

Reactions of Acids and Bases

 Lab Activity - Student Edition

Making Salt

Background Information

A soluble salt can be made by reacting an acid with either a metal, metal oxide or hydroxide, or a metal carbonate. The type of salt that is formed is dependent on the type of reactant which is chosen and the acid which is used. The table shows some examples of the salts produced by different combinations of insoluble reactants and acids.

Type of Solid	Hydrochloric acid	Sulfuric acid	Nitric acid
Copper oxide	Copper chloride	Copper sulfate	Copper nitrate
Aluminium hydroxide	Aluminium chloride	Aluminium sulfate	Aluminium nitrate
Zinc carbonate	Zinc chloride	Zinc sulfate	Zinc nitrate

Learning Objectives

By the end of this lesson students will be able to:

- Produce copper sulfate crystals by reacting copper oxide and an acid.
- Predict the products of a reaction between an acid and a metal, metal oxide and metal carbonate.

Prelab Questions:

1. Name type of reaction which occurs between a metal oxide and an acid.

2. Predict the products which will form when a metal oxide reacts with an acid.

Equipment:

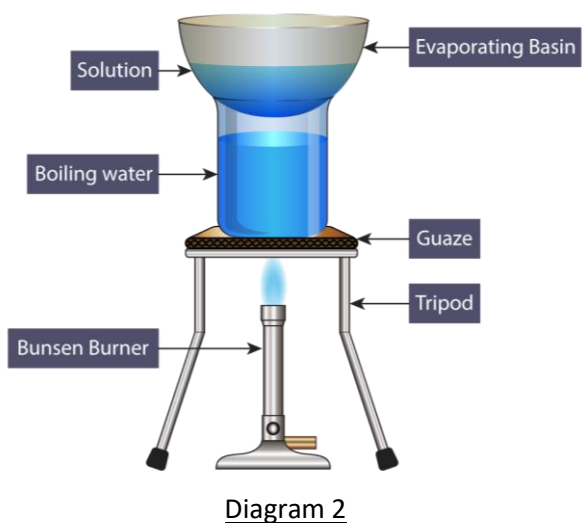
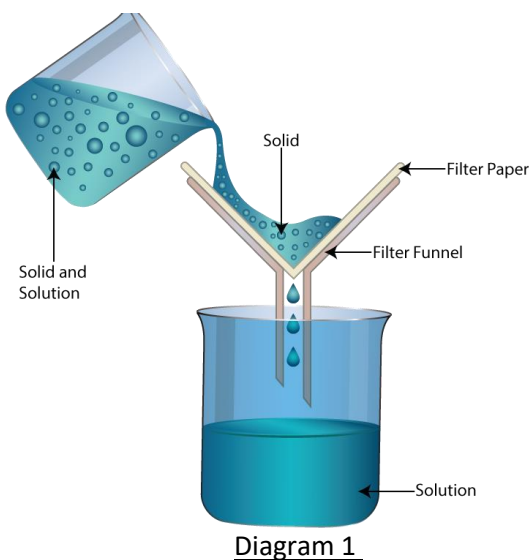
- Copper oxide powder
- Dilute sulfuric acid (0.5 molL^{-1})
- Spatula
- 2 x 100ml beakers
- 50ml measuring cylinder
- Heating equipment
- Thermometer
- Funnel
- Filter paper
- Evaporating dish
- Stirring rod

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Method:

1. Measure 20mL of sulfuric acid and place in a 100ml beaker. Heat the acid until it reaches 70°C. Turn off your Bunsen burner.
2. Add a “pea-sized” amounts of powdered copper oxide to the acid in the beaker using a spatula.
3. Mix the solution for 30 seconds and then repeat step 2 until no more powder will dissolve (there should be a small amount of unreacted powder left over).
4. Fold the filter paper and place in the funnel. Filter the mixture into a second beaker to remove the excess solid. The filtrate now contains only the salt and water (diagram 1 below).
5. Transfer the solution to an evaporating basin and rinse the beaker. Leave 50-60ml of cold water in the beaker and place on the gauze mat. Place the evaporating dish on top of the beaker (diagram 2 below).
6. Heat the solution in the evaporating dish over the water bath. Stop heating when small crystals start to appear around the edge of the evaporating basin. The solution is now saturated.
7. Leave the saturated solution in the evaporating dish at room temperature for a day or two for observation.

Diagram of Set up:



Name: _____ Period: _____ Date: _____

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Post Lab Questions:

1. Name the salt made in this experiment.

2. Name another product of this reaction

3. At what point had all the acid reacted with the copper oxide powder? How could you tell?

4. Explain the purpose of the beaker of water under the evaporating dish.

5. What would the pH of the products likely be from this experiment? How could you test this and what would you expect to see?

6. Initially the liquid in the evaporating dish disappears very quickly leaving tiny crystals, how did the size of the crystals which were left to develop at room temperature over a couple of days differ from this? What can you infer about crystal size and evaporation rate?
