

Name \_\_\_\_\_

Period \_\_\_\_\_

## Solubility

Some solids dissolve only slightly. Other solids are very soluble - a lot can be dissolved in a small volume of solvent. The solubility of solids also depends on the temperature of the solvent.

This sort of graph is called a **solubility curve**.

### Activity 1:

Draw a graph to show the solubility of potassium nitrate, the figures are given below. The solubility goes up the side, the temperature goes along the bottom. Draw a smooth curve through the points on the graph:

<b>Temperature in °C</b>	0	20	40	60	80
<b>Solubility in g/100g water</b>	13	32	64	110	169

### Activity 2:

On a clean piece of paper write the title, copy the opening sentence from this sheet.

Tap the graph underneath.

Copy the following table on your paper, fill in the difference column and answer the questions that follow.

<b>Name of chemical</b>	<b>solubility at 15oC</b>	<b>solubility at 80oC</b>	<b>difference</b>
Copper (II) sulphate	18.8	55	
Potassium chloride	32.8	51.3	
Potassium nitrate	25.8	169	
Sodium carbonate	16.4	45.8	
sodium chloride	35.9	38.4	

1. Which is the least soluble at 15°C? \_\_\_\_\_ Which is most soluble at 15°C? \_\_\_\_\_
2. Which one is most soluble at 80°C? \_\_\_\_\_
3. Which one increases in solubility by the most? \_\_\_\_\_
4. Which one increases in solubility by the least? \_\_\_\_\_

### Activity 3:

Use the graph that you drew earlier in the lesson to answer the following questions (in sentences)

5. How many grams of potassium nitrate would dissolve in 100g of water at 50C? \_\_\_\_\_

6. At what temperature is the solubility of potassium nitrate 200g per 100g of water? \_\_\_\_\_

Imagine that you have heated 100 g of water to 60°C. You find that you can dissolve 110 g of potassium nitrate in it. ] you now cool the water to 20°C, only 32 g can stay dissolved in the water. The other 78 g will have to **crystallize** out.

- a. If you heated 100 g of water to 80°C, how much potassium nitrate could you dissolve in it? \_\_\_\_\_
- b. If you now cooled the solution to 40C, how much potassium nitrate would crystallise out? \_\_\_\_\_
- c. How much potassium nitrate do you think you could dissolve in 50 g of water at 20C? \_\_\_\_\_

#### Activity 4:

Read the following information and answer the questions (again in full sentences) from the bottom of the page.

1. Fortunately for fish, oxygen is slightly soluble in water. A fish takes water in through its mouth. The water passes over the fish's gills, which are able to remove the dissolved oxygen. The water, minus the dissolved oxygen, then passes out through the gill slits.
2. Fizzy drinks contain a dissolved gas - carbon dioxide. It isn't a very soluble gas, so it is forced into the water under pressure. When you unscrew the top of a bottle of fizzy drink, the pressure is released and the carbon dioxide comes back out of solution. You see bubbles of gas streaming to the surface. Carbon dioxide is added to drinks to improve the taste. If you leave the top off a bottle, most of the carbon dioxide will be released and the drink will taste 'flat'.
3. This table shows the solubility of some gases in water. The solubility of a gas is the volume in cm<sup>3</sup> that will dissolve in 1 cm<sup>3</sup> of water. The solubility is shown at three different temperatures.
4. Which of the gases is the most soluble?
5. Which of the gases is the least soluble?
6. In what way is the effect of temperature on the solubility of gases different from its effect on the solubility of solids?
7. Draw a solubility curve for ammonia on a fresh sheet of graph paper. How much ammonia would dissolve at 25°C?

Gas	Temperature in degrees C	
	10	20
Ammonia	870	680
Carbon dioxide	1.16	0.848
Oxygen	0.037	0.030