**Endothermic vs. Exothermic Reactions Lab**

**Objectives:**

* SWBAT identify chemical reactions as either endothermic or exothermic based on their qualitative and quantitative observations.
* SWBAT safely handle hazardous materials and conduct themselves in an appropriate manner.

**Materials:**

1. 7.

2. 8.

3. 9.

4. 10.

5. 11.

6. 12.

**Roles:**

|  |  |
| --- | --- |
| **Group Member:** | **Role:** |
|  | Recorder & Timer |
|  | Materials Manager\* |
|  | Temperature Taker  (qualitative) |
|  | Temperature Taker  (quantitative) |
| Everyone | Clean-up |

\*This person should be chosen by the teacher. See #8 below.

**Procedure:**

AS A GROUP, READ THE WHOLE PROCEDURE FIRST BEFORE BEGINNING!

1. On each test tube, use the labeling tape to write the name of each white substance you will be testing today (one per test tube).
2. Fill out the table on the next page with the chemicals you will be testing.
3. Add one scoop of your first chemical to the appropriate test tube (do one experiment at a time, please!).
   1. Feel the temperature of the chemical and record it in the table. (qualitative data)
   2. Take the temperature of the chemical using the thermometer and record in your table. (quantitative data)
4. Measure 5ml of water using a graduated cylinder.
   1. Feel & take the temperature of this water, and record both observations in your table.
5. Place your thermometer inside the test tube. Have one partner hold the bottom of the test tube while another partner pours the water in.
   1. Record the qualitative and quantitative observations in your table.
6. Take out a timer (you may use your cell phone) to time for 3 minutes. After three minutes, take the qualitative and quantitative measurements again.
7. Repeat for additional white powdered substances.
8. **NOTE: For the hydrochloric acid (HCl) and sodium hydroxide (NaOH) test, a very responsible member of your group will be selected by the teacher.**   
   **CAUTION: HYDROCHLORIC ACID is corrosive. It will burn through your clothes and skin if it comes in contact them. USE EXTREME CAUTION!!!**
9. Feel & take the initial temperature of the magnesium strip, and record.
10. Pour 2 mL of HCL into a clean test tube. Take qualitative and quantitative temperature measurements, and record.
11. Place the magnesium into the HCL test tube. Take qualitative and quantitative temperature measurements, and record.
12. Repeat steps 9-11 with a new magnesium strip, and instead use NaOH instead of HCl.

**Results**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Reactants** | | | **Products** | | **Endo or Exo?** |
|  | **Qualitative Temperature** | **Quantitative Temperature** | **Qualitative Temperature** | **Quantitative Temperature** |  |
| Water |  |  | N/A | N/A |  |
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**Exothermic vs. Endothermic Analysis**

When an exothermic reaction occurs, energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, meaning the end result will feel \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

When an endothermic reaction occurs, energy is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, meaning the end result will feel \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Using this information, return to your table on the previous page and classify each reaction as either exothermic or endothermic. You may write “exo” or “endo” for short.

**Discussion**

The discussion section of a lab report is where you talk about the meaning of your results. Using your new knowledge of endo and exothermic reactions, write a detailed discussion of the outcome of your experiments in regards to these processes. (You may go onto the back) What is happening at the molecular level, and how do your results support your claim?

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