

## Types of Chemical Reactions

Name - \_\_\_\_\_

Partner - \_\_\_\_\_

### Pre-lab Questions -

1.) List the four phases with each one's symbol.

\_\_\_\_\_

\_\_\_\_\_

2.) State the rule for determining whether a single replacement reaction will be spontaneous (occur) or not. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3.) State how to know if a double replacement reaction will occur or not.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4.) What phase do we assume all ionic compounds will be if no water is suggested in the reactions?

\_\_\_\_\_

Purpose - to observe chemical reactions to practise identifying the reaction type and writing complete, balanced chemical equations.

Materials - 1.) lab burner      2.) crucible tongs      3.) bare copper wire      4.) wood splints

5.) iron nail      6.) steel wool      7.) copper (II) sulphate solution

8.) medium size test tube      9.) solid copper (II) sulphate pentahydrate

10.) crucible    11.) hot plate    12.) dropper    13.) balloon    14.) acetylene (ethyne) gas

15.) calcium chloride solution      16.) sodium carbonate solution

Procedure - in this lab you will proceed from one station to the next completing reactions, writing down observations (**use all four senses**) and then using this information to write complete chemical equations that contain reactants and products, are balanced and have phase subscripts.

Station 1 -

- a.) Adjust burner flame to **medium heat** (open chimney, turn counter clockwise, until bluish flame but no cone).
- b.) Using tongs, hold an **approximately** 6 cm piece of copper wire in the middle height part of the flame for one minute. (**Hint - copper is  $\text{Cu}^{+2}$** )

Station 2 -

- a.) Clean an iron nail using emory cloth so the surface is shiny, blackish grey colour.  
(**Hint - iron is  $\text{Fe}^{+2}$** )
- b.) Place the nail in a test tube and add copper (II) sulphate solution so that **half** of the nail is covered.
- c.) Wait 7 – 10 *minutes*, then remove the nail and note any changes to the solution and nail.  
(Move on to stations 3 and 4 while you wait for the station 2 reaction to occur).

Station 3 -

- a.) Put a small amount of copper (II) sulphate pentahydrate into a small crucible.
- b.) Heat the crucible until no further change is observed, and remove from heat.

Station 4 -

- a.) Allow the crucible to cool (2 – 3 *minutes*) before continuing!!! (**you have been warned!**)
- b.) Using a medicine dropper, add 1 or 2 *drops* of water (just enough to cover the chemical) to the material in the crucible.

Station 5 -

- a.) Fill a test tube  $\frac{1}{4}$  full with calcium chloride solution. Fill a second test tube one quarter full with sodium carbonate solution.

- b.) Pour the calcium chloride solution into the test tube containing the sodium carbonate solution.

Station 6 -

- a.) Fill a 1000 mL beaker  $\frac{2}{3}$  full with tap water. Add 10 drops of phenolphthalein solution to the beaker. (**Remember** phenolphthalein is clear in the presence of an acid and pink in the presence of a base).
- b.) Place 1 larger or 2 small chunks of solid calcium into the beaker. Fill a test tube with water fully and carefully invert it over the calcium chunk in the beaker to collect the gas product. Do not clean this reaction up until after station 7. You will be using the gas product of this reaction to complete the station 7 reaction.

Station 7 -

- a.) When the test tube is full of gas, hold a burning splint of wood near the open end of the tube. (**Hint** - remember a burning splint is a test to see if hydrogen gas is present).

Station 8 - **Teacher Demonstration** - I will demonstrate this near the beginning of the class.

- a.) Fill a balloon with a 50/50 mix of ethyne gas (acetylene gas) and oxygen gas.
- b.) Tape the balloon to the end of a metre stick.
- c.) Tape a splint to the end of a second metre stick.
- d.) Holding the balloon stuck metre stick at full length away from oneself, bring the burning splint to the balloon.

Data and Observations -

Table 1 -

	<b>Observations Before</b>	<b>Observations After</b>
<b>Station 1</b>		
<b>Station 2</b>		
<b>Station 3</b>		
<b>Station 4</b>		
<b>Station 5</b>		
<b>Station 6</b>		
<b>Station 7</b>		
<b>Station 8</b>		

Post-lab Questions -

- 1.) What substance in the air is the heated copper at **station 1** reacting with? \_\_\_\_\_.
- 2.) Is an acid or base produced in the reaction at **station 6**? \_\_\_\_\_.
- 3.) At **station 7** there should have been a small explosion produced when you brought the splint near. What explosive gas must have been produced in station 6? \_\_\_\_\_.

Conclusion - answer the purpose by writing all 8 chemical reactions, equation type, the phase subscripts, and balancing.

**Reaction Type**

**Balanced Reaction**

\_\_\_\_\_ 1.)

\_\_\_\_\_ 2.)

\_\_\_\_\_ 3.)

\_\_\_\_\_ 4.)

\_\_\_\_\_ 5.)

\_\_\_\_\_ 6.)

\_\_\_\_\_ 7.)

\_\_\_\_\_ 8.)