

Name: _____ Date: _____ Class _____

Solubility Curve Worksheet and Sample Lab



You'll notice that for most substances, solubility increases as temperature increases. As discussed earlier in solutions involving liquids and solids typically more solute can be dissolved at higher temperatures. Can you find any exceptions on the graph?

exceptions on the graph? $NH_3, Ce_2(SO_4)_3$

Here's an example of how to read the graph. Find the curve for $KClO_3$. At $30^\circ C$ approximately 10g of $KClO_3$ will dissolve in 100g of water. If the temperature is

increased to $80^\circ C$, approximately 40g of the substance will dissolve in 100g (or 100mL) of water.

Directions: Use the graph to answer the following questions. REMEMBER UNITS!

1) What mass of solute will dissolve in 100mL of water at the following temperatures?

a. KNO_3 at $70^\circ C$ =

130g

b. $NaCl$ at $100^\circ C$ =

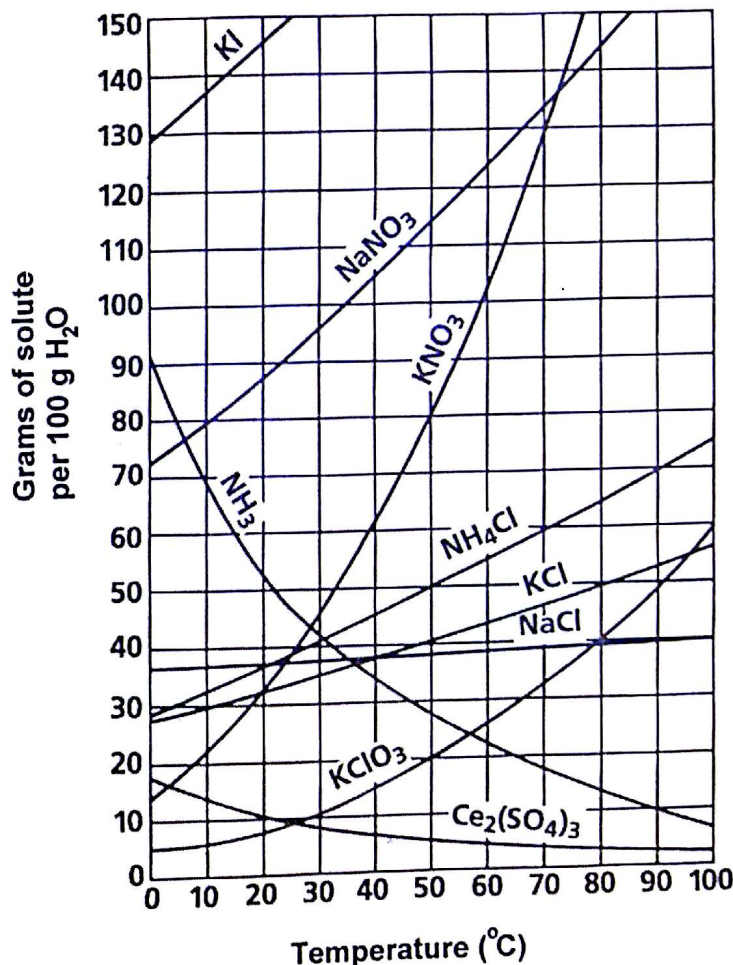
35g 40

c. NH_4Cl at $90^\circ C$ =

70g

d. Which of the above three substances is most soluble in water at $15^\circ C$. =

~~NH_4Cl~~ , $NaCl$



2) Types of Solutions

On a solubility curve, the lines indicate the concentration of a saturated solution - the maximum amount of solute that will dissolve at that specific temperature.

Values on the graph below a curve represent unsaturated solutions - more solute could be dissolved at that temperature.

1. a) What is the solubility of KCl at $5^\circ C$? 28g

b) What is the solubility of KCl at $25^\circ C$? 33g

c) What is the solubility of $Ce_2(SO_4)_3$ at $10^\circ C$? 15g

d) What is the solubility of $Ce_2(SO_4)_3$ at $50^\circ C$? 5g

2. a) At 90°C, you dissolved 10 g of KCl in 100. g of water. Is this solution saturated or unsaturated?

b) How do you know?

52g is saturated

3. A mass of 100 g of NaNO₃ is dissolved in 100 g of water at 80°C.

a) Is the solution saturated or unsaturated? unsaturated

b) As the solution is cooled, at what temperature should solid first appear in the solution? Explain.

35°

4. Use the graph to answer the following two questions:

Which compound is most soluble at 20 °C? KI

Which is the least soluble at 40 °C? Ce₂(SO₄)₃

5. Which substance on the graph is least soluble at 10°C? KClO₃

6. A mass of 80 g of KNO₃ is dissolved in 100 g of water at 50 °C. The solution is heated to 70°C. How many more grams of potassium nitrate must be added to make the solution saturated? Explain your reasoning (See question #2 on the other side for a hint)

130 g = saturated, so $130 - 80 = 50$ g more

Label the following solutions as saturated or unsaturated. If unsaturated, write how much more solute can be dissolved in the solution.

Solution	Saturated or Unsaturated?	If unsaturated: How much more solute can dissolve in the solution?
a solution that contains 70g of NaNO ₃ at 30°C (in 100 mL H ₂ O)	saturated	—
a solution that contains 50g of NH ₄ Cl at 50°C (in 100 mL H ₂ O)	saturated	—
a solution that contains 20g of KClO ₃ at 50°C (in 100 mL H ₂ O)	Sat	—
a solution that contains 70g of KI at 0°C (in 100 mL H ₂ O)	unsaturated	$130 - 70 = 60$ g

Solubility Curve Worksheet

1) Define solubility.

amount of solute that will dissolve

2) Look at the graph below. In general, how does temperature affect solubility?

increases

3) Which compound is LEAST soluble at 10 °C? KClO₃

4) How many grams of KCl can be dissolved in 100g of water at 80°C? 50g

5) How many grams of NaCl can be dissolved in 100g of water at 90°C? 40g

6) At 40°C, how much KNO₃ can be dissolved in 100g of water? 60g

7) Which compound shows the least amount of change in solubility from 0°C-100°C?

~~Ce₂(SO₄)₃~~ NaCl

8) At 30°C, 90g of NaNO₃ is dissolved in 100g of water. Is this solution saturated or unsaturated?

unsaturated

9) At 60°C, 72g of NH₄Cl is dissolved in 100g of water. Is this solution saturated or unsaturated?

saturated

10) A saturated solution of KClO₃ is formed from one hundred grams of water. If the saturated solution is cooled from 90°C to 50°C, how many grams of precipitate are formed? 50g - 20g = 30g

11) A saturated solution of NH₄Cl is formed from one hundred grams of water. If the saturated solution is cooled from 80°C to 40°C, how many grams of precipitate are formed? 65g - 45g = 20g

12) Which compounds show a decrease in solubility from 0°C-100°C?

NH₃, Ce₂(SO₄)₃

13) Which compound is the most soluble at 10°C?

KI

14) Which compound (besides Ce₂(SO₄)₃) is the least soluble at 50°C? KClO₃

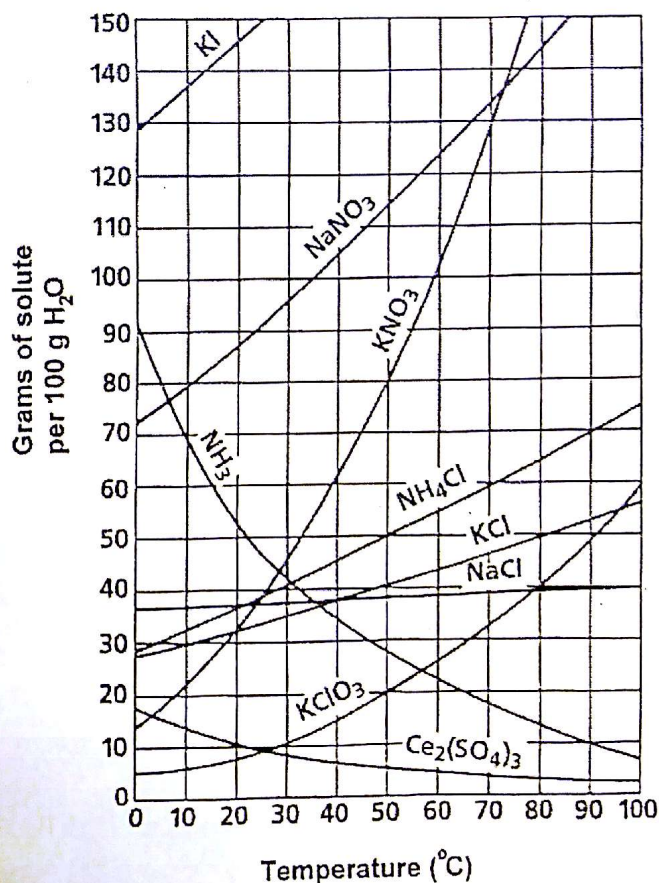
15) For each of the following solutions, explain how much of the solute will dissolve and how much will remain undissolved at the bottom of the test tube?

a) 120 g of KCl in 100 g of water at 80°C

50g
120 - 50 = 70g

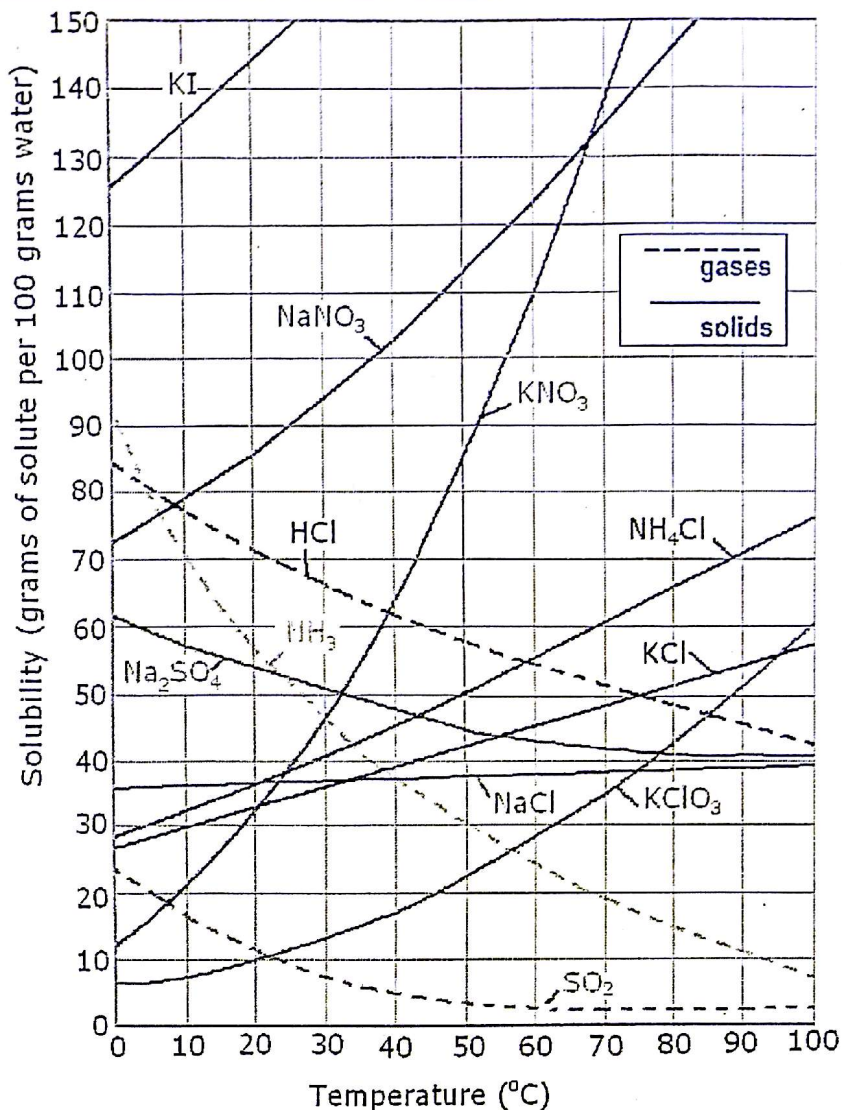
b) 130 g of NaNO₃ in 100 g of water at 50°C

115g
130 - 115 = 15g



UNIT 12 - SOLUTIONS

SOLUBILITY CURVES WORKSHEET



- 1.) Which compound is *least* soluble at 20 °C? At 80 °C?
20° - KClO₃ 80° - SO₂
- 2.) Which substance is the *most* soluble at 10 °C? At 50 °C? At 90 °C?
10° - KI 50° - NaNO₃ 90° - NH₄Cl
- 3.) The solubility of which substance is *most* affected by changes in temperature?
KNO₃
- 4.) The solubility of which substance is *least* affected by changes in temperature?
SO₂
- 5.) Are the following solutions saturated, unsaturated, or supersaturated?
 (Assume all are dissolved in 100 grams of water.)
 - (A) 50 grams of KNO₃ at 50 °C *un*
 - (B) 100 grams of NaNO₃ at 80 °C *un*
 - (C) 30 grams of KNO₃ at 25 °C *un*
 - (D) 50 grams of KCl at 80 °C *super*
 - (E) 65 grams of NH₄Cl at 70 °C *super*
 - (F) 90 grams of KNO₃ at 60 °C *un*

6.) NH₃ is a gas. Describe what happens to its solubility as the temperature goes from 20 °C to 80 °C.

decreases