

JEdSTEM at-Home Lesson 1 - Reactions

Overview:

The JEdSTEM Initiative is dedicated to developing engaged, curious, and innovative Jewish minds for the modern world. This lesson is designed to be done at home as combined parent-child learning and features a simple STEM experiment, Torah story and thought-provoking discussion questions.

Experiment Introduction	Supplies Needed
<p>In today's lesson we are going to be talking about Reactions, both a scientific reaction and how we react to the world around us.</p>	
<p>Story Summary - Moses Strikes the Rock</p>	
<p>After the Israelites escaped slavery in Egypt, they wandered in the desert for 40 years until they reached the Promised Land of Israel. Moses and his siblings, Aaron and Miriam led the people on this journey.</p> <p>Near the end of their journey, Miriam dies. Throughout their journey, Miriam had been able to find water for the Israelites. She had a rock that G-d blessed to bring water for the people.</p> <p>When Miriam died, the rock's water dried up and left the Israelites without water. The Israelites were very angry about this and told Moses that he needed to fix this problem.</p> <p>Moses and Aaron prayed to G-d to help them. G-d told Moses to speak to the rock and promised that the water would return.</p> <p>After this conversation with G-d, Moses gathered the angry Israelites and told them he was going to get water from the rock again, but instead of speaking as G-d had said, Moses hit the rock twice with his staff.</p> <p>The rock did burst open with water, enough for all the people and animals.</p> <p>After this, G-d spoke to Moses again and told him that G-d was upset because Moses did not trust G-d's instructions and acted out of anger in hitting the rock.</p>	

<p>G-d told Moses that he would lead the people to the Promised Land, but could not lead them inside, because of this action Moses had done.</p> <p>Numbers 20:1-13.</p> <p>For a more detailed version of this story follow this Link</p>	
<p>Questions</p>	
<ul style="list-style-type: none"> ● Is there anything you already know about Moses and his siblings, Aaron and Miriam? ● What do you think caused the Israelitees to feel angry? ● How do you think Moses was feeling when he hit the rock? ● Why do you think that Moses hit the rock instead of following G-d's instructions to speak to it? 	
<p>Experiment Procedure</p>	
<p><i>Disclaimer: This experiment requires adult supervision for children under the age of 10. If not done safely, this experiment can be hazardous to individuals and environments. Please keep away from faces and in a contained area.</i></p> <p><i>All of the products of the experiment can be cleaned with dish soap and water, and they can be discarded in the sink.</i></p> <p>The above story and questions talk about how Moses and the Jews reacted with “Miriam’s Well” dried up and Moses’ reaction to directions from G-d.</p> <p>Moses’ reaction was big and perhaps unexpected. This experiment creates a reaction between two ingredients: baking soda and vinegar.</p> <ol style="list-style-type: none"> 1. Get all the materials ready by having them nearby. 2. Put your Large Cup or Bottle onto your contained surface, which is your Baking Sheet Tray. This will contain any spills and keep the rest of your environment clean. 3. Pour 1/2 cup of Vinegar into your Cup or Bottle. 4. Optional: If you are adding food coloring, put 2-3 drops into the Vinegar and stir. 	<ul style="list-style-type: none"> ● Large Cup or Bottle ● Small Cup ● Aluminum Baking Tray ● Baking Soda ● Vinegar ● Half-cup measure ● Teaspoon measure <p>Optional:</p> <ul style="list-style-type: none"> ● Food coloring ● Spoon ● Gloves

<p>5. Measure 2 teaspoons of Baking Soda and carefully pour them into the Vinegar.</p> <p>6. Watch the reaction!</p> <p>7. Carefully clean up.</p> <p>It is recommended that you start small with this reaction to keep everyone safe. You can try the experiment again with the variations below and see if and how the reaction differs.</p>	
<p>Experiment Explanation</p>	
<p><u>How do you think this works?</u></p> <p>Baking soda is a base, and vinegar is an acid, which are ways that we can identify how materials act and how they will react with each other.</p> <p>When an acid and base come into contact their goal is to become equal on the Acid-Base Scale, which is also known as the pH Scale (below). The middle of the Acid-Base Scale is water, because water is exactly neutral.</p> <p>When you mix baking soda and vinegar, it creates two products: water and carbon dioxide. Carbon dioxide is a gas that creates bubbles in liquid. These bubbles want to rise and create the foamy substance you see in this reaction.</p>	
<p>Expand the Experiment</p>	
<p>So you did the experiment and want to know more than you can do?</p> <p>Options:</p> <ul style="list-style-type: none"> ● Do the reaction in a bottle with a balloon on top and see how much the balloon inflates with the carbon dioxide created in the reaction. <ul style="list-style-type: none"> ○ Instead of a cup, use a bottle with a small opening. ○ Put the measured baking soda into the balloon, and then carefully secure the balloon over the opening of the bottle. ○ Carefully tilt the balloon to let the baking soda drop into the vinegar. ● Experiment with different types of vinegar you may have. See which creates the biggest reaction! <ul style="list-style-type: none"> ○ Some possibilities include: red wine vinegar, balsamic vinegar, and rice vinegar. 	

Wrap Up Questions	
<p>What do you think about the experiment?</p> <p>What do you think about the decision Moses made to hit the rock?</p> <p>How do you think Moses could have reacted instead?</p> <p>What do you think you can do when you feel angry?</p>	

pH Scale

