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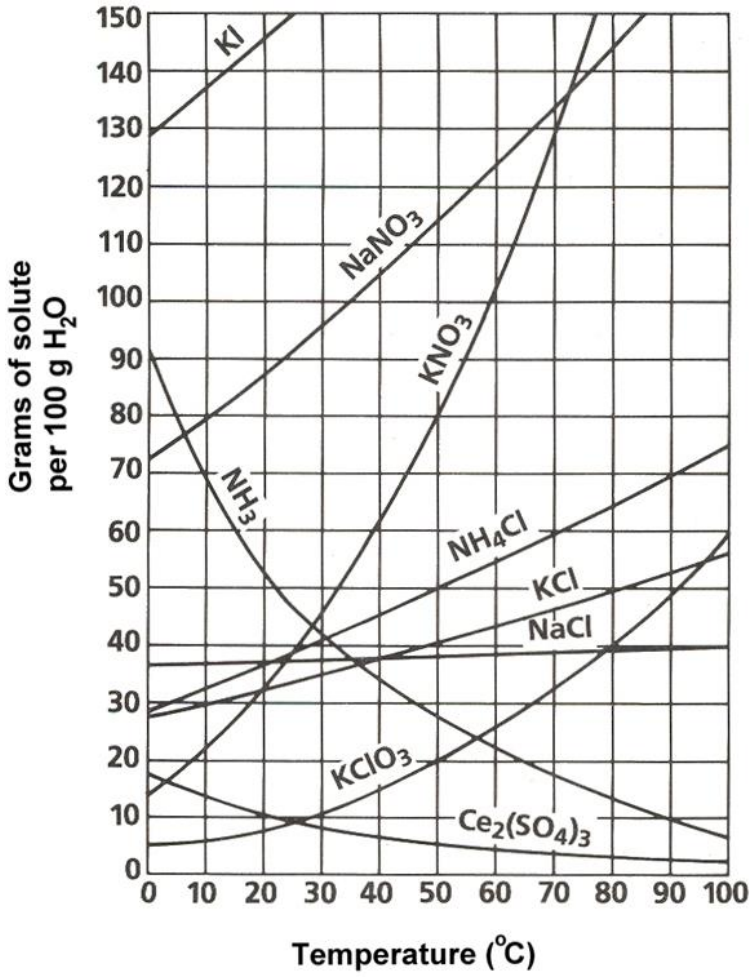
Unit 11 Solutions- Funsheets

Part A: Solubility Curves- *Answer the following questions using the solubility curve below. Include units!*

1) What mass of each solute will dissolve in 100mL of water at the following temperatures?
   a. KNO_3 at 70°C = _____
   b. NaCl at 100°C= _____
   c. NH_4Cl at 90°C= _____
   d. $KClO_3$ at 10°C= _____
   e. Which of the **above** three substances is most soluble in water at 15°C? _____



2) Which of the substances (if any) on the solubility curve gases? How do you know?

3) Which compound is most soluble at 20 ºC? _____

4) Which is the least soluble at 40 ºC? _____

5) Which substance is least soluble at 10°C? _____

6) How much NH_4Cl can be dissolved in **200 g of H_2O** at 50°C? _____

7) How much NaCl can be dissolved in **500 g of H_2O** at 100°C? _____

8) A mass of 80 g of KNO_3 is dissolved in 100 g of water at 50 ºC. The solution is heated to 70ºC. How many more grams of potassium nitrate must be added to make the solution saturated? _____

9) A mass of 70 g of $NaNO_3$ is dissolved in 100 g of water at 10 ºC. The solution is heated to 35ºC. How many more grams of sodium nitrate must be added to make the solution saturated? _____

10) On a solubility curve, the points on the curve indicate a _____ **solution**.

11) Values on the graph _____ a curve represent **unsaturated solutions**.

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

12) A solution that contains 70g of $NaNO_3$ at 30°C (in 100 mL H_2O): _____

13) A solution that contains 50g of NH_4Cl at 50°C (in 100 mL H_2O): _____

14) A solution that contains 70g of KI at 0°C (in 100 mL H_2O): _____

15) A solution that contains 20g of $KClO_3$ at 50°C (in 100 mL H_2O): _____

16) A solution that contains 20g of NH_3 at 80°C (in 100 mL H_2O): _____

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Part B: Solutions Vocabulary Part 1

Fill in the blank using the most appropriate vocabulary word or phrase.

1) A solution is a _____ mixture.
2) In a carbonated drink like Dr. Pepper, the solute is in the _____ state of matter, the solvent is in the _____ state of matter, and together they make a solution that is in the _____ state of matter.
3) Liquids, such as antifreeze and water, which dissolve in one another are said to be _____, while liquids that do not dissolve in one another, such as salad oil and vinegar are said to be _____.
4) Brass, a mixture of copper and zinc, is an example of a solid solution known as a(n) _____.
5) Because the particles in a solution are so small, _____ cannot be used to separate the components no do the components settle upon standing.
6) The rate of dissolution expresses how _____ a solute dissolves in a solvent.
7) A solution is _____ if it contains a relatively large amount of solute. A solution is _____ if it contains a relative small amount of solute.
8) List at least 3 ways concentration is measured in.
   _____
9) What is the most common way to express concentration in chemistry? _____
10) List an example of each of the following types of solutions:
    a. Solid solute in liquid solvent: _____
    b. Gas solute in liquid solvent: _____
    c. Solid solute in solid solvent: _____
    d. Liquid solute in liquid solvent: _____
11) A _____ is a graphical representation of solubility of substances.
12) A _____ solution is a solution at its maximum concentration for a given temperature and pressure.
13) A _____ solution is a solution that has not reached its maximum concentration.
14) A _____ solution is a solution that contains more solute than it saturation limit.

Answer the following questions in complete sentences.

15) Explain the phrase “like dissolves like”. Give an example and a non-example.

16) What substance is the universal solvent and how did it get this nickname?

17) Give an example of a solution and describe the solute and solvent.

18) Explain the terms solubility, soluble, and insoluble.

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19) Is it possible to dissolve a 5 pound back of flour in a cup of milk? Explain why or why not.

20) How are supersaturated solutions made?

21) What is concentration and why is it important?

22) Explain how a solution can be both dilute and saturated at the same time.

23) How would you prepare 1 L of a 0.5 M solution of HCl?

24) What is the most important solution in your life and why?

25) Describe the process of NaCl dissolving in water. Be detailed and specific.

26) If you were making a solution of lemonade and you wanted the solute to dissolve faster, list at least 3 different things you could increase the rate of dissolution.

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Part C: Molarity- *Answer the following questions. Show ALL WORK and include units!*

1) What is the formula and units of molarity?
   _____
2) Calculate the molarity of 0.060 moles $NaHCO_3$ in 1500. mL of solution.

3) What is the molar concentration of 1.0 mol of KCl dissolved in 750. mL of solution?

4) Calculate the molarity of 34.2 grams of sugar, $C_{12}H_{22}O_{11}$ in 500. mL of solution.

5) Calculate the number of moles of NaCl contained in 0.500L of a 1.5M solution.

6) Calculate the number of moles of NaOH contained in 250. mL of a 0.05M solution.

7) If 10.7 g of NH_4Cl is dissolved in water to make 800 mL of solution, what will be its molarity?

8) Calculate the molarity of a solution prepared by dissolving 6.80 grams of $AgNO_3$ in enough water to make 2.50 liters of solution.

9) What volume of solvent is required to prepare of 0.700 M $CaCl_2$ using 0.85g of $CaCl_2$?

10) How many moles, of CaCl2 will be required to prepare the above solution?

11) How many grams of KNO_3 will be required to prepare 800 mL of 1.40 M KNO3?

12) Calculate the volume of a 1.25 M solution of HCN made from 31.0 grams of HCN.

13) Calculate the volume of a 3.50 molar solution of H_2SO_4 made from 49.0 grams of H_2SO_4?

14) Your teacher asks you to prepare 500 mL of a 2.75 molar solution of NaCl for a lab. Write a step-by-step procedure describing how you would carry out this task.

15) Your teacher asks you to prepare 250 mL of a 0.35M solution of $HC_2H_3O_2$ for an upcoming lab. Write a step-by-step procedure describing how you would carry out this task.

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Part D: Colligative Properties- *Answer the following questions.*

1) What is a colligative property?

2) What property are colligative properties dependent on?

3) What is a dissociation factor?

4) List 2 examples of colligative properties.

5) Which would freeze faster a 0.50M solution of sugar water or a 1.0M solution of sugar water? _____Which would boil faster? _____
6) How will adding 10.0g of sodium chloride to a 0.10M solution of salt water affect…?
   a. Concentration? Increase or Decrease
   b. Boiling Point? Increase or Decrease
   c. Freezing Point? Increase or Decrease
7) How will adding 100mL of solvent to a 0.10M solution of salt water affect…?
   a. Concentration? Increase or Decrease
   b. Boiling Point? Increase or Decrease
   c. Freezing Point? Increase or Decrease
8) Using colligative properties, in complete sentences explain why we add antifreeze to the solution in our engines in the winter time. Discuss concentration, freezing point, and importance of antifreeze.

9) Create a model of the molecular level of the solution before and after antifreeze was added.

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KEY	

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Part E: Dilutions- *Answer the following questions. Show ALL WORK and include units.*

1) What is a dilution?

2) What is the mathematical formula for calculating dilutions?

3) Describe the step-by-step process of diluting 0.50L of a 1.0M solution of NaCl to a 0.50M solution of NaCl.

4) In question number 2, during the dilution, what happened to…
   a. The concentration? Increase – Decrease – Remain the same
   b. The volume of the solution? Increase – Decrease – Remain the same
   c. The amount of solvent? Increase – Decrease – Remain the same
   d. The amount of solute? Increase – Decrease – Remain the same
5) Model the solution on the molecular level from number 2 before and after the dilution. Include a key if necessary.

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Answer the following questions. Show ALL WORK and include units.

6) If 45 mL of water is added to 250mL of a 0.75 M K_2SO_4 solution, what will the molarity of the diluted solution be?

7) If water is added to 175mL of a 0.45 M KOH solution until the volume is 250 mL, what will the molarity of the diluted solution be?

8) How much 0.075 M NaCl solution can be made by diluting 450 mL of 9.0 M NaCl?

9) If 550mL of a 3.50 M KCl solution are set aside an allowed to evaporate until the volume of the solution is 275 mL, what will the molarity of the solution be?

10) How much water would need to be added to 750 mL of a 2.8 M HCl solution to make a 1.0M solution?

11) If I add water to 100 mL of a 0.15 M NaOH solution until the final volume is 150 ML, what will the molarity of the diluted solution be?

12) How much 0.05 M HCl solution can be made by diluting 250 mL of a 10 M HCl solution?

13) I have 345 mL of a 1.5 M NaCl solution. If I boil the water until the volume of the solution is 250 mL, what will the molarity of the solution be?

14) How much water would I need to add to 500 mL of a 1.0 M KCl solution to make a 2.4 M solution?