Designing Exothermic and Endothermic Reactions

Background
Endothermic reactions result in a temperature decrease. An endothermic reaction absorbs heat from the surrounding atmosphere or liquids. Exothermic reactions result in a temperature increase. An exothermic reaction releases heat as a byproduct of a chemical process.

Objective
You will design and test a laboratory experiment using the materials given to create either an endothermic or an exothermic chemical reaction.

Materials
- Vinegar
- Water
- Baking Soda
- Steel Wool
- 16 oz Plastic Cups
- Thermometers
- Graduated Cylinders
- Timer
- Laptops/tablets

Safety
- Always wear safety goggles when handling chemicals in the lab.
- Wash your hands thoroughly before leaving the lab.
- Follow your teacher’s instructions for clean-up of your materials and dispose of any chemicals.

Procedure
1. You will design and test a laboratory experiment using the materials given to create either an endothermic or an exothermic chemical reaction.
2. With the given materials in mind, first construct a procedure, and then carry out the procedure, recording data as needed (temperature change). Finally, modify the procedure as needed. You may need to repeat these steps a number of times until you have successfully created a procedure that for an endothermic or exothermic reaction.
3. You do not have to use all of the materials, and your final procedure may be different than other groups, this is expected.
4. You will only design and test a procedure for creating an endothermic or an exothermic reaction, not both. You are not creating two different experiments.
5. Your experiment must be designed to collect measurable data (temperature). See the example data table below for guidance.
6. You must be able to replicate your own experimental procedures, and its results multiple times before you move on to step 7, which is documenting your experiment guidelines.

7. After you have successfully created a procedure for an endothermic or exothermic reaction using a selection of the given materials, you will need to document the lab guidelines to be used by somebody else to carry out the experiment.

8. Your lab guidelines should include a title, lab objectives, material list (including quantities), safety precautions, procedural steps, and data table. See the Lab Guidelines template for help and formatting.

**Data (sample)**

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<tr>
<th>Test #</th>
<th>Initial Temperature</th>
<th>Final Temperature</th>
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