

## **Laboratory Experiment: Types of Chemical Reactions**

### **Objectives**

1. To observe a variety of chemical reactions.
2. To interpret and explain observations with balanced chemical equations.
3. To classify each reaction as one of the seven main types.

Most of the solutions that you will be using in this lab are poisonous, corrosive, or irritants. When handling these solutions be sure to wear your goggles properly. Wash any spills and splashes immediately with plenty of water and inform your teacher of what has been spilled.

### **Materials:**

Bunsen burner  
Wood splints  
Test tubes (6)  
Crucible  
Ring clamp  
Clay triangle  
Tongs  
Medicine dropper  
Steel wool  
Copper wire  
Iron nail  
Copper (II) sulfate pentahydrate solid  
Mossy zinc  
Hydrogen peroxide solution (3 %)  
0.5 M copper (II) sulphate  
0.5 M calcium chloride  
water  
0.5 M sodium carbonate  
2 M hydrochloric acid  
manganese dioxide

### **Procedure:**

1. Make observations before, during and after each reaction. Record your observations in a table.
2. Each different reaction is at a different station throughout the room. Travel throughout the room so that all of the 7 reactions are completed.

### **Reaction 1**

1. Adjust a burner flame to high heat.
2. Using crucible tongs, hold a 6 cm length of copper wire in the hottest part of the flame, for a few minutes. The hottest part of the flame is the top of the blue cone.

### **Reaction 2**

**CAUTION:** Copper (II) sulphate is poisonous. Do not get any in your mouth; wash any spills or splashes away with plenty of water.

1. Clean an iron nail with a piece of steel wool so that the surface of the nail is shiny.

2. Place the nail in the tube and add copper (II) sulphate solution so that one quarter of the nail is covered.
3. After a few minutes, remove the nail and note any changes in both the nail and the solution.

### **Reaction 3**

1. Put about 1 cm of solid copper (II) sulphate pentahydrate in a crucible.
2. Attach the ring clamp to the retort stand, place the clay triangle on the ring clamp and stand the crucible on the clay triangle.
3. Heat the crucible with a Bunsen burner until no further change is observed.
4. Save the contents for Reaction 4.

### **Reaction 4**

1. Allow the crucible from Reaction 3 to cool for 5-10 minutes (until the crucible is cool to the touch).
2. Use a medicine dropper to add 2 or 3 drops of water to the crucible.
3. Record your observations (feel the bottom of the crucible).

### **Reaction 5**

1. One quarter fill a test tube with calcium chloride solution. One quarter fill the other test tube with sodium carbonate solution.
2. Pour the calcium chloride into the sodium carbonate and observe any changes.
3. Dispose of materials down the drain.

### **Reaction 6**

**CAUTION:** Hydrochloric acid is corrosive to skin, eyes and clothing. When handling hydrochloric acid make sure your goggles are on properly. Wash spills and splashes off your skin and clothing immediately using plenty of water and call your teacher.

1. Place a piece of zinc in the test tube.
2. Carefully add hydrochloric acid to the test tube to cover the piece of zinc.
3. Observe any changes.
4. Stopper the test tube for one minute and test the gas by inserting a flaming splint into the mouth of the test tube.

### **Reaction 7**

1. Quarter fill a test tube with hydrogen peroxide solution.



### **Post Lab Discussion**

**Write balanced chemical equations for each reaction and state type of reaction :**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_

### **Questions**

1. In Reaction 1, with which substance in the air did the copper react?  
\_\_\_\_\_
2. In Reaction 2, changes occurred in both the nail and the solution. What do the changes in the solution indicate?  
\_\_\_\_\_  
\_\_\_\_\_
3. What evidence did you see that chemical reactions took place in Reactions 3 and 4?  
\_\_\_\_\_  
\_\_\_\_\_
4. In reaction 5, one of the products is sodium chloride (table salt), which, as you know, is highly soluble in water. What, therefore, would be the product that would account for the precipitate which formed?  
\_\_\_\_\_  
\_\_\_\_\_
5. What does the glowing splint test suggest about the identity of the gas evolved in Reaction 7?  
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6. The formula for hydrogen peroxide is  $H_2O_2$ . Two products are formed in Reaction 7, one of which is a common gas which you know from Question 6 and the other a common liquid. What is the most likely identity of this common liquid?  
\_\_\_\_\_
7. Compare the solid product produced in in reaction 8 to the product in reaction 1.  
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