A Tasty Solution

If you make a saltwater solution, you can use either table salt or rock salt. Using the same mass of each, the salt with the greater surface area – table salt – will dissolve faster. Other factors affect the rate at which a solute dissolves. For example, temperature and stirring will change the dissolving rate of a solute. In addition, the dissolving rates of gases are affected by changes in pressure.

Part 1: Analyzing the Rate of Solution of M & M's

Procedure:

Step 1: Place one piece of candy in your mouth and allow it to dissolve without using your tongue or teeth to help! Record the time it takes for the candy to dissolve in the chart.

Step 2: Place another piece of candy in your mouth and allow it to dissolve using only your tongue to move it around. Record the time it takes for the candy to dissolve in the chart.

Step 3: Place another piece of candy in your mouth and allow it to dissolve using your tongue and teeth. Record the time it takes for the candy to dissolve in the chart.

Piece of Candy	Dissolving Time (seconds)
1st	
2nd	
3rd	

Analysis/Questions:

1. Use your data to determine which trial was the fastest. Why?

2. What factor allowed for the piece of candy to dissolve faster?

3. What other factor could impact how quickly something dissolves?

Part 2: Analyzing the Rate of Solution of Sugar

Procedure:

Step 1: Add 100 mL of cold tap water to cups A and B.

Step 2: Add a crushed sugar sample to cup A and B. Stir the contents of cup B. When adding each sample, observe closely and record the time required for the sugar to dissolve completely. When no sugar particles are visible, record the time in the data table below.

Step 3: Add 100 mL of cold tap water to cup C.

Step 4: Add 100 mL of hot water to cup C. Add a crushed sugar sample to cups A - C. When adding each sample, observe closely and record the time required for the sugar to dissolve completely. When no sugar particles are visible, record the time in the data table below.

Data Table

Cup	Sugar Sample	Water Conditions	Time (seconds)
A	Crushed	Cold	
B	Crushed	Cold, stirred	
C	Crushed	Hot	
D	Cube	Cold, stirred	

Analysis/Questions:

1. Which cup conditions, A or B, caused the sugar to dissolve the fastest? Why?

2. Which cup conditions, A or C, caused the sugar to dissolve the fastest? Why?

3. Which cup conditions, B or D, caused the sugar to dissolve the fastest? Why?

4. How does particle size affect the rate at which sugar dissolves in water? Explain.

5. How does temperature affect the rate at which sugar dissolves in water? Explain.

6. How does stirring affect the rate at which sugar dissolves in water? Explain.

Going Further: Gas Solution Rate Concepts

1. How could you create a pressure change in a bottle of soda water? What could happen as a result of this pressure change?

2. What factors could cause the rate of bubbling in soda water to increase?

Concept Review:

1. In the solutions used in the lab experiments, what were the solute and the solvent?

   Solute = _____ Solvent = _____

2. Identify the solute(s) and solvent in each solution.

Solution	**Solute(s)**	**Solvent**
Ocean water		
Kool-Aid		
Antifreeze		
Pepsi		
Lemonade		
Sterling silver		

3. What liquid is called the “universal solvent”?

4. Which would have the most SOLUTE: a glass of very sweet Kool-Aid or a glass of barely sweet Kool-Aid? Give a reason for your answer.

5. “Likes dissolve likes” is an important part of the solution formation process. Determine the polarity of each substance in the pairs below and whether or not a solution can be formed between them.

Mixture	**Polarity**	**Will a Solution Form?**
Table salt in hexane		
Water in methanol		
Table salt in water		
Benzene in hexane		