

Solubility Investigation

Definitions:

Solute: _____

Solvent: _____

Solution: _____

Saturation Point: _____

Question #1: Which substance is most soluble in room-temperature water?

Manipulated variable: _____ Responding variable: _____

Controlled variables (list 2): _____

Write a formal hypothesis for this experiment:

If _____ is related to _____, then _____

because _____.

Procedure:

1. Measure out 20 mL of water into three identical beakers.
2. Obtain a sample of each of 3 substances from Mrs. Aker. Record the weight of each substance **before you begin.**
3. Begin adding a tiny bit of one substance and stirring. Keep doing this until no more solute will dissolve.
4. Weigh the sample you started with and subtract to determine how much solute you put into the beaker.
5. Calculate the solubility by dividing the mass of solute added to the water by the volume of water.
6. Repeat procedure for the other 2 substances.

<i>Solute</i>	<i>Volume of water (mL)</i>	<i>Starting mass of solute (g)</i>	<i>Ending mass of solute (g)</i>	<i>Mass of solute added to water (g)</i>	<i>Solubility (list correct units)</i>

Write a partial conclusion including statement about hypothesis, restatement of hypothesis, reference to specific data points, discussion of trends, and discussion of outliers.

Solubility Investigation-Day 2

Observe the solubility of sugar graph on the back of this paper. What can you say about the effects of temperature on the solubility of sugar?

Question #2: How does the temperature of water affect the solubility of a salt?

Controlled variables (list 2): _____

Formal hypothesis for how the solubility of salt will change with temperature:

If _____ is related to _____, then _____

because _____.

Procedure:

1. Obtain a measured sample of salt from Mrs. Aker. Record the mass of this sample.
2. Measure out 20 mL of water into a beaker and record its temperature with a thermometer.
3. Add small amounts of salt while stirring until you reach the saturation point.
4. Record the remaining mass of salt and subtract to determine how much salt was added.
5. Pour out the salt water and add 20 mL of cold tap water from Mrs. Aker's container to your beaker, and repeat steps 1-4.
6. Pour out the salt water and add 20 mL of hot water from the hot water tap on your sink, and repeat steps 1-4.

Solubility of Salt at different temperatures:

<i>Temperature</i>	<i>Volume of Water (mL)</i>	<i>Starting mass of salt (g)</i>	<i>Ending mass of salt (g)</i>	<i>Mass of salt added to water (g)</i>	<i>Solubility (include correct units)</i>
	20 mL				
	20 mL				
	20 mL				

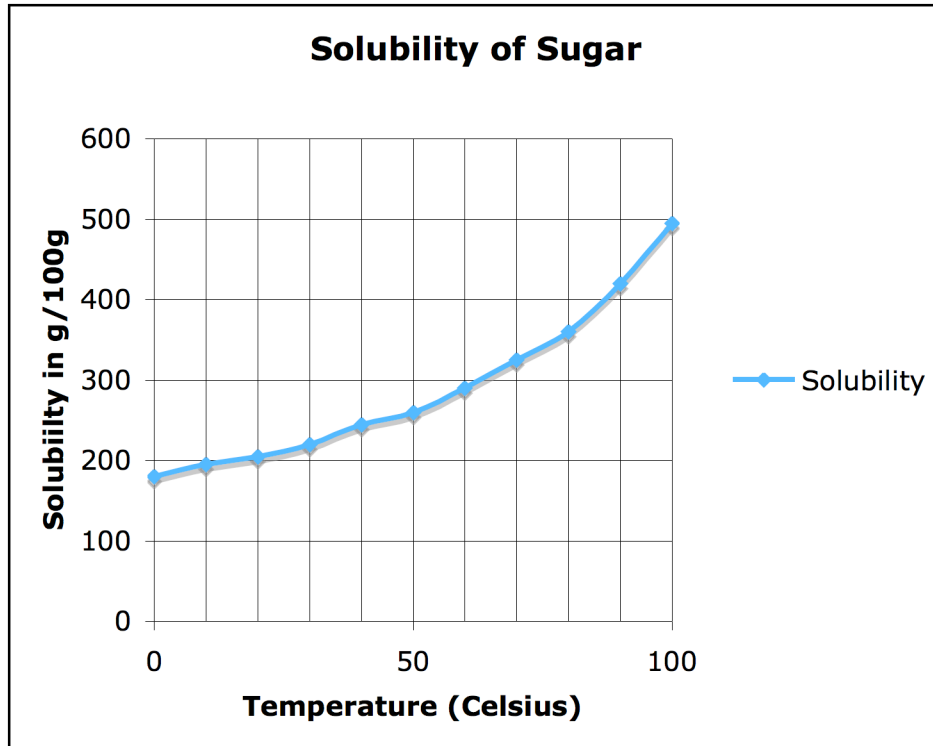
The standard measure of solubility is grams of solute/100 grams of solvent. The units we used were grams of solute/mL of solvent. We will go through the process of converting your three solubilities above to the correct units. What is the mass of 1 mL of water? _____ (you don't need to measure this-think about the density of water)

So let's say you got the solubility to be .2g/mL. This allows you to change the solubility to .2g/g. That means that .2g of solute will dissolve in 1 g of water. We want to know how much will dissolve in 100g. So if you multiply the solubility by 100, you will get the solubility to be 20g/100g or 20 g of solute dissolving in 100 g of water.

Convert your solubilities in the table above to the appropriate units

<i>Temp of Water (C) (copy from table above)</i>	<i>Solubility in g/mL (copy from table above)</i>	<i>Solubility in g/g</i>	<i>Solubility in g/100g</i>

Add these solubilities as a separate line on the sugar solubility graph (so that the graph also shows the solubility of salt at the three temperatures you tested).



After you have added your data onto this graph, answer the following questions.

1. Is the relationship between temperature and sugar solubility direct or inverse?
2. What can you say about the solubility of salt as you increase temperature? How is its solubility different from that of sugar? List at least 3 ways it is different.
3. How many grams of sugar could you dissolve in 100 grams of 40 degree water?
4. How many grams of sugar could you dissolve in 50 grams of 40 degree water?
5. How many grams of salt could you dissolve in 100 grams of 40 degree water?
6. Write a partial conclusion for this lab based on your hypothesis.

Solubility Investigation—Day 3

Question #3: ???? (Your choice....details below)

Select an experiment below to go a little bit deeper into solubility. You will conduct the experiment and do a lab report for your findings. You will have today to prepare your variables, hypothesis, and procedure. You will have only 2 days to conduct these experiments, so be productive and efficient (you need to conduct multiple trials). You will need to complete the “inquiry lab ticket” (found below) for your group and have it approved by Mrs. Aker before you begin.

- How does the solubility of sugar change with different surface area? (sugar cubes vs. granulated)
- How does the solubility of sugar change in different solvents? (like alcohol or vegetable oil)
- How does the solubility of salt change in different solvents? (like alcohol or vegetable oil)
- How does the amount of solvent affect the solubility of a substance? (substance=salt, sugar, corn starch)
- How do the solubilities of other sweeteners compare to sugar? (Sweet n low, Equal, etc.)
- Confirm your findings in any of the previous experiments with a more careful procedure and multiple trials.
- Confirm your findings in the temperature experiments by selecting two other temperatures to test.
- Select a different question of your choice and OK it with Mrs. Aker.

Group Members: _____

Manipulated variable: _____ (this is the one you are going to change)

Responding variable: _____ (this is the one you are going to record data for)

3 Controlled variables: _____

Prediction about what you expect will happen: _____

Hypothesis: If _____ is related to _____,

then _____

because _____.

Procedure: