

Total
60



Assignment 1-2: Chemistry Lab Book

Complete **four** of the experiments that follow.

A. Answer the questions below. Or, you may choose to demonstrate the four experiments of your choice in a video with an accompanying oral explanation.

Experiment 1: What is Surface Tension?

Consider what you have learned about hydrogen bonding in water in the course.

Hypothesis

1

1. Will adding detergent to water increase or decrease the surface tension of water? Why?

1

2. Will adding oil to water increase or decrease the surface tension of water? Why?

1

3. Will adding rubbing alcohol to water increase or decrease the surface tension of water?

Materials

- rubbing alcohol, vegetable oil, liquid dishwasher detergent
- toothpick
- a large bowl or pan or bathtub full of water
- bread tag

Method

Step 1:

Place the bread tag on the surface of the water in the container. Put a drop of the detergent on a toothpick. Place the detergent from the toothpick into the hole in the middle of the bread tag. Observe and write what happens.

Step 2:

Use clean water. Place the bread tag on the surface of the water in the container. Put a drop of the oil on a toothpick. Place the detergent from the toothpick into the hole in the middle of the bread tag. Observe and write what happens.

Step 3:

Use clean water. Place the bread tag on the surface of the water in the container. Put a drop of the rubbing alcohol on a toothpick. Place the detergent from the toothpick into the hole in the middle of the bread tag. Observe and write what happens.

10

Observations and Conclusions

Picture (drawing or photo of you doing the experiment), Include a caption underneath explaining what you are doing.	What happened in the experiment?

What question(s) were you asking or what problem were you trying to solve with the experiment?	What did you prove?

2

4. Using what you know about surface tension of water explain why soap might help remove dirt from dishes or clothes?

Experiment 2: How can fresh, drinkable water be produced from a sandy, saltwater solution?

Consider what you have learned about states of matter and separating solutions so far in this course.

Hypothesis

1

1. Identify which solid, sand or salt, will dissolve in water?

2

2. What are two techniques you can use to separate materials such as sand and salt from water?

2

3. Identify what makes a change reversible or irreversible.

Materials

- funnel
- coffee filter
- large bowl
- heavy glass cup
- teaspoon
- clear plastic food wrap
- any coin
- clear cellophane tape
- blue food colouring
- salt
- sand

Method

1. Pour tap water in a bowl to a depth of about two inches.
2. Add ten drops of blue food colouring and 2 to 3 teaspoons of salt. Add 2 to 3 teaspoons of sand. Mix well.
3. Add 1 cup of boiling water.
4. Place the coffee filter in the funnel and place the funnel on top of a second bowl. Slowly pour the entire solution over the filter. As the solution seeps through the filter, let it collect in the second bowl.
5. Place the heavy glass cup (opening up) in the centre of the bowl so it is surrounded by the blue salt-water solution.
6. Put a loose covering of plastic food wrap over the top of the bowl. Tape the plastic wrap to the sides of the bowl so that no air can get in or out. Be sure the plastic wrap is not pulled tightly across the bowl.
7. Tape a coin to the outside of the plastic wrap directly over the centre of the glass. The weight of the coin must make the plastic wrap slant down toward the centre of the glass.
8. Put the bowl on a flat surface outside where it will get lots of sunshine on a warm day. Or, on a cold day, put it in a sunny window.
9. Leave the bowl in the sun for about four hours. After four hours, take off the plastic wrap and lift the glass from the salt-water solution.

Note: When moving the bowl, be sure that none of the blue salt-water solution splashes into the glass.

Note: Check on the bowl every hour to see if any changes are occurring or in case you need to make adjustments. Do not leave the bowl outside or in a sunny location indoors for more than four hours because mold may grow in the water.

Another option for making a water purifier is to make two holes in two lids from 2-litre pop bottles.

2. Recap the pop bottles.
3. Glue the lids together so that both pop bottles are connected.
4. Fill one bottle with salt water.
5. Leave the bottles in the Sun. The pop bottle without water should be slightly elevated so that purified water can form in it.

10

Observations and Conclusions

Picture (drawing or photo of you doing the experiment), Include a caption underneath explaining what you are doing.	What happened in the experiment?
What question(s) were you asking or what problem were you trying to solve with the experiment?	What did you prove?

Experiment 3: Which substance will produce the largest and fastest growing crystals?

Consider what you have learned about growing crystals so far in this course.

Hypothesis

1

1. Will crystals grow faster or slower in colder temperatures?

1

2. Which substance (table salt or sugar) will produce the largest crystals?

Materials

- 4 small cups
- 4 pencils/popsicle sticks
- Vaseline or oil
- 4 pieces of string
- 1 windowsill
- 1 refrigerator
- 1 Tbsp (approx. 10 g) sugar
- 1 Tbsp (approx. 10 g) table salt
- Saucepan
- Ruler
- Stirring spoon
- Paper Towel
- Rubber Bands
- scale

Method

1. Add 4 tablespoons and two teaspoons of water to the sugar. Heat the mixture to approximately 60°C or 140°F in a saucepan. Stir until all the sugar has dissolved. (Dissolve as much of the solid into the liquid water as possible). Let the mixture sit to allow any cloudy material to settle.

2. Carefully pour the liquid into a clean pot without disturbing the settlement. If necessary, heat this mixture, until the sugar crystals are completely dissolved. Pour the mixture into two small cups.

3. Tie a piece of thread to a popsicle stick or pencil. Adjust the length of the thread so that not more than 1/2 inch (1.3 cm) is submerged. Smear Vaseline or oil on the part of the thread above the solution to prevent the solution from creeping up the thread. Repeat for the second piece of thread and pencil.
4. Place the pencils on top of the cups, cover the cups with pieces of paper towel held in place with rubber bands, and store one cup in a warm place like the windowsill. Place the other cup in the refrigerator.
5. Repeat for salt (dissolve as much of the solid into the liquid water as possible).
6. Crystals should form on the submerged thread, at the bottom of the cup, or in both places within a few days or by the end of one week.
7. After crystals have grown, drain all the liquid in all the cups and take the pencils off the strings.
8. Leave the strings inside the cups and put the cups on a scale such as a triple beam balance one at a time.
9. Record the weight of each cup.
10. After you have weighed and record all of the cups weigh an empty cup.
11. Subtract the weight of the cup off of the total amount for each cup.

10

Observations and Conclusions

Picture (drawing or photo of you doing the experiment), Include a caption underneath explaining what you are doing.	What happened in the experiment?
What question(s) were you asking or what problem were you trying to solve with the experiment?	What did you prove?

2

3. Why might crystals form more quickly at the temperature and with the substance you observed?

1

4. What is one thing you might do differently in a future experiment?

Experiment 4: Is a Lighted Candle a Physical or Chemical Change?

Consider what you have learned about physical and chemical changes.

2

Hypothesis

1. What is the key indicator of a chemical change?

Materials

- tea light
- jar lid
- matches

Method

1. Place the tealight on the jar lid in a safe location. (Where it is not close to anything flammable).
2. Light the candle.

10

Observations and Conclusions

Picture (drawing or photo of you doing the experiment), Include a caption underneath explaining what you are doing.	Describe three physical changes that take place.
What question(s) were you asking or what problem were you trying to solve with the experiment? What does the evidence suggest might be your answer to this question?	List as much evidence as possible that a chemical reaction has taken place.

1

2. What is the Law of Conservation of Mass?

2

3. According to the above law, what has happened to the matter in this experiment?

Experiment 5: What is the Mass of the Products of a Chemical Reaction Compared to the Mass of Its Reactants?

Consider what you have learned about chemical reactions and the Law of Conservation of Matter so far in this course.

Hypothesis

5

1. What do you think the total mass will be of two Alka-Seltzer tablets before they dissolve in water, and after they dissolve in water? Explain.

Materials

- water bottle
- 4 Alka-Seltzer tablets
- balloon
- matches
- sensitive scale such as an electronic balance

Method

1. Place the empty bottle on the scale. Pour in 100 mL of water.
2. Place two Alka-Seltzer tablets together with the bottle and water on the scale. Record the mass.
3. Remove the bottle from the scale and add the two tablets to the water.
4. Once the reaction is complete, place the bottle back on the scale and reweigh it. Record the mass.
5. Empty the bottle and rinse it out so that no substance remains.
6. Pour 100 mL of water into the bottle.
7. Weigh the bottle with the water, the empty balloon, and two Alka-Seltzer tablets on the scale. Record the mass.

7. Place two Alka-Seltzer tablets in the mouth of the balloon. You may need to break the tablets.

7. Place the balloon over the mouth of the bottle.

8. Once the reaction is complete, place the bottle with the balloon still covering its mouth on the scale. Record the mass.

Ask an adult to help you with this step. Do not complete without adult supervision.

9. After you have weighed the bottle. Remove the balloon. Light a match. Pour the invisible gas out of the water bottle onto the lighted match. What happens?

10**Observations and Conclusions**

Picture (drawing or photo of you doing the experiment), Include a caption underneath explaining what you are doing.	Describe what you observed. Include the weights listed above.
What is your answer to the question(s) were you asking or problem were you trying to solve with the experiment?	What substance do you think filled the balloon?

Experiment 6: What is the Effect of Acid Rain on Plants?

Consider what you have learned about the effects of acids and bases in this course.

Hypothesis

2

1. What do you think will happen to plants that are watered with a solution of water and vinegar? Explain.

Materials

- empty milk cartons
- potting soil
- distilled water
- vinegar
- seeds such as bean seeds

Method

1. Cut the milk cartons to 10 cm in height.
2. Plant 5 seeds per container.
3. Water one container regularly with distilled water.
4. Water the other container with a solution of distilled water and vinegar.
5. Keep the plants in the same area, provide the same amount of light, water at the same time, and water with the same amount of water.

10

Observations and Conclusions

Picture (drawing or photo of you doing the experiment), Include a caption underneath explaining what you are doing.	Describe what you observed.
What is your answer to the question(s) were you asking or problem were you trying to solve with the experiment?	How could you decrease the effects of acid rain on plants?

3

2. Why is rain slightly acidic even without air pollution. Hint: Refer to p. 39 in your Lesson Book.

Experiment 7: What Happens When an Acid and a Base are Combined?

Consider what you have learned about chemical reactions (mixing acids and bases) so far in the course.

Hypothesis:

1. Identify two signs that a chemical change has occurred.

1

2. Identify one indicator that shows a substance is an acid and what colour would it turn?

1

3. Identify one indicator that shows a substance is a base and what colour would it turn?

1

4. Predict what will adding a base to an acid look, smell, feel, or taste like?

1

5. Will adding a base to an acid increase or decrease the acidity of the substance?

1

Materials

- milk
- vinegar
- baking soda
- coffee filter paper
- two cups or mugs and one bowl

Method

1. Combine 1/2 cup of milk with 2 teaspoons vinegar. Mix. What happens?
2. Next, place a coffee filter or paper towel over a second large cup or mug. The coffee filter should sag a little bit to make a little filter bowl. Hold the paper filter in place with a rubber band around the top of the cup.
3. Pour the milk/vinegar mixture into the filter bowl you made.
4. It may take awhile for the liquid to drip into the cup.
5. Scrape what remains in the filter paper into a bowl.
6. Add 1/4 teaspoon baking soda to the lumps and mix. What happens? Can you stick two pieces of paper together using this substance?

Extension

If you want to extend this experiment, you may try the following acid base combination.

Materials

- 1/2 teaspoon of citric acid crystals
- 1 teaspoon of icing sugar
- 1/2 teaspoon of drink or jelly powder crystals
- 1/4 teaspoon of bicarbonate of soda (baking soda)

Method

Mix together the above ingredients.

Stir everything together and then have a taste of your delicious sherbet! Can you tell that there's a chemical reaction happening on your tongue?

10

Observations and Conclusions

Picture (drawing or photo of you doing the experiment), Include a caption underneath explaining what you are doing.	Describe what you observed.
What is your answer to the question(s) were you asking or problem were you trying to solve with the experiment?	What is the name for a solid that is formed by a chemical reaction of two liquids?