

Dissolving Rate of Sugar

The most familiar solution is a solid dissolved in water. Dissolving a solid in a liquid is an everyday experience for many people. You make a solution when you make up a powdered drink mix. When you add lemon powder to water, you make lemonade, a water solution. No chemical change takes place when a solid is dissolved in a liquid. Does your powder dissolve faster in tap water out from the sink, water from the refrigerator, or hot water? What are the factors that affect the rate of dissolving? If the liquid evaporates, the original solid remains chemically unchanged.

OBJECTIVE: Students demonstrate how factors such as temperature and particle size influence the rate of dissolving. (TEKS 9D and 9E)

PROBLEM: Which factor is more effective in dissolving sugar, temperature, particle size, or stirring?

HYPOTHESIS: What do you think? Record your predictions in your science journal.

Safety Precautions:



MATERIALS:

- goggles
- 50-mL graduated cylinder
- 250-mL beaker
- hot plate
- alcohol thermometer
- heat resistant gloves
 - stop watch (2 if possible)
- apron
- triple beam balance
- water
- 6 sugar cubes
- stirring rod/spoon
- 2 clear cups or 100 mL beakers

PROCEDURES:

1. Safety goggles and laboratory aprons should be worn throughout this experiment.
2. Obtain laboratory materials. **READ THE LAB COMPLETELY THROUGH BEFORE BEGINNING.**



- Measure 50 mL of water and place in a 100 mL beaker. Make sure there are no cracks or chips in the glass before you place the beaker on the hot plate and turn it to high. Bring to a boil. Continue reading as the water warms. Measure 50 mL of water and place in a 100 mL beaker of water. This will be your cold water sample.
- On one paper towel, carefully crush a sugar cube and label it A. Repeat the process for cube 2 labeling it B. Measure the mass of the sugar cubes separately and record the results in the appropriate data table in your journal.
- Once the water reaches the boiling point, use heat resistant gloves to carefully remove the beaker and set on the table. Do not add the sugar when the water is on the hot plate.
- Place the crushed sugar sample A in the hot water and time how long it takes for the sugar to completely dissolve using a stop watch. Do not shake or stir the solution. Record your observations in your data table in your journal.



HOT



**COLD –
NOT STIRRED**



**COLD –
STIRRED**

- Rinse out all cups and prepare for the next set. Read the data tables for Sets 2 – 4 and conduct the investigations needed to complete the data tables.
- Once you are completely finished, **WASH** each beaker out and dry.
- Carefully return all materials to materials area, make sure your hot plate is unplugged, and return goggles and folded apron. Wipe off your work area so it is clean of sugar and water.

DATA/OBSERVATIONS:

COPY THE FOLLOWING DATA TABLES BELOW IN YOUR JOURNAL TO COMPLETE AS YOU WORK.

	Cup	Sugar Sample	Water Conditions	Mass (g)	Time (min.)
SET 1	A	Crushed	Hot		
	B	Crushed	Cold		

SET 2	Cup	Sugar Sample	Water Conditions	Mass (g)	Time (min.)
	C	Cube	Hot		
	D	Cube	Cold		

SET 3	Cup	Sugar Sample	Water Conditions	Mass (g)	Time (min.)
	E	Cube	Hot, stirred		
	F	Cube	Hot, NOT stirred		

SET 4	Cup	Sugar Sample	Water Conditions	Mass (g)	Time (min.)
	G	Crushed	Cold, stirred		
	H	Crushed	Cold, NOT stirred		

ANALYSIS/CONCLUSIONS: (Record in your journal.)

1. Did you change the same factors in each set? _____ Complete the data table below identifying the independent variable in each set.

Set	Independent Variable
1	
2	
3	
4	

2. Were all the dependent variables the same? _____ Complete the data table below identifying the dependent variable for each set.

Set	Dependent Variable
1	
2	
3	
4	

3. Complete the data table below identifying the constants for each set.

Set	Constants
1	
2	
3	
4	



4. How does the particle size affect the rate at which sugar dissolves in water?
5. How does temperature affect the rate at which sugar dissolves in water?
6. How does stirring affect the rate at which sugar dissolves in water?
7. If you wanted to dissolve a substance faster, what should you do?
8. If you wanted to dissolve a larger amount of substance, say 10 sugar cubes, what should you do to dissolve the sugar faster?

