



## Science 10: Types of Chemical Reactions Lab



Name: \_\_\_\_\_

Block: \_\_\_\_\_

Group Members: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Due Date: \_\_\_\_\_

Drop Date: \_\_\_\_\_

The report is submitted in full, **on the due date**. If you are absent on the day, the report is expected to be submitted electronically. Late reports are penalized, and will *not accepted past the drop date*.

Criteria	Student Self Evaluation	Teacher Assessment
<b>Objective:</b> Correctly identifies the scientific question to be answered. Explains the goal of the lab and how it will be achieved/tested.	/2	/2
<b>Flow Chart:</b> a flow chart diagram of the procedure(s) completed individually by each group member <b><i>before the lab!</i></b> <b>Pre-Lab Questions:</b> displays a critical understanding of the background theory.	/8	/8
<b>Data, Results:</b> Provides results & detailed observations (and diagrams where appropriate) that are presented in <b>correctly labelled</b> tables with <b>descriptive, numbered titles</b> .	/16	/16
<b>Follow up Questions:</b> Correctly identifies and explains the theory relating to the experiment and supports this with accurate observations & data.	/16	/16
<b>Conclusion:</b> Identifies and defines important concepts and principles relevant to the experiment by relating back and answering to the objective and hypothesis.	/3	/3
<b>Presentation:</b> Practical report is presented in third person past tense & in the <b>correct format</b> . Is written fluently and provides <b>appropriate section headings</b> and accurate referencing. <b>Tables &amp; graphs</b> have numbered headings & descriptive titles. Data & calculations may be hand written, however the remainder of the report is to be <b>word-processed</b> .	/2	/2
<b>Practical:</b> Demonstrates an organized and safe approach to experimental work during the lab. Shows maturity, cooperation and leadership during laboratory work. Works collaboratively within lab group and cleans up safely and appropriately.	/3	/3
<b>Results Summary</b>	<b>/50</b>	<b>/50</b>

We will be doing the lab on \_\_\_\_\_.

In order to be ready to go, you need to complete the following sections of your lab report:

- Flow Chart
- Pre-Lab Questions

**Background:**

In this series of experiments, you will first observe examples of various types of chemical reactions. Next you will write chemical equations that support your observations. Finally you will classify each reaction as synthesis, decomposition, single replacement, double replacement, neutralization, or combustion.

**Objective**      \_\_\_/2 marks


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**Pre-Lab Questions:**      (Submit your answers **on a separate page** before you begin the lab **with your flow chart**)

/ 7 marks

Checked by  
teacher 

1. Describe observations which can be made to confirm a chemical reaction has taken place

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2. How can you tell the difference between a **synthesis** reaction and a **decomposition** reaction

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3. Describe the difference between a **single replacement** and a **double replacement** reaction

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4. Define the following terms: a) cation b) anion c) ionic compound

a)

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b)

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c)

5. Precipitates form when an insoluble salt has been produced in a double replacement reaction. Explain what a precipitate is and describe what is meant by the term *insoluble salt*.

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6. The products of an acid base neutralization reaction are: \_\_\_\_\_ + \_\_\_\_\_

7. What characteristic observations would you expect to see during an **acid-metal reaction** to determine a chemical change is occurring?

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## Safety Precautions



- *Copper(II) chloride and Copper (II) sulphate are moderately toxic; avoid contact with eyes, skin, and mucous membranes. These solutions are extreme marine toxins. **NEVER POUR DOWN SINK!***
- **Silver nitrate** solution is *toxic and a skin irritant (will stain)*. Avoid contact with eyes and skin.
- **Acids** are corrosive. You are working with hydrochloric acid (HCl) in this lab. Wash off any spills immediately with water. Wipe any spills off the table with paper towels.



- Rinse **wooden splints** before placing in the trash can to prevent a fire.
- **Safety glasses & lab apron** are to be worn at all times, for all experiments involving chemicals!



**Reagent Disposal:** all waste is to be collected in the **WASTE DISPOSAL**.

**Clean Up:** clean up all materials as instructed by your teacher. Glassware needs to be washed and dried for use by other students. Wipe lab bench with disinfectant and wash hands *well* with soap and water before you leave the lab each day.

**Procedure:** Use this to **prepare a flow chart** for next class (***MUST be completed to participate in the lab!***)

### Station 1 Reaction 1:

1. TEACHER DEMO...see the screen at the front of the room. Check back on this throughout the lesson to make further observations on the reaction progress.
2. At this station you will be observing an apparatus that is already set up with a chemical reaction underway.
3. A piece of *solid copper* wire has been placed in a *silver nitrate solution* in the test tube.
4. Compare the beginning state of the reaction to the changes that occur as the reaction progresses. You will need to check back at least 2-3 times throughout the lesson to make observations.
5. Record any observations in your data table.

*Clean up: none required by students. Teacher demo only.*

### Station 2 Reaction 2:

1. Place 2-3 drops of lead (II) nitrate in the center of a spot plate well.
2. To the same spot plate add 2-3 drops of potassium iodide.
3. *Record your observations in your data table.*
4. Place 2-3 drops of copper (II) sulphate in the center of a spot plate well.
5. To the same spot plate add 2-3 drops of sodium hydroxide.
6. *Record your observations in your data table.*

*Clean up: Using the wash bottle at this station rinse the spot plate thoroughly into the waste beaker at the station. Dry it with a paper towel and replace the spot plate for the next group to use.*

### Station 3 Reaction 3:

1. At this station you will be observing an apparatus that is already set up with a chemical reaction underway.
2. Electrical energy is being used to cause a reaction. In the *u-shaped tube* is a solution of copper (II) chloride. Graphite leads are connected to a dry cell ("battery") and the lead ends are in the solution of copper (II) chloride.
3. Wait a few minutes and observe the reaction.
4. Note any evidence of chemical change (*ie: formation of bubbles*) or any other changes to the appearance of the graphite leads.

*Clean up: Leave this station intact for the next group to make an observation.*

### Station 4 Reaction 4:

1. Fill a test tube  $\frac{1}{2}$  full with copper (II) chloride solution. Note the blue colour of the solution.
2. Roll a small piece of aluminum foil into a tube, and place it in the copper (II) chloride solution.

3. Watch for the reaction to occur and record your observations.

*Clean up: Empty the contents of your test tube into the waste beaker at the lab bench. If it is sticking to the sides of the test tube please use the wash bottle to rinse the products into the beaker. Once the test tube is free of debris then place it in the dishbin near the sink.*

#### **Station 5 Reaction 5a + 5b:**

1. Fill a test with **8 drops of calcium chloride** and add **8 drops of sodium carbonate**.
2. Gently agitate the test tube.
3. *Record your observations.*
4. Try adding a small amount of water from the wash bottle to the test tube.
5. *Record your observations.*
6. Fill a test with **8 drops of nickel (II) chloride** and add **8 drops of sodium hydroxide**.
7. Gently agitate the test tube.
8. *Record your observations.*
9. Try adding a small amount of water from the wash bottle to the test tube.
10. *Record your observations.*

*Clean up: Take your test tube and the contents of your test tube and place it in the dishbin near the sink.*

#### **Station 6 Reaction 6:**


1. Read the information provided at this station.
2. Use the information to answer the following questions:
  - a) What are the reactants in a neutralization reaction?
  - b) What are the products in a neutralization reaction?
  - c) You've been stung by an ant. This particular ant's venom contains formic acid. What type of compound could you use to neutralize the sting?

#### **Station 7 Reaction 7:**

1. Fill a test tube  $\frac{1}{2}$  full with hydrochloric acid solution (HCl).
2. Place a small **APPROX. 1cm strip of magnesium** metal into the acid in test tube. Then **quickly** place a stopper over the test tube while the gas bubbles are forming. The gas is hydrogen. Wait one minute and continue to let the gas form.
3. Perform the splint test to demonstrate that the gas product is actually hydrogen. To do this, use the lighter to light the wooden splint. Make sure you have a good grip on the test tube or place it in the test tube rack. Bring the lit wooden splint towards the test tube and quickly remove the stopper. Place the lit splint over the test tube opening. There should be a "pop" sound as the hydrogen reacts with the oxygen in the air.

*Clean up: Before moving to the next station empty your test tube into the beaker at the lab bench. Then take your test tube and place it in the dish bin near the sink. Dip the wooden splint in water and then put it in the trash can.*

**Flow-Chart (must be completed to participate in the lab):**

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teacher 

**Data & Results:**

Table 1: \_\_\_\_\_

Station #	Reactants	Observations	Products
1			
2			
3			
4			
5			
6			
7			

**Follow-Up Questions:****(16 marks)**

For each reaction (station) *write a word equation and a balanced chemical equation* to describe the chemical reaction that occurred.

Be sure to write the formulas correctly first and then **balance the equation**.

Finally **classify the type of reaction** that you observed as either synthesis (**S**), decomposition (**D**), single replacement (**SR**) or double replacement (**DR**).

**Table 2:**

Reaction # 1	
Word equation	
Balanced chemical equation	
Classify the reaction type	
Reaction # 2	
Word equation	
Balanced chemical equation	
Classify the reaction type	
Reaction # 3	
Word equation	
Balanced chemical equation	
Classify the reaction type	
Reaction # 4	
Word equation	
Balanced chemical equation	
Classify the reaction type	

Reaction # 5a	
Word equation	
Balanced chemical equation	
Classify the reaction type	
Reaction # 5b	
Word equation	
Balanced chemical equation	
Classify the reaction type	
Reaction # 6	
Word equation	
Balanced chemical equation	
Classify the reaction type	
Reaction # 7	
Word equation	
Balanced chemical equation	
Classify the reaction type	

**Conclusion: (3 marks)**

- Briefly summarize experimental results.
- Answer objective/experimental question.
- Discuss any sources of experimental error.

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