Cosmo School

Science

Class-VI

Chapter-8

Mixture

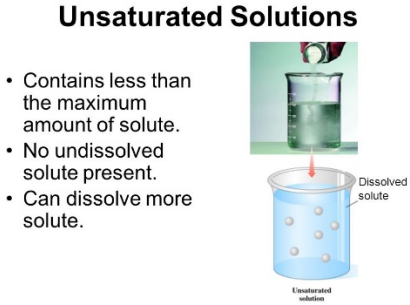
Subject teacher- Syeeda Sultana

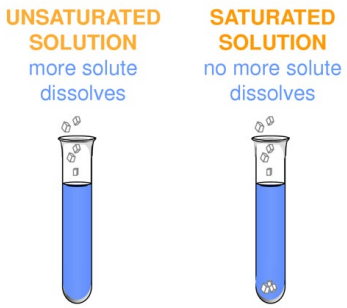
Lecture sheet with worksheet-2

Date-05.11.2020

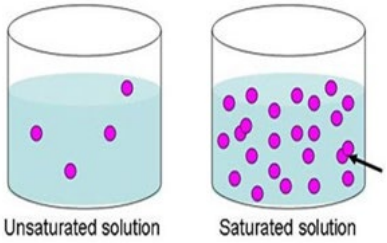
Saturated and unsaturated solution:

A solution can be saturated or unsaturated. Suppose we have a glass of water, we add salt to it. The salt is getting dissolved. That means this is an unsaturated solution. We add more salt, still the salt is getting dissolved. Again, this is an unsaturated solution. We go on adding salt, now there comes a point when we are adding salt, but the salt is not getting dissolved in the water. That is because the water is already completely filled with salt. So, when we add more salt to the solution, it cannot get dissolved. Now this is a saturated solution. So, a saturated solution is the one in which no more solute can be added at a specific temperature and an unsaturated solution is the one in which more solute can be added.



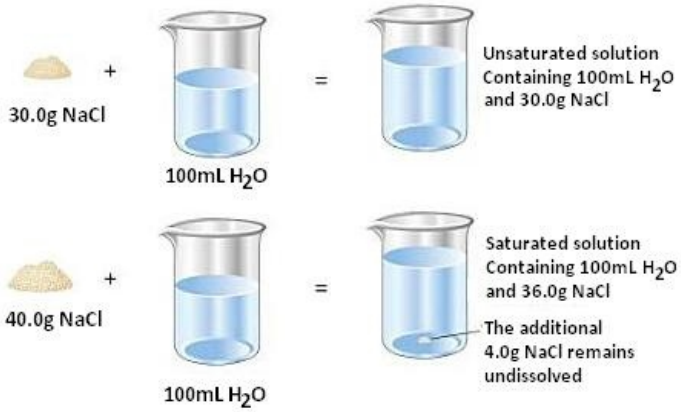


The picture below shows you the distribution of solute particles in the solutions. In unsaturated solution a smaller number of solute particles are present than that in saturated solution.



Solubility:

Suppose we have 100 grams of water. We go on adding salt to it. Maximum how much of salt can we add to 100 grams of water so that the solution becomes saturated? We can add maximum of 36 grams of salt, then the solution becomes saturated at a temperature of 25^0 Celsius.
This is what we call solubility of the salt. So, solubility of sodium chloride in water is 36 grams. Thus, solubility is defined as the maximum amount of solute that can be dissolved in 100 grams of solvent is called its solubility. Copper sulfate salt can be dissolved maximum of 21 grams in 100 grams of water at 25^0 celcuis. So, the solubility of copper sulfate is 21 grams. Solubility of sodium chloride is 36g. Solubility of sugar, as you can see is 211.4 gm. That means sugar has a maximum solubility out of all these salts. So, at 25-degree celcuis, if you have a hundred grams of water, maximum sugar that you can dissolve in that water is 211.4gm.



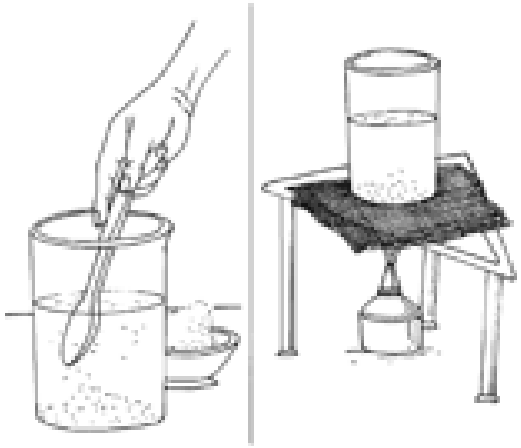
100g is approximately equal to 100 ml of water at a specific temperature and pressure. The mass of 100ml of water is 100 grams. The density of water is 1g/mL. Each milliliter of water weighs one gram, so 100g is 100mL. Different liquids have different densities.

Effect of temperature on solubility or on solution:

Task: To observe the effect of temperature on solution.

Required accessories: One beaker, stirrer, tripod stand, wire-net, one balance, salt, water and spirit lamp.

Procedure: Use the balance to take 100 gm water in a clean beaker. Adding salt to in little amounts and continue to stir. Stop adding salt when the added salt is no more dissolving. Now, place the beaker on the wire-net kept over the tripod and apply heat at the bottom of the beaker by the spirit lamp and continue to stir the solution.

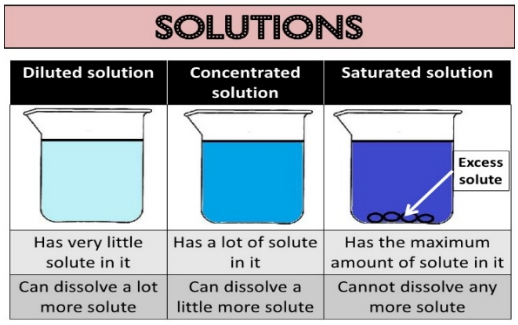


Observations and results:

Do you observe any change in the solution after applying heat? Yes, slowly the amount of undissolved salt begins to decrease. In this way, with the heating up of the solution for some time, the entire salt will be dissolved. Then it can be said that, the solubility of salt in water has been increased due to increase of temperature. For this reason the undissolved salt got dissolved after the solution was heated. But in case of some solutions (For example: cerium-sulphate and calcium hydro-oxide in water), solubility of the solute decreases with the increase of temperature.

Suppose we have hundred grams of water in which maximum 36 grams of salt can be dissolved at 25-degree celcuis. Now at the same temperature, we cannot dissolve more salt. So solubility of sodium chloride right now is only 36g. But now if we increase the temperature of this solution, if we heat the solution, the solubility of the solute will increase.
As the temperature increases the solubility of the solute increases, when the temperature decreases the solubility of the salt also decreases.

Now suppose we have a saturated salt solution. How do we make this saturated solution unsaturated? By heating the solution. When we heat this salt-water solution, the water particles start going far away from each other due to which the space between them increases and then more salt can be added, so to make a saturated solution, unsaturated we can heat it.
Now what happens if we cool down this saturated solution? When we cool down the saturated solution, the water particles come closer to each other. Now when they come closer to each other the space between them decreases due to which the salt which was dissolved in the solution, start precipitating out of the solution. So this is the effect of temperature on a saturated solution. If you heat the solution, you can add more solute to it, and if you cool down the solution, the solute which is added also comes out of the solution.



Exercise:

1. What is meant by saturated and unsaturated solution?
2. What is solubility?
3. As the temperature increases the solubility of the solute increases. — prove it experimentally.
4. How do we make a saturated solution unsaturated?
5. What happens if we cool down this saturated solution?
6. Make a comparison among the diluted, concentrated and saturated solution.