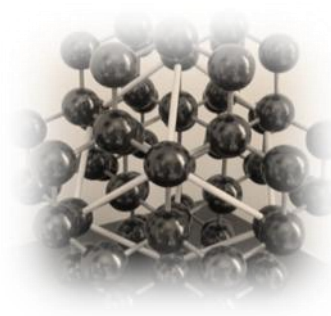


Lab Procedure

Sodium Borate Crystals



Materials:

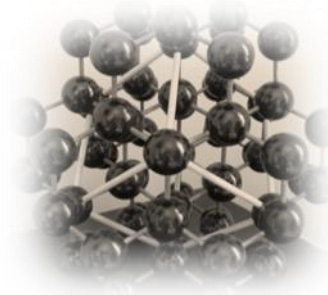
- Plastic cup, marked for 50 mL
- Styrofoam cup
- 50 mL of deionized water
- 2 teaspoons of sodium borate
- String
- Plastic spoon
- Scissors

Procedure:

1. Label a styrofoam cup, Sodium Borate solution.
2. Place 2 teaspoons of sodium borate in the Styrofoam cup.
3. Place 50 mL of water that has been warmed into the cup as well.
4. Using a plastic spoon, stir solution until all of the sodium borate is dissolved.
5. Using scissors, cut a piece of string slightly longer than the height of the cup and tie to the plastic spoon.
6. Place the string into the mixture and rest the plastic spoon across the top of the cup.
7. Place a piece of paper over the cup and let it sit undisturbed overnight to one week.

Lab Procedure

Nickel Sulfate Crystals:



Materials:

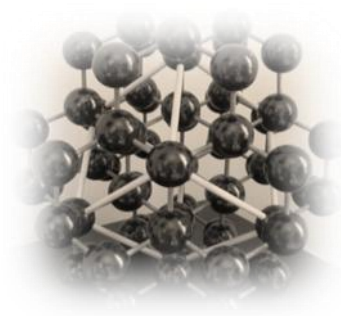
- 6 teaspoons of nickel sulfate hydrate
- Plastic cup, marked for 50 mL
- Styrofoam cup
- 50 mL of deionized water
- Plastic spoon
- String
- Scissors

Procedure:

1. Label a Styrofoam cup, "Nickel Sulfate solution.
2. Place 6 teaspoons of nickel sulfate hydrate in a Styrofoam cup.
3. Place 50 mL of deionized water, which has been warmed, into the Styrofoam cup.
4. Using scissors cut a length of string slightly longer than the height of the cup.
5. Place the string into the mixture, resting the spoon across the top of the cup.
6. Place a piece of paper over the cup and let it sit undisturbed overnight to one week.

Lab Procedure

Chrome Alum Crystals



Materials:

- Solution of alum
- Solution of potassium chromium sulfate
- Graduated cylinder
- Plastic cup, marked for 50 mL
- Styrofoam cup
- String
- Spoon
- Scissors

Procedure:

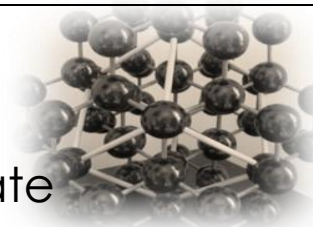
1. Label the Styrofoam cup with the percentage of potassium chromium sulfate solution to be added.
2. Based on the percentage that your group is assigned, measure out the amount of potassium chromium sulfate solution needed in a graduated cylinder.

0% - 0 mL potassium chromium sulfate

5% - 2.5 mL potassium chromium sulfate

10% - 5 mL potassium chromium sulfate

Lab Procedure



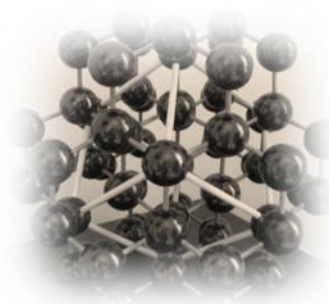
25% - 12.5 mL potassium chromium sulfate

50% - 25 mL potassium chromium sulfate

3. Pour the potassium chromium sulfate solution into the plastic cup.
4. Add potassium aluminum sulfate solution to the cup, filling to the 50 mL mark
5. Stir the solution well and pour it into the labeled Styrofoam cup.
6. Cut a piece of string slightly longer than the height of the Styrofoam cup and tie to the spoon.
7. Lay the spoon across the cup allowing the string to dangle into the solution.
8. Place a piece of paper over the cup and let it sit undisturbed overnight to one week.

Lab Procedure

Copper Sulfate Crystals



Materials:

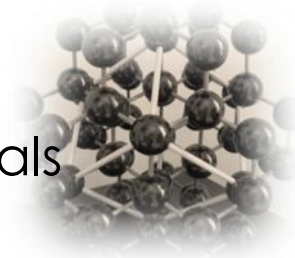
- 4 teaspoons of copper sulfate hydrate
- Plastic cup, marked for 50 mL
- 50 mL of deionized water
- Styrofoam cup
- Plastic spoon
- String
- Scissors

Procedure:

1. Label a Styrofoam cup, "Copper Sulfate solution".
2. Place 4 teaspoons of copper sulfate into a Styrofoam cup.
3. Obtain 50 mL of warmed deionized water from the lab station, using your marked plastic cup.
4. Pour the warm water into the Styrofoam cup and stir with the plastic spoon until all solid is dissolved.
5. Cut a piece of string slightly longer than the height of the Styrofoam cup and tie it to the spoon.
6. Lay the spoon across the cup allowing the string to dangle into the solution.
7. Cover and let stand overnight to one week.

Lab Procedure

Ferrous Ammonium Sulfate Crystals



Materials:

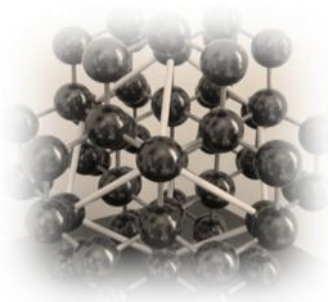
- 3 teaspoons of ferrous ammonium sulfate
- Plastic cup, marked for 50 mL
- Styrofoam cup
- Plastic spoon
- 50 mL of deionized water

Procedure:

1. Label a Styrofoam cup, "Ferrous Ammonium Sulfate solution".
2. Place three teaspoons of ferrous ammonium sulfate in the Styrofoam cup.
3. Place warmed water in the plastic cup to the mark.
4. Place the warmed water from the plastic cup into the Styrofoam cup.
5. Using the plastic spoon stir until the ferrous ammonium sulfate is dissolved.
6. Using scissors, cut a length of string slightly higher than the cup.
7. Tie the string to the plastic spoon.
8. Lay the spoon across the cup allowing the string to dangle into the solution.
9. Cover and let stand overnight to one week.

Lab Procedure

Rochelle Salt Crystals



Materials:

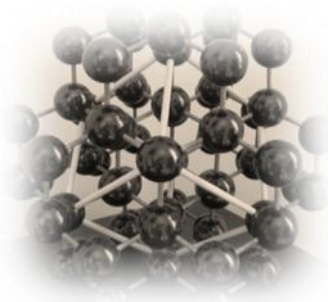
- 10 teaspoons of Rochelle Salt (potassium sodium tartrate)
- 50 mL of deionized water
- Plastic cup, marked for 50 mL
- Styrofoam cup
- Plastic spoon
- String
- Scissors

Procedure:

1. Label a Styrofoam cup, "Rochelle Salt solution".
2. Place 10 teaspoons of Rochelle Salt in a Styrofoam cup.
3. Measure out 50 mL of warmed water in the marked cup and pour into the Styrofoam cup.
4. Stir the salt until dissolved in water.
5. Using scissors, cut a length of string slightly longer than the height of the Styrofoam cup.
6. Tie one end of the string to the plastic spoon.
7. Place the other end of the string into the solution and rest the spoon on top of the cup.
8. Cover the cup with a piece of paper and let stand undisturbed overnight to one week.

Lab Procedure

Mineral Hardness Test



Materials:

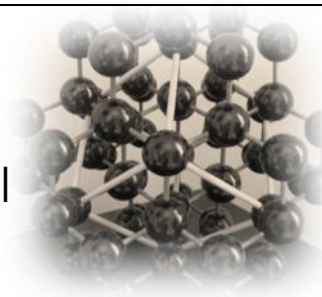
- Nail
- Copper penny
- Mineral sample
- Finger nail
- Magnifying glass

Procedure:

1. Using the nail, attempt to scratch the mineral, by dragging the nail across the mineral. Observe the mineral using a magnifying glass if necessary.
2. If the mineral was scratched, repeat the procedure for number 1, using the copper penny instead of the nail.
3. If the mineral is scratched again, repeat with your finger nail.
4. Make a statement about the hardness of your mineral. For example, a nail has the hardness of 5, if it scratched the mineral then the mineral's hardness is less than 5, however a copper penny has a hardness of 3. If the mineral was not scratched by the copper penny, then the hardness of the mineral was 3.5 to 4.5. A finger nail has the hardness of 2.5.
5. Repeat with several other minerals.

Lab Procedure

Making a Ball and Stick Crystal Model



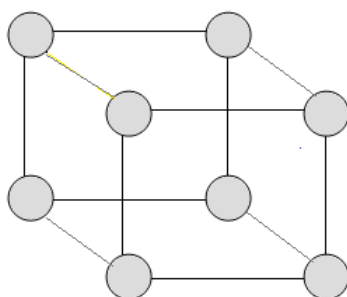
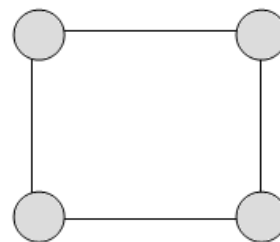
Materials:

- Toothpicks
- Bamboo skewers (cut in two equal lengths)
- Small Styrofoam balls
- Protractor

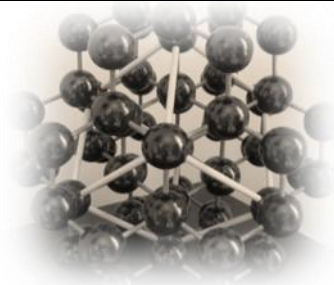
Procedure:

Cubic Crystal:

1. Obtain eight (8) small Styrofoam balls and twelve (12) toothpicks.
2. Connect four Styrofoam balls to form a square shape using four toothpicks. Use a protractor to make the angles in the square exactly 90° . Repeat this for the other 4 Styrofoam balls.
3. Using four more toothpicks, connect your two squares to form a cube. Use a protractor to make all the angles between the squares exactly 90° .
4. Your structure should look similar to the drawing below.

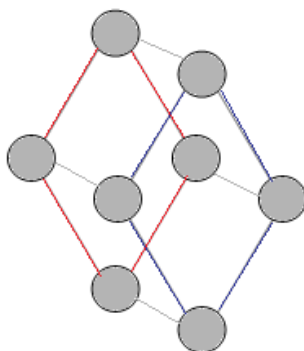
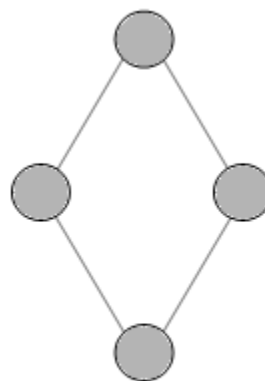


Lab Procedure



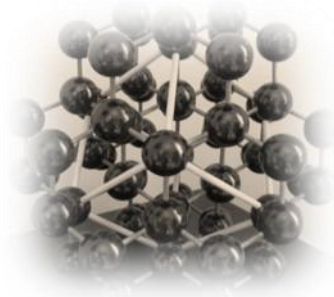
Procedure: Hexagonal Crystal

1. Obtain eight (8) small Styrofoam balls, eight (8) toothpicks, and four (4) bamboo skewers that have been cut into two equal pieces.
2. Connect four Styrofoam balls to form a parallelogram with two angles of 60° and two angles of 120° . Use a protractor to make the angles in the parallelogram exactly 60° and 120° . Repeat this for the other 4 Styrofoam balls.
3. Using four more toothpicks, connect your two squares as you did with the cube. Use a protractor to make all the angles between the parallelograms exactly 90° .
4. Your structure should look similar to the drawing below.



Lab Procedure

Examining Crystals Part One



Materials:

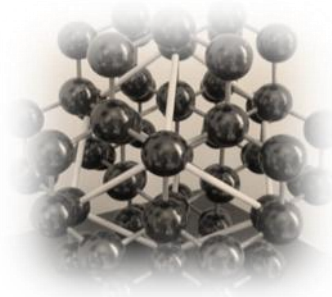
- crystal growing experiments from Day 1
- stirring rod
- waste container
- magnifying glasses
- Paper towels

Procedure:

1. Obtain crystal growing experiments from Day 1.
2. Lift the string from the cup and lay spoon, string and crystals on paper towel.
3. Take cup to the waste container and decant the liquid from the cup by pouring the liquid from the cup into a funnel attached to the waste container.
4. Examine crystals on the string as well as in the cup. Look at the crystals and make observations. Then take a magnifying glass and make observations of what you see through the magnifying glass.
5. Clean up according to your instructor's directions.

Lab Procedure

Examining Crystals Part Two



Materials:

- collection of crystals
- magnifying glass
- data sheet

Procedure:

1. Obtain materials.
2. Make observations of each of the crystals and try to determine which optical property the crystal has. Do this by:
 - a. placing the crystal on a white sheet of paper.
 - b. placing the crystal on the print of this paper or you data sheet.
 - c. holding the crystal toward a light and looking through the crystal.
3. Make all written observations on your data sheet.