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LAB 7 EXPERIMENT

THE EFFECT OF TEMPERATURE ON THE SOLUBILITY OF CERTAIN SOLIDS

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Goal

Determine the effect of temperature on the solubility of certain solids.

1. What is the independent variable in this lab?

_____

_____

_____

2. What is the dependent variable in this lab?

_____

_____

_____

Hypothesis

I think that _____

because _____.

Materials

- marker
- test-tube rack
- 4 test tubes (18 mm × 150 mm) and stoppers (No. 0)
- 10-mL graduated cylinder
- wash bottle of distilled water
- balance (accurate to 0.01 g)
- weighing pan
- spatula
- container of sodium nitrate ($NaNO_3$)
- 250-mL beaker
- hot plate
- thermometer clamp *or* universal clamp and perforated cork stopper
- ring stand
- thermometer
- temperature-resistant gloves

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Procedure

1. Number the test tubes from 1 to 4 with the marker.
2. Measure into the graduated cylinder and pour into each test tube 5 mL of distilled water.
3. Weigh 4.50 g of $NaNO_3$ and add to test tube 1; weigh 5.00 g of $NaNO_3$ and add to test tube 2; weigh 5.50 g of $NaNO_3$ and add to test tube 3; weigh 6.00 g of $NaNO_3$ and add to test tube 4.
4. Stopper the test tubes and shake. Solutes will not dissolve completely.
5. Pour 150 mL of distilled water into the beaker.
6. Place the beaker on the hot plate.
7. Set the test tubes into the beaker.
8. Immerse the thermometer in water and clamp it so the bulb is submerged completely and not touching the beaker or the test tubes.
9. Wait a few minutes for the temperature of the test tube to match the water temperature of the beaker.
10. Heat gently.
11. Regularly shake the test tubes.
12. As soon as the solute in a test tube dissolves completely:
    a) Record the temperature of the beaker water.
    b) Pour the contents of the test tube into the graduated cylinder. Measure and record the total volume.
    c) Empty and rinse the graduated cylinder.
13. Repeat step 12 for each remaining test tube.
14. Calculate the solubility of sodium nitrate in each test tube.
15. Clean up and put away materials.

Results

Record your results in the table below. Give the table a title.

Title:

Mass of solute (g)	Temperature of solute at complete dissolution (°C)	Volume of solution (mL)	Solubility (g/L)

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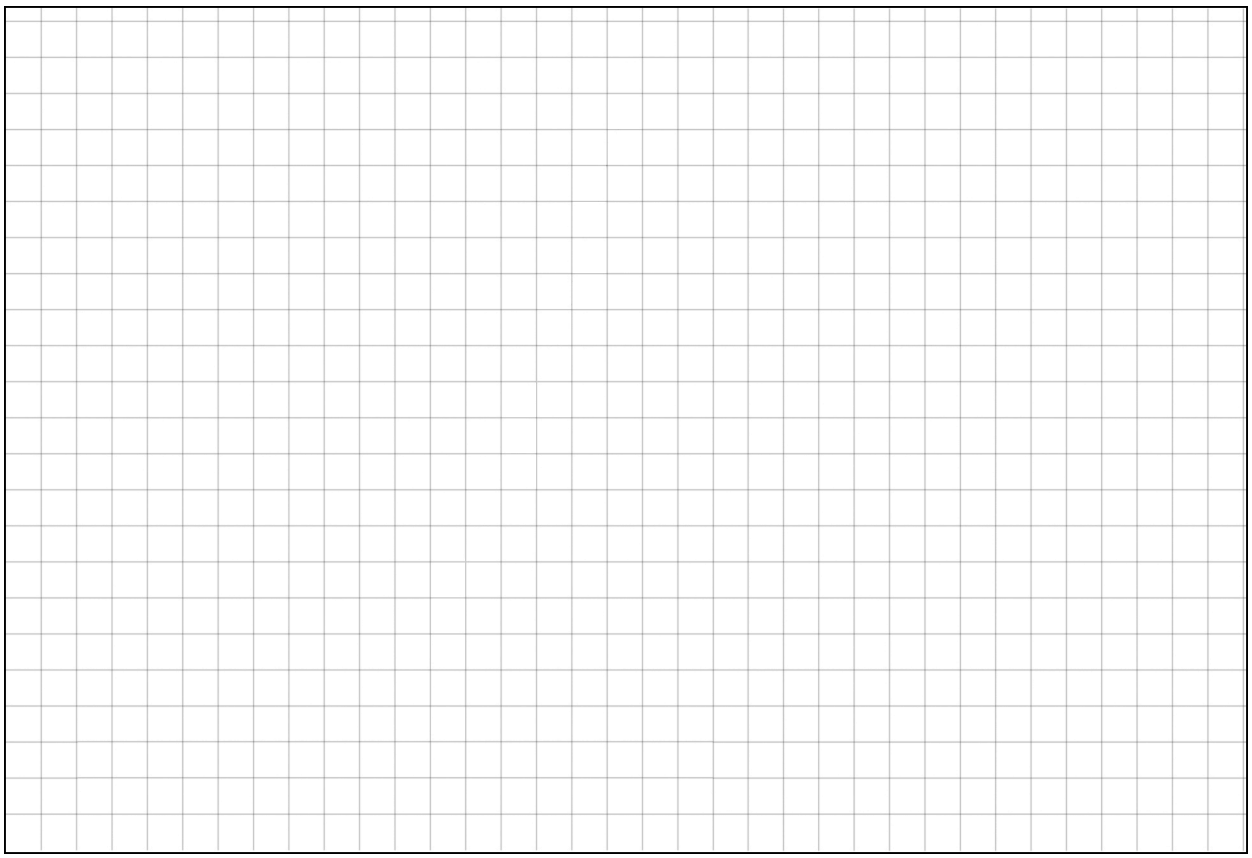
Graph

Plot the solubility of sodium nitrate in water according to temperature. Give the graph a title.

Title:



Analyzing the results

1. Describe the graph that you drew.

_____

2. What effect does temperature have on the solubility of sodium nitrate?
Explain your answer using your graph.

_____

_____

_____

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3. What is the solubility of $NaNO_3$ at a temperature of 50 C?

_____

4. What are the possible sources of error in this lab?

_____

5. How could you improve the protocol for this lab?

_____

CONCLUSION

1. Complete the following sentence:
As the temperature rises, the solubility of sodium nitrate _____.

2. Was your hypothesis confirmed or not? Explain your answer.

_____

APPLICATION

Isabelle makes herself a cup of hot chocolate by completely dissolving a teaspoon of cocoa in some warm milk. She leaves for a few minutes and returns to find that her drink is now cold and there is a deposit of cocoa at the bottom of the cup. What happened?

_____

_____

_____

_____

_____

_____