Classifying Reaction Types

Purpose
- Perform a composition, decomposition, single displacement and double displacement reaction
- Make observations of chemical reactions and categorize them
- Write and balance chemical equations

Safety
- Always wear safety goggles when working in the lab.
- When cleaning up, pour all solutions in the designated chemical waste container.

Materials
- goggles
- 7 graduated cylinders (10 mL)
- 8 test tubes
- test tube rack
- steel wool
- scoopula
- magnesium ribbon
- crucible tongs
- Bunsen burner
- copper wire
- zinc strip
- pH strips
- water
- rubber stopper
- wooden splint
- matches
- catalase/potato piece
- hydrogen peroxide (5–6%)
- 1.0 M hydrochloric acid
- 0.1 M of the following:
  - copper(II) sulfate solution
  - potassium carbonate solution
  - sodium oxalate solution
  - copper(II) chloride solution
  - calcium chloride (solid)
  - calcium oxide (solid)

Procedure

REACTION A
1. Place 10 mL of copper(II) chloride solution in a test tube. Record your observations.
2. Take a piece of magnesium metal and sand it with steel wool. Record your observations.
3. Place the magnesium in the test tube. Complete reaction B and then return to make final observations.

REACTION B
1. Place 10 mL of 1.0M hydrochloric acid solution in a test tube. Record your observations.
2. Take a piece of zinc and sand it with steel wool. Record your observations.
3. Place the zinc in the test tube. Complete reaction C and then return to make final observations.

REACTION C
1. Take a small piece of copper wire and hold it at one end using crucible tongs. Record your observations.
2. Place the opposite end of the wire into the hottest part a Bunsen burner flame (the...
blue part) for 30 seconds.
3. Remove the wire and examine it. After the wire is cooled, scrape the surface. Record your observations.

REACTION D
1. Place 5 mL of copper (II) sulfate in a test tube. Record your observations.
2. Measure 5 mL of potassium carbonate solution in a graduation cylinder. Record your observations.
3. Add the potassium carbonate solution to the test tube. Record your observations.
4. Leave the test tube in the test tube rack. Complete reaction E and then return to make final observations.

REACTION E
1. Place 10 mL of hydrogen peroxide in a test tube. Record your observations.
2. Record observations of a small sample of potato (catalase). Add it to the test tube. Quickly place the rubber stopper LIGHTLY onto the test tube.
3. Observe what happens. Allow the reaction to carry on for about 10 seconds.
4. Light a wooden splint using a match. Blow out the flame. The splint should glow. Remove the stopper from the test tube and place the glowing splint into the test tube. Record your observations of the splint.

REACTION F
1. Place 10 mL of sodium oxalate solution in a test tube. Record your observations.
2. Use a scoopula to obtain a small piece of calcium chloride. Record your observations.
3. Add the calcium chloride to the test tube. Record your observations.
4. Leave the test tube in the test tube rack. Complete reaction G and then return to make final observations.

REACTION G
1. Use a scoopula and put a small sample of calcium oxide in two test tubes. Record your observations.
2. To one of the test tubes, add 15 mL of water.
3. To a third test tube, add 15 mL of water. Record your observations.
4. Test the pH of the contents in each test tube with a pH strip.

<p>| Observations |
|--------------|------------------|------------------|
| Reaction     | Observations before: | Observations after: |
| A            |                   |                  |
| B            |                   |                  |
| C            |                   |                  |</p>
<table>
<thead>
<tr>
<th>D</th>
<th>Calcium oxide</th>
<th>Calcium oxide + water</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
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</tbody>
</table>

**Analysis**

1. Write the balanced chemical equations for reactions A–G. Also identify the reaction type it is an example of.
   - Reaction A
   
   Reaction B
   
   Reaction C
   
   Reaction D
   
   Reaction E
   
   Reaction F
   
   Reaction G

2. For the products identified in reactions A–G, match the observations you made to the products predicted by your chemical equation. For example, if your reaction produced a yellow precipitate, then you would say: In reaction X, the yellow precipitate that formed was lead(II) iodide.
   - Reaction A
   
   Reaction B
   
   Reaction C
Reaction D

Reaction E

Reaction F

Reaction G

3. How do you know a chemical change occurred in each reaction?

4. If you measured the mass of the reactants before the reaction and the mass of the products after the reaction, what would you expect to find? Why? How does balancing an equation support this idea?