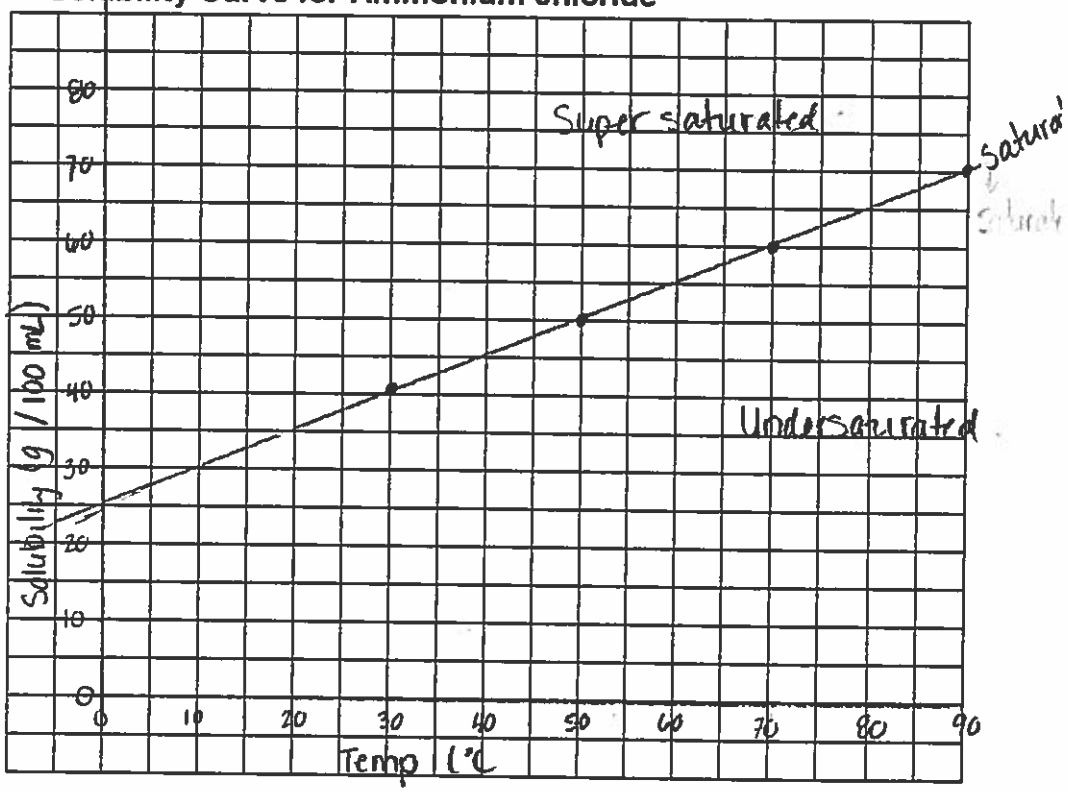
Mulatchen

SCH 3UI **Solubility Curves Practice ....**

1. Using the information given plot a solubility curve for ammonium chloride.

Temperature (°C)	Mass of NH_4Cl in g/100 mL of water
30	41.4
50	50.4
70	60.2
90	71.3

Solubility Curve for Ammonium chloride



The line on the curve represents the saturation point of the solid. Above the line represents a supersaturated solution and below the line represents an unsaturated solution. **Label these areas on your graph.**

2. Using the constructed graph in question 1, answer the following questions.
   a) Determine the amount of ammonium chloride that would be soluble at 60°C, in 100 mL of water. 55g.

   b) Determine the amount of ammonium chloride that would be soluble at 80°C, in 100 mL of water. 65g

   c) Calculate the mass of ammonium chloride that would be soluble in 25mL of water at 50°C.
   50°C 50g in 100 $\frac{50g}{x} = \frac{100}{25}$ x = 12.5g.

   d) A solution of 35g in 50 mL of water at 45°C would be considered which of the following?
   i) Unsaturated ii) Saturated (iii) Supersaturated
   45°C in 100mL, 47.5g. $\frac{47.5g}{x} = \frac{100}{50}$ x = 23.75g soluble. ∴ 35g - above saturat'n limit

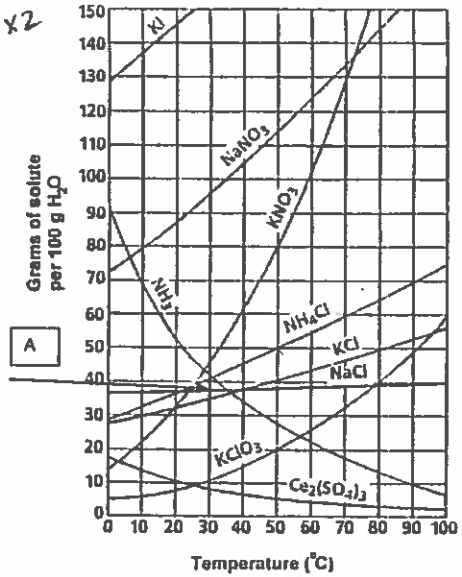
Solubility Curve Practice Problems Worksheet

For most substances, solubility increases as temperature increases. What are the exceptions on the graph below? NH_3, $Ce_2(SO_4)_3$

Part One: Reading Solubility Curves
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°C 130g
   b. NaCl at 100°C 40g
   c. NH_4Cl at 90°C 70g
   d. Which of the above three substances is most soluble in water at 15°C. NaCl

2. What mass of solute will dissolve in 200 **mL** of water at the following temperatures? x2
   a. KNO_3 at 70°C 260 g
   b. NaCl at 100°C 80 g
   c. NH_4Cl at 90°C 140 g



Part Two: Types of Solutions (saturated, unsaturated, supersaturated)

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 (below, above, on) a curve represent **unsaturated solutions** - more solute could be dissolved at that temperature.

Use the solubility curve on the first page to 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_2O)	unsat	25g
a solution that contains 50g of NH_4Cl at 50°C (in 100 mL H_2O)	sat	—
a solution that contains 20g of $KClO_3$ at 50°C (in 100 mL H_2O)	sat	—
a solution that contains 70g of KI at 0°C (in 100 mL H_2O)	unsat	60g

Additional Practice:

1. 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? unsat, below line

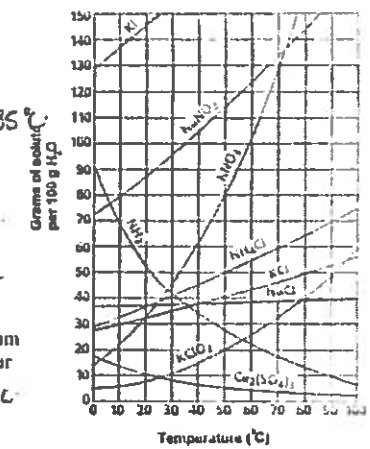
2. A mass of 100 g of $NaNO_3$ is dissolved in 100 g of water at 80°C.

   a) Is the solution saturated or unsaturated?

   b) As the solution is cooled, at what temperature should solid first appear in the solution? Explain. 35°C - 100g - sat @ 35°C

3. 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? $Ce_2(SO_4)_3$
   Which substance on the graph is least soluble at 10°C? $KClO_3$



4. A mass of 80 g of KNO_3 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.

   80g KNO_3 in 100g H_2O @ 50°C
   ↑ 70°C
   → 130g
   ∴ add 50g