Molarity Practice Problems #1

1. How many grams of potassium carbonate are needed to make 280 mL of a 2.5 M solution?

2. How many liters of water are needed to make a 4.00 M solution using 75.0 grams of lithium bromide?

3. What is the concentration if I have 450 mL of iron (II) chloride solution that contains 9.6 grams of iron (II) chloride solute?

4. How many grams of ammonium sulfate are needed to make a 0.25 L of solution at a concentration of 6.0 M?

5. If I have 2.5 L of a solution that contains 660 grams of calcium phosphate, what is this solution's concentration?

6. How many grams of copper (II) fluoride are needed to make 6.7 liters of a 1.2 M solution?

Molarity Practice Problems #2

1. How many liters of 0.88 M LiF solution can be made with 25.5 grams of solute?

2. What is the concentration of a solution that has a volume of 660 mL and contains 33.4 grams of aluminum acetate?

3. How many liters of 0.75 M solution can be made using 75 grams of lead (II) oxide?

4. How many kilograms of manganese (IV) oxide are needed to make 5.6 liters of a 2.1 M solution?

5. What is the concentration of a solution with a volume of 9.00 mL that contains 0.025 grams of iron (III) hydroxide?

6. What is the concentration of a solution containing 3.3 mL of solvent and 12 grams of ammonium sulfite?

SOLUBILITY CURVE WORKSHEET

Use your solubility curve graphs provided to answer the following questions.

1. What are the customary units of solubility on solubility curves?

2. Define solubility.

3. According to the graph, the solubility of any substance changes as _____ changes.

4. List the substances whose solubility decreases as temperature increases.

5. Which substance is least affected by temperature changes?

6. How many grams of ammonium chloride (NH_4Cl) at 50°C?

7. _____ and _____ have the same solubility at approximately 78°C.

8. Which compound is least soluble in water at 10°C?

9. How many grams of KNO_3 can be dissolved at 50°C?

10. Are the following solutions unsaturated, saturated, or supersaturated?
    a. a.45g of $NaNO_3$ in 100 g of water at 30°C.
    b. b.60g of $KClO_3$ in 100 g of water at 90°C.

11. How many grams of sodium chloride, NaCl are required to saturate 100 grams of water at 100° C?

12. How many grams of $NaNO_3$ are required to saturate 100 grams of water at 75°C?

13. How many grams of KCl will saturate water at 20°C?

14. At what temperature would 25g of potassium chlorate ($KClO_3$) dissolve?

15. At what temperature would 60 g of NH_4Cl dissolve?

16. 89 g $NaNO_3$ is prepared at 30°C.
    a) Will all of the salt dissolve?
    b) What mass of $NaNO_3$ will dissolve at this temperature?

17. If 50 grams of NH_4Cl is dissolved at 50°C, how many additional grams NH_4Cl would be needed to make the solution saturated at 80°C?

18. At 50°C, how many grams of KNO_3 will dissolve?

19. At 70°C, how many grams of cerium (III) sulfate ($Ce_2(SO_4)_3$) dissolve?

20. Determine if each of the following is unsaturated, saturated, or supersaturated.

    a. 55g of NH_3 at 20°C

    b. 10g of $Ce_2(SO_4)_3$ at 10°C

    c. 110g of KNO_3 at 60°C.

    d. 65g of NH_4Cl at 80°C.

    e. 12g of NH_3 at 90°C.

    f. 78g of $NaNO_3$ at 10°C.

    g. 145g of $NaNO_3$ at 80°C.

    h. 35g of NaCl at100°C.

Molarity Practice Problems #1 Answer Key

1. How many grams of potassium carbonate are needed to make 280 mL of a 2.5 M solution?
    Using the molarity equation (M = mol/L), we can find that we'll need 0.70 mol of potassium
    carbonate. Given that the molar mass of K2CO3 is 138.21 g/mol, this means that we'll require
    97 grams

2. How many liters of water are needed to make a 4.00 M solution using 75.0 grams of lithium
    bromide? Given that the molar mass of LiBr is 86.85 g/mol, we'll find that we have 0.864 mol
    LiBr. Plug that into the molarity equation to find that we'll make 0.216 L of solution.

3. What is the concentration if I have 450 mL of iron (II) chloride solution that contains 9.6grams of
    iron (II) chloride solute? Given that the molar mass of FeCl2 is 126.75 g/mol, we can determine
    that we have 0.076 mol FeCl2 solute, which gives us a solution of concentration 0.17 M.

4. How many grams of ammonium sulfate are needed to make a 0.25 L of solution at a
    concentration of 6.0 M? The handy molarity equation tells us that we'll need 1.5 moles of
    solute, which translates into a mass of 2.0 x 102 grams

5. If I have 2.5 L of a solution that contains 660 grams of calcium phosphate, what is this solution's
    concentration? If I have 2.5 liters of this solution and 2.13 moles of calcium phosphate, our
    handy molarity equation tells us that the concentration of this solution is 0.85 M.

6. How many grams of copper (II) fluoride are needed to make 6.7 liters of a 1.2 M solution? 820
    grams (molar mass 101.54 g/mol, molarity equation indicates we'll need 8.0 moles)(Note:
    Thanks to Anna Hsu for figuring out that the answer key to #6 had a mistake. It has been
    corrected, for which you can thank her!)

Molarity Practice Problems #2 ANSWER KEY

1. How many liters of 0.88 M LiF solution can be made with 25.5 grams of solute? 1.1 L

2. What is the concentration of a solution that has a volume of 660 mL and contains 33.4 grams of aluminum acetate? 0.25 M

3. How many liters of 0.75 M solution can be made using 75 grams of lead (II) oxide? 0.45

4. How many kilograms of manganese (IV) oxide are needed to make 5.6 liters of a 2.1 M solution? 1.0 kg

5. What is the concentration of a solution with a volume of 9.00 mL that contains 0.025 grams of iron (III) hydroxide? 0.026 M

6. What is the concentration of a solution containing 3.3 mL of solvent and 12 grams of ammonium sulfite? 0.0308 M

These are suggested answer corrections from a fellow student.

"Molarity Practice Problems #2," the answer to number six is wrong. The correct answer is 31.21 M.

Also, I believe that, even though this is opinion based, number fifteen on the "Solubility Curve Worksheet" also happens to be wrong. It appears that 60 grams of NH4Cl (ammonium chloride) is dissolved at about 72 degrees Celsius, rather than at 70 degrees Celsius.

Lastly, number 16, part B, also appears to be wrong. The correct answer should be 96 degrees Celsius.

CPHS Chemisty - Mr. G Edelman

SOLUBILITY CURVE WORKSHEET ANSWER KEY

KEY: Use your solubility curve graphs provided to answer the following questions.

1. What are the customary units of solubility on solubility curves?
   Degrees Celsius and grams of solute/100g of water
2. Define solubility.
   A measure of how much solute can dissolve in a given amount of solvent.
3. According to the graph, the solubility of any substance changes as temperature changes.
4. List the substances whose solubility decreases as temperature increases.
   NH_3 and $Ce_2(SO_4)_2$
5. Which substance is least affected by temperature changes?   NaCl
6. How many grams of ammonium chloride (NH_4Cl) at 50°C? 50g
7. NaCl   and $KClO_3$ have the same solubility at approximately 78°C.
8. Which compound is least soluble in water at 10°C? $KClO_3$
9. How many grams of KNO_3 can be dissolved at 50°C? 80g
10. Are the following solutions unsaturated, saturated, or supersaturated?
    a. 45g of $NaNO_3$ in 100 g of water at 30°C. unsaturated
    b. 60g of $KClO_3$ in 100 g of water at 90°C. supersaturated
11. How many grams of sodium chloride, NaCl are required to saturate 100 grams of water at 100°C?   40g
12. How many grams of $NaNO_3$ are required to saturate 100 grams of water at 75°C? 140g
13. How many grams of KCl will saturate water at 20°C? 33g
14. At what temperature would 25g of potassium chlorate ($KClO_3$) dissolve? 60 C
15. At what temperature would 60g of NH_4Cl dissolve? 70 C
16. 89 g $NaNO_3$ is prepared at 30°C.
    a) Will all of the salt dissolve? YES
    b) What mass of $NaNO_3$ will dissolve at this temperature? 95g
17. If 50grams of NH_4Cl is dissolved at 50°C, how many additional grams NH_4Cl would be needed to make the solution saturated at 80°C? 15g
18. At 50°C, how many grams of KNO_3 will dissolve? 80g
19. At 70°C, how many grams of cerium (III) sulfate ($Ce_2(SO_4)_3$) dissolve? 5g
20. Determine if each of the following is unsaturated, saturated, or supersaturated.
    a. 55g of NH_3at 20°C supersaturated   f. 78g of $NaNO_3$ at 10°C.saturated
    b. 10g of $Ce_2(SO_4)_3$ at 10°C unsaturated   g. 145g of $NaNO_3$ at 80°C. saturated
    c. 110g of KNO_3at 60°C. supersaturated   h. 35g of NaCl at100°C.   unsaturated
    d. 65g of NH_4Cl at 80°C. saturated
    e. 12g of NH_3at 90°C. supersaturated