

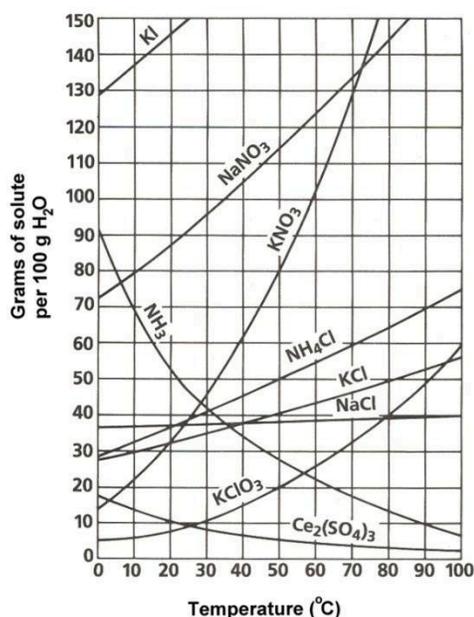
Name: _____

Solubility & Hydrates Practice #1

1) For the following compounds, determine if they are soluble (S) or insoluble (I) in water:

- | | | | | | |
|--------------------|---------|--|---------|---------------------------------|---------|
| A) NaNO_3 | = _____ | E) BaSO_4 | = _____ | I) AgNO_3 | = _____ |
| B) MgSO_4 | = _____ | F) $\text{Zn}(\text{C}_2\text{H}_3\text{O}_2)_2$ | = _____ | J) Na_2S | = _____ |
| C) KOH | = _____ | G) MgI_2 | = _____ | K) FePO_4 | = _____ |
| D) CaCO_3 | = _____ | H) PbCl | = _____ | L) $(\text{NH}_4)_2\text{CO}_3$ | = _____ |

Use the graph below to answer questions #2 - #5



2) Which compound shows the greatest increase in solubility with increasing temperature?

3) Which compounds show a decrease in solubility with increasing temperature?

4) How many grams of sodium nitrate could be dissolved in 100 grams of water at a temperature of 50°C?

5) How many grams of ammonium chloride could be dissolved in 200 grams of water at a temperature of 90°C?

7) A solution is prepared by dissolving 38.2 g of potassium carbonate in water to make 0.850 L of solution. What is the molarity of this solution?

7) _____

8) Describe how you would prepare 500 mL of a 1.25 M potassium chromate solution.

9) Anhydrous lithium perchlorate (4.78 g) was dissolved in water and re-crystallized. Care was taken to isolate all the lithium perchlorate as its hydrate. The mass of the hydrated salt obtained was 7.21 g. What is the chemical formula of the hydrate?

9) _____

10) The three compounds shown below are all added to water. Draw a picture demonstrating the solubility of each compound, and briefly describe why you drew that diagram.



11) Answer the following questions relating to gravimetric analysis. In the first of two experiments, a student is assigned the task of determining the number of moles of water in one mole of MgCl₂ · n H₂O. The student collects the data shown in the following table:

Mass of empty container	22.347 g
Initial mass of sample and container	25.825 g
Mass of sample and container after first heating	23.982 g
Mass of sample and container after second heating	23.976 g
Mass of sample and container after third heating	23.977 g

a) Explain why the student can correctly conclude that the hydrate was heated a sufficient number of times in the experiment

b) Use the data above to:

i) calculate the total number of moles of water lost when the sample was heated, and

11bi) _____

ii) determine the formula of the hydrated compound.

11bii) _____

c) A different student heats the hydrate in an uncovered crucible, and some of the solid spatters out of the crucible. This spattering will have what effect on the calculated mass of the water lost by the hydrate? Justify your answer.

In the second experiment, a student is given 2.94 g of a mixture containing anhydrous MgCl₂ and KNO₃. To determine the percentage by mass of MgCl₂ in the mixture, the student uses excess AgNO₃(aq) to precipitate the chloride ion as AgCl(s).

d) The student determines the mass of the AgCl precipitate to be 5.48 g. On the basis of this information, calculate each of the following.

i) The number of moles of MgCl₂ in the original mixture.

11di) _____

ii) The percent by mass of MgCl₂ in the original mixture.

