FLINN SCIENTIFIC

Name_____

Solubility and Temperature

Data Table

Sample		Mass of empty test tube	Mass of test tube plus KNO_3	Mass of test tube plus KNO_3 plus water	Saturation temperature
Series I	A				
	B				
	C				
Series II	A				
	B				
	C				

Post-Lab Calculations and Analysis *(Use a separate sheet of paper to answer the following questions.)*

Construct a Results Table to summarize the results of the following calculations for all solutions (Series I and Series II).

1. Calculate the mass of potassium nitrate and the mass of water in each solution.
2. Calculate the ratio of the mass of potassium nitrate to the mass of water for each solution. *Example:* For 0.47 g KNO_2 and 1.06 g H_2O, the mass ratio is equal to 0.47 g/1.06 g or 0.44.
3. Multiply the mass ratio by 100 to determine the concentration of each saturated solution in grams of potassium nitrate per 100 grams of water.
4. Plot a graph of solubility of potassium nitrate (in g of solute/100 g of water) on the y-axis versus temperature on the x-axis. Scale each axis as necessary. Draw a smooth, best-fit curved line though the data points. Don't forget to label each axis and give the graph a title!
5. Using your graph, estimate the solubility of potassium nitrate in water at (a) 0 °C; (b) 50-°C; and (c) 100 °C.
6. Using your graph, predict the temperature at which each of the following mixtures of potassium nitrate in water would form a saturated solution: *(a)* 15 g KNO_3 in 25 g H_2O; *(b)* 100 g KNO_3 in 150-g H_2O. *Hint:* Convert the concentrations to the proper units for solubility before referring to the graph.
7. Define the terms saturated, unsaturated, and supersaturated as they apply to solutions. Use complete sentences.
8. Based on your graph, classify each of the following solutions as either unsaturated or supersaturated at the indicated temperature. Assume that the solutions do not contain any undissolved solid. *(a)* 50 g KNO_3 in 100 g H_2O at 40 °C; *(b)* 70 g of KNO_3 in 40 g H_2O at 70 °C. Explain your reasoning.
9. Some of the water may have evaporated from the test tubes before their saturation temperatures were measured. What effect would this error have on the solubility of potassium nitrate for a solution? Would the corresponding saturation temperature be too high or too low as a result of this error?
10. All thermometers have a lag time—it takes a little while to register or report a temperature change. What effect would this error have on the solubility of potassium nitrate for a solution? Would the corresponding saturation temperature be too high or too low as a result of this error?