

# Lesson 122: Solubility Lab

Chemistry with Lab

## Procedure:

- 1) Each lab group was assigned a different temperature, calculating the solubility of KCl in water at that temperature. Each group conducted the lab as seen on the video, and their data follows. You are to complete columns #5 and #6, using the provided data from each lab group.

## Data:

#1	#2	#3	#4	#5	#6	#7
Assigned Temperature °C	Mass of evaporating dish + cover	Mass of evaporating dish + cover + KCl solution	Mass of evaporating dish + cover + dry KCl	Mass of KCl (#4 - #2)	Mass of water (#3 - #4)	Mass of KCl per 100 g of water
10	37.81 g	48.75 g	40.54 g			
20	37.65 g	50.42 g	40.99 g			
30	36.95 g	47.82 g	39.81 g			
40	37.80 g	48.19 g	40.63 g			
50	36.50 g	47.49 g	39.75 g			
60	37.75 g	50.08 g	41.52 g			
70	35.98 g	48.29 g	39.86 g			
80	37.81 g	48.64 g	41.37 g			
90	36.99 g	48.96 g	40.98 g			

- 2) Column #7 is to be calculated as to express the solubility of KCl in grams per 100 grams of water. Following the equation given, complete column #7 for each group's data.

$$? \text{ g KCl} = 100 \text{ g H}_2\text{O} \times \frac{\text{Mass of KCl}}{\text{Mass of water}} =$$

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- 3) Construct a graph using the vertical axis for grams of solute per 100 g of solvent and the horizontal axis for temperature. Staple your graph to this paper. BE SURE TO USE PROPER SCIENTIFIC GRAPHING TECHNIQUES.

### Conclusion Questions:

1. The solubility of a solute is the maximum mass of the solute that will dissolve in a certain amount of water at a certain \_\_\_\_\_. This is the same as saying that solubility is the concentration of a/n (unsaturated, saturated) solution of the solute.
2. From your graph, what mass of KCl can be dissolved in 100 g of water at these temperatures? (*Use dotted lines on your graph to show how you used your graph to determine your answers*):
  - a) 25 °C \_\_\_\_\_
  - b) 55 °C \_\_\_\_\_
3. For each of the following, tell whether the solution would be saturated, unsaturated, or \*crystallizing. (Hint: Plot the point and see whether it lies above, below, or on the best-fit line. Remember that the line represents a \_\_\_\_\_ solution.)
  - a) 40.0 g of KCl in 100 g of water at 75 °C \_\_\_\_\_
  - b) 34.0 g of KCl in 100 g of water at 55 °C \_\_\_\_\_
  - c) 45.0 g of KCl in 100 g of water at 25 °C \_\_\_\_\_

\* Normally, crystallization (rather than supersaturation) occurs when more solute is present than what can be dissolved in a given amount of solvent at a given temperature. Crystallization simply refers to the excess solute "crystallizing" and settling out of the solution. Supersaturation is rare.