

Name: Answer Key

## Temperature and solubility



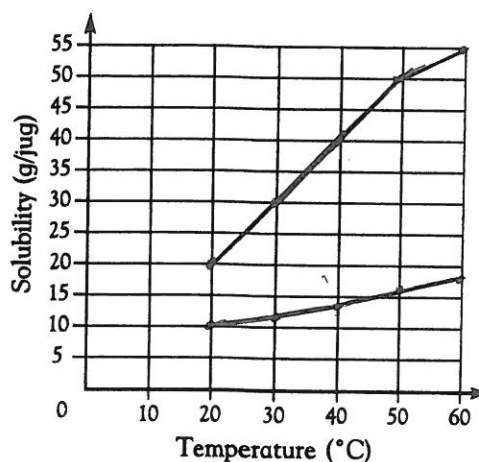
### Background knowledge

It is easier to dissolve soluble substances in warm water than in cold water. However, heat increases the solubility of some substances more than of others.

### Science activity

Make a line graph to plot the data from the table. Be sure to connect all the points after they are plotted. The data shows the solubility of table salt and of Epsom salts as temperature increases.

Temperature (°C)	Amount dissolved per jug (in grams)	
	Salt	Epsom salts
20	10	20
30	12	30
40	14	40
50	16	50
60	18	55



1 Do you see a relationship between temperature and the solubility of table salt? Explain.

Yes. As temperature increases, solubility of the table salt increases.

2 Is this relationship the same for Epsom salts? Explain.

Yes. As temperature increases, solubility of the Epsom salts increases.

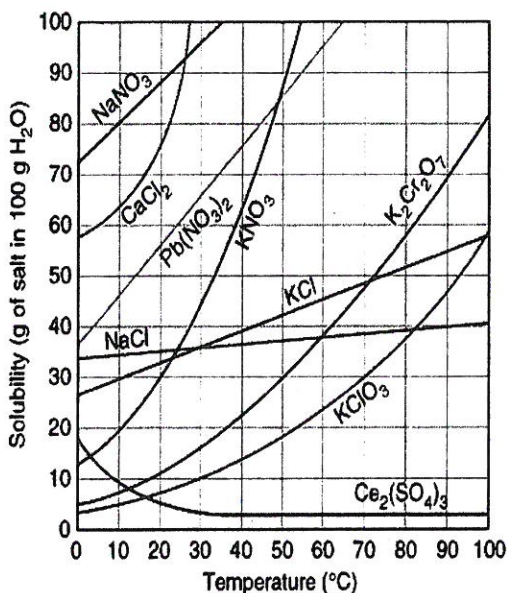
3 Describe any differences temperature has on the solubility of Epsom salts as compared to table salt.

Temperature will moderately increase the solubility in table salt (slight slope) whereas temperature has a very pronounced effect in increasing the solubility of Epsom salts.

Worksheet: Solubility Graphs

Name Answer key

Use the provided solubility graph to answer the following questions:



For questions 1 - 4 an amount of solute is given, and a temperature is stated. *If all of the solute could be dissolved in 100 g of water at the given temperature, would the resulting solution be unsaturated, saturated, or supersaturated?*

- 60 g KCl at 70 °C Supersaturated
- 10 g KClO<sub>3</sub> at 60 °C unsaturated
- 80 g NaNO<sub>3</sub> at 10 °C saturated
- 70 g CaCl<sub>2</sub> at 20 °C unsaturated

For questions 5 - 8 a solute and temperature are given. Tell how many grams of each solute must be added to 100 g of water to form a saturated solution at the given temperature.

- Pb(NO<sub>3</sub>)<sub>2</sub> at 10 °C ~46g
- Ce<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub> at 50 °C ~3g
- NaCl at 20 °C ~35g
- K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> at 50 °C 30g

For questions 9 and 10 underline the solution that is more concentrated.

- At 10 °C: a saturated solution of KNO<sub>3</sub> or a saturated solution of CaCl<sub>2</sub>.
- At 50 °C: a saturated solution of KNO<sub>3</sub> or an unsaturated solution of NaNO<sub>3</sub> consisting of 90 g of the solute dissolved in 100 g of water.

- If 115 g KNO<sub>3</sub> are added to 100 g of water at 35 °C, how many grams do not dissolve?

$$\begin{array}{r}
 115\text{g} \\
 - 55\text{g} \\
 \hline
 60\text{g}
 \end{array}$$