

TEACHING TRANSPARENCY WORKSHEET 42

Solubility-Temperature Graphs

Use with Chapter 14, Section 14.3

1. What variables are plotted on the graph? Solubility & Temperature
2. What is the unit of each variable?
Solubility (g solute/100g H₂O) Temperature (°C)
3. Use the graph to complete the table below.

Substance	Solubility at 10°C
Calcium chloride (CaCl ₂)	<u>64g CaCl₂/100g H₂O</u>
Cerium(III) sulfate (Ce ₂ (SO ₄) ₃)	<u>10g Ce₂(SO₄)₃/100g H₂O</u>
Potassium chloride (KCl)	<u>30g KCl/100g H₂O</u>
Potassium chlorate (KClO ₃)	<u>5g KClO₃/100g H₂O</u>
Sodium chloride (NaCl)	<u>36g NaCl/100g H₂O</u>

4. At what temperature are sodium chloride and potassium chloride equally soluble in water? 30°C
5. How does the solubility of cerium(III) sulfate differ from the solubility of potassium chlorate over the temperature range 0°C–100°C?
Ce₂(SO₄)₃ decreases
KClO₃ increases

6. How many grams of sodium chloride will dissolve in 1.0 kg of water at 20°C?
 $(\frac{1.0 \text{ kg H}_2\text{O}}{1}) \cdot (\frac{1000\text{g}}{1 \text{ kg}}) (\frac{36\text{g NaCl}}{100\text{g H}_2\text{O}}) = 360\text{g NaCl}$

7. Explain whether increasing temperature has a greater effect on the solubility of KCl or on the solubility of NaCl.
The KCl line has a greater slope than the NaCl line. This sharper rise indicates that the solubility of KCl increase more.

8. Explain how you might make a solution containing 42 g KCl dissolved in 100 g H₂O at a temperature of 40°C. What term describes this type of solution?

① Heat 100g of H₂O to 50°C or higher. ② Add 42g KCl until dissolved ③ Let solution cool to 40°C.
The resulting KCl solution is supersaturated solution.

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