

Solubility of Solutes in Water

You will be graphing the solubility of two different compounds. One of the compounds is solid copper(II) sulfate and the other compound is ammonia gas.

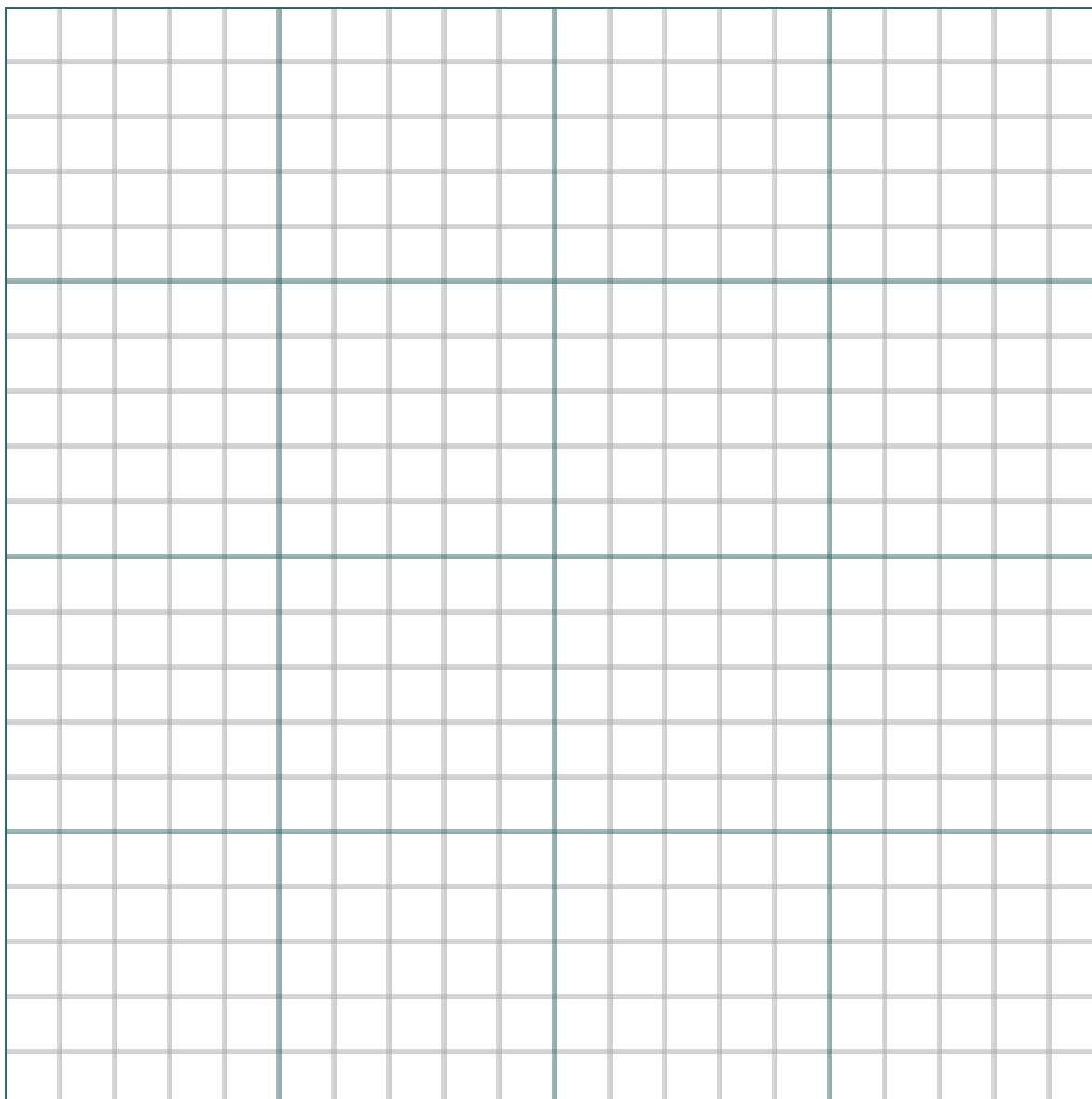
Both compounds are solutes being dissolved in the solvent water. Based on how much of each solute is added to 100 grams of water, various amounts are able to dissolve. The solution can be either saturated, unsaturated, or supersaturated.

When the data is graphed, any point on the line is considered saturated, any point below the line is unsaturated, and any point above the line is supersaturated.

Copper(II) sulfate		Ammonia	
Water temperature (°C)	Mass of solute dissolved in 100 grams of water (grams)	Water temperature (°C)	Mass of solute dissolved in 100 grams of water (grams)
0	23.1	0	89.5
10	27.5	10	68.4
20	32.0	20	52.9
30	37.8	30	41.0
40	44.6	40	31.6
50	53.2	50	23.5
60	61.8	60	16.8
70	72.8	70	11.1
80	83.8	80	6.5
90	98.9	90	3.0
100	114.0	100	0.0

Graphing instructions

1. Graph the independent variable (temperature, °C) on the x-axis and the dependent variable (solubility in grams per 100 grams of water) on the y-axis. Make sure to label the axis and title the graph.
2. Title the graph by saying “The (insert the dependent variable here) versus (insert the independent variable here).”
2. Plot the points for copper(II) sulfate on the graph in one color and connect the points with a smooth curve.
3. Plot the points for ammonia on the graph using a different color and connect the points with a smooth curve.
4. Label the two different solutes.



Questions

1. What were the solutes in this activity?
2. What is the solvent?
3. Which solute's solubility varies directly with the temperature of the solvent?
4. Which variable varies inversely?
5. Using your graph, estimate how many grams of ammonia that can be dissolved in 100.0 grams of water at 45°C?
6. If 10 grams of copper(II) sulfate is dissolved in 100.0 grams of water at 0°C would the solution be saturated, unsaturated, or supersaturated? How do you know?

7. How many grams of ammonia can be dissolved in 100.0 grams of water at 25°C to give a saturated solution?

8. If 54 grams of ammonia is dissolved in 100.0 grams of water at 40°C would the solution be saturated, unsaturated, or supersaturated? How do you know?