is a safety issue and you don't want to get hurt
- Particles will change size when the temperature is change and this is not fair to the solution

Attachments

rate of dissolving worksheet.tif