

Qualitative and Quantitative Observations Lab

NAME: _____ DATE: _____ PERIOD: _____

Background:

Measurements can be qualitative or quantitative. A qualitative measurement is a non-numerical description based on characteristics such as color, smell or shape. A quantitative measurement is based on a numerical value made from measurements. For example, "The reaction occurred at a fast rate." is qualitative while "The reaction occurred within 1 minute." is quantitative. An observation can describe whether a physical or chemical change has occurred. Observing a release of a gas, a change in solution color, a production of a solid, production of light and a change in temperature can indicate that a chemical change has taken place. Chemical changes often proceed at different rates. Iron rusting outside is a slow chemical reaction while the combustion of gasoline is a fast chemical reaction. A catalyst can be added to a reaction to increase the speed of the reaction.

Procedure:

- 1) Obtain two small beakers (100-150mL). Pour 50 milliliters of copper II chloride (CuCl_2) solution into one beaker and 50 milliliters of copper II sulfate (CuSO_4) solution into the other beaker. Record the appearance of each solution.
- 2) Obtain a thermometer and record the initial temperature of each solution.
- 3) Obtain a ruler and scissors. Cut two small squares of aluminum foil measuring 2" x 2". Observe and record the appearance of aluminum foil.
- 4) Slightly crumple both pieces of foil (do not roll into a small ball). Drop a piece of foil into each beaker and observe for five minutes.
- 5) Gently stir each solution with stirring rod for ten minutes. Observe from the side do not lean directly over the beakers or breathe any vapors.
- 6) Record the final temperature and appearance of each solution.
- 7) Decant off the liquid from each beaker into another small clean beaker. Observe and record the appearance of the remaining solid in each beaker. Dump waste liquid into appropriate waste container.
- 8) Use a paper towel to wipe out the solid. Place the solids into a trashcan.

Data:

	Copper (II) chloride	Copper (II) sulfate
Appearance of solution before adding aluminum		
Appearance of aluminum before adding to solution		
Temp of solution before adding aluminum foil	°C	°C
Temperature of solution after adding aluminum foil	°C	°C
Appearance of solution after adding aluminum foil		
Appearance of remaining solid after reaction		

Conclusion:

Write a **qualitative complete sentence** for the following situations. Restate the information given below into a new sentence. Start with the word "The".

- 1) appearance of aluminum foil before placing into beaker
- 2) appearance of both solutions before adding aluminum foil
- 3) the color change of the copper (II) chloride solution

Write a **quantitative complete sentence** for the following situations. Restate the information given below into a new sentence. Start with the word "The".

- 4) the amount of solution used
- 5) the amount of aluminum used
- 6) the temperature change, if any, for the solution in each beaker
- 7) When the aluminum foil was placed into the beaker containing the _____ solution, it appeared that no gas was released, no new solid was produced and the solution did not change in color; observations indicating that a chemical change did not occur or did not appear to occur within the first five minutes.
- 8) When the aluminum foil was placed into the copper (II) chloride beaker, a _____ was released, a new _____ remained on the bottom of the beaker and the solution changed _____; observations indicating that a _____ change occurred within the first five minutes.
- 9) Give the formulas for the following substances that were placed in this beaker.
Water _____ Copper (II) chloride _____ Aluminum foil _____
- 10) Based on the types of atoms in the substances placed into the beaker and the appearance of the solid at the bottom of the beaker, make an educated guess about the identity of the remaining solid. _____
- 11) Both beakers contained water, aluminum foil and copper ion. The difference, one beaker contained chloride ions and the other beaker contained sulfate ions. If aluminum will react with both solutions, was there an ion acting as a catalyst? Explain & Give name of catalyst: _____