Observing a Chemical Reaction

Research Question: How can you determine whether or not a chemical reaction takes place?

Background Knowledge:
- When a chemical reaction occurs, the products that form have different properties than the initial materials.
- Evidence of a chemical reaction.
- Endothermic and exothermic reactions.

Materials for each group:
1 baggie with zip seal
1 plastic spoon
1 25-ml graduated cylinder
1 small container/canister
1 plastic spoonful of sodium bicarbonate (baking soda)
2 plastic spoonfuls of calcium chloride (road salt)

Available tools/instruments:
Digital balance
Infrared thermometer

Safety:
- Wear goggles at all times.
- Wash your hands after you finish the investigation.

Procedure:
1. Recall the solubility data about sodium bicarbonate and calcium chloride. Indicate whether each is soluble or insoluble.
2. Observe what the sodium bicarbonate looks like and record the data in your table.
3. Place 1 tsp of the sodium bicarbonate in the plastic bag.
4. Observe what the calcium chloride looks like and record the data in your table.
5. Place 2 tsp of calcium chloride into the plastic bag.
6. Observe if anything happens.
7. Use a graduated cylinder to measure 10 mL of water and pour the water into the small container that was provided.
8. Carefully set the water-filled container into the bag without spilling. Zip the bag closed while carefully removing air from the bag.
9. Tip the container in the bag and record your observations.

Data Collection:
Record your data in the following table.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Color</th>
<th>Solubility in Water</th>
<th>State of Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium bicarbonate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium chloride</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Observations after mixing substances but before adding water

Observations after mixing substances and adding water

Data Analysis:
Did a chemical reaction take place? How do you know?

Draw a model for what you perceive to be happening before and after mixing the substances with water.

Assuming that a chemical reaction did take place, was the reaction dependent on the presence of sodium bicarbonate, calcium chloride, or both? Create a hypothesis and devise an experiment to test your hypothesis. Then do your experiment, record data and observations, and develop a conclusion based on your results. Draw another set of models that demonstrate what is happening according to your hypothesis and results.