

Introductory Chemistry Labs - Sample

- If there are more H^+ ions than OH^- ions the substance will have a pH less than 7
- If there are more OH^- ions than H^+ ions, the pH will be greater than 7

- If there are more H^+ ions than OH^- ions the substance will have a pH less than 7
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- Purpose:** In this lab you will be determining the pH for a variety of household substances. Perform a neutralization reaction between two acids and base.

Purpose: In this lab you will be determining the pH for a variety of household substances as well as conducting a redox titration reaction for acids and bases.

Materials:

1. *Chlorophyll*
 2. *Carotenoids*
 3. *Xanthophylls*
 4. *Anthocyanins*
 5. *Flavonoids*
 6. *Alkaloids*
 7. *Glycosides*
 8. *Terpenoids*
 9. *Phenols*
 10. *Essential oils*
 11. *Resins*
 12. *Gums*
 13. *Starch*
 14. *Cellulose*
 15. *Hemicellulose*
 16. *Pectin*
 17. *Lignin*
 18. *Chitin*
 19. *Silica*
 20. *Calcium oxalate*

Task 6) Determining the pH of various household substances

- Using the chart below, estimate the pH of each substance.
- One person from each group will come to the front of the room and get a dropper glass, 10 mL and 2 small pieces of pH paper.
- Each group member will come to the front of the room with your dropper glass and add 12 drops of each substance into the dropper (add as directed on the sign).
- Using the pH paper provided, dip a differentiation piece of pH paper into each well using the technique provided.
- Compare the colour of your pH papers to the chart provided.

4) Using the pH paper provided, dip a different piece of pH paper into each well using the technique provided.	Student Name	##
5) Compare the color of your pH papers to the chart provided and indicate the pH.	Measuring Tools	1 liter
	Volume	100 ml

Substance	pH: Freshwater	pH: Seawater
Carbonic acid		
Carbonic acid		
Bicarbonate ions		
Carbonic acid		
Bicarbonate ions		
Carbonic acid		
Bicarbonate ions		

6. Bring your plate to the front of the room and add 2 drops of phenolphthalein to each well. Record what you see.

Task 5: Advertisement

- 1) Cover the front faces of the room and columns with the white and blue paint mix. Place the markers at the first side.
- 2) In each row take place 4 drops of the CH.
- 3) Add 2 drops of propylene glycol to each row mix.
- 4) Add 2 drops of H₂O to the first row white and oval. If you disappoin and then regreyn, add five more drops of propylene glycol to the first row. Record the number of drops needed to eliminate the paint completely in the table below.
- 5) Add 2 drops of Vapeur to the second row white and oval. If you disappoin and then regreyn, add five more drops. Repeat until you drop away completely. Record the number of drops needed to eliminate the paint completely in the table below.
- 6) Drop the contents down the side and clean your markers.

Diagnostic Questions - To be submitted

- 1) Which item in Table A1 was the most acidic? What was its pH?
- 2) Which item in Table A1 was the most basic? What was its pH?
- 3) Which item turned pink when the phenolphthalein was added? What did this tell you?
- 4) In Table A1, which acid was strongest? How do you know?

*Please note: This demonstration needs to be done with extreme care as it can be very dangerous!

Purpose
This demonstration can be used to illustrate the vast amount of energy which is available from the oxidation of carbohydrates, such as sugar. An excess of oxygen, generated by the decomposition of sodium chlorate, will react with a burning hear, releasing a large amount of energy quickly and dramatically.

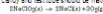
Grade Level and Tools

- Hydrocarbons and Energy Unit
- Demonstrating combustion and exothermic reactions.
- Showing decomposition reactions and reaction rates in the Energy Changes and Rates of Reaction.
- In addition, this reaction could be applied to several other units in intermediate science as well as biology courses.

Theory

When heated, sodium chlorate decomposes, producing sufficient oxygen to ignite the sugar in the gummy bear. Since the oxidation of the sugar is very exothermic, sodium chlorate continues to decompose to oxygen and the rate of combustion becomes very rapid. Other carboxylate materials may be used for this reaction, e.g. an M&M gum drop or cinnamon heart. The size of the candy and test tubes should be matched so that the candy will easily fit into the tube.

$2\text{NaClO}_3(s) \rightarrow 2\text{NaCl}(s) + 3\text{O}_2(g)$



Materials:
one 25x150 mm test tube
one ring stand with clamp for test tube
5-7 grams sodium chloride
Bunsen burner
one candy dummy bear

Procedure

7. Remove the stopper and amp, and add the test tube into the clamp in a vertical position.
8. Add 500 grams of sodium chloride to the test tube (about 10 in depth). (Note: sodium chloride can be substituted here, but since sodium chloride has a lower melting point and requires less initial heating.)
9. Gently heat the tube with the burner until the sodium chloride is completely melted. Bubbles of oxygen gas will be seen.
10. Remove the burner and use crucible tongs to drop in the safety shield, and then stand back. For added piece of mind, the reaction can be performed behind a safety shield.
11. Allow the tube to cool, and then remove from the clamp. The tube should be soaked in water for about 15 minutes and then cleaned with a brush to remove the residue. These chemicals may be washed down the drain.

Wade for success

Hints for Success: While waiting for the sodium phosphate to dissolve, distribute gummy bears to the class (each get the green bears) say: "a guy of gummy bears has found Mr. Yellow hold up a yellow gummy bear guilty of cannibalism it seems that he has eaten all of the green gummy bears." For this he has been sentenced to death, to be carried out immediately in the fumehood in order to set an example for all the other gummies. Have students predict what will happen, what reactants will cause the gummy bear to ignite and what is responsible for the "reaction".

Safety Considerations

Safety Considerations: This reaction produces a large quantity of heat, flame, and smoke (mostly water vapor). It should be done in a well-ventilated room. Sodium chlorate should be used with caution. It is a strong oxidizing agent, especially when molten. Keep all combustible materials away from the reaction area. Make sure the test tube used is scrupulously clean and the mouth is pointed away from the audience.

Building Molecules with Molecular Model Kits

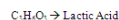
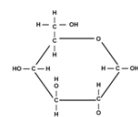
DATE _____

Hydrogen	()	has	holes, and must make	bonds
Oxygen	()	has	holes, and must make	bonds
Nitrogen	()	has	holes, and must make	bonds
Carbon	()	has	holes, and must make	bonds
Sulfur	()	has	holes, and must make	bonds
Chlorine	()	has	holes, and must make	bonds

- The connections represent connections between atoms
- Flexible connections are used for double and triple bonds
- Non-flexible connections are used for single bonds
- The holes in the atoms represent the bonds

Task: Build and draw the following molecules.

Elemental Compound Name	Chemical FORMULA	Elemental Compound Name	Chemical FORMULA
Hydrogen Gas	H ₂	Burner	C ₂ H ₆
Oxygen Gas	O ₂	Carbon Dioxide	CO ₂
Nitrogen Gas	N ₂	Acetic Acid (Vinegar)	C ₂ H ₄ O ₂
Carbon Tetrachloride	CCl ₄	Water	H ₂ O
Ammonia	NH ₃	Methane	CH ₄



Conservation of Mass Lab Activity

Purpose: The purpose of this activity is to investigate whether mass is conserved during chemical reactions.

Hypothesis: Write a hypothesis predicting whether or not the mass will be conserved during a chemical reaction.

Materials:

Before: Copper
 0.5M Sodium acetate (sodium acetate) solution
 One 500 mL beaker
 Electronic scale

After: Sodium acetate solution
 0.5M Sodium acetate solution
 0.5M Sodium acetate solution

Procedure:

1. Add sodium acetate solution to the Erlenmeyer flask to a depth of 1 cm.
 2. Weigh the flask and its contents on the electronic scale.
 3. Carefully place the flask into the 500 mL beaker.
 4. Place the copper strip in the flask.
 5. Observe each of the five reactions and record their appearance in the table below.
 6. Use the electronic balance in the front of the room to determine the mass of the materials and record it in the table below.
 7. Do you find any of the other strips? Use the data you have. Write the results in your table.
 8. Do you find any of the other strips? Use the data you have. Write the results in your table.
 9. Do you find any of the other strips? Use the data you have. Write the results in your table.
 10. Do you find any of the other strips? Use the data you have. Write the results in your table.
 11. Do you find any of the other strips? Use the data you have. Write the results in your table.
 12. Do you find any of the other strips? Use the data you have. Write the results in your table.

Observation for reaction 1 (if work)

Reaction	Initial mass (g)	Final mass (g)	Appearance of products	Notes

Reaction 1:

1. Add sodium acetate to the Erlenmeyer flask to a depth of 1 cm.
 2. Weigh the flask and its contents on the electronic scale.
 3. Carefully place the flask into the 500 mL beaker.
 4. Place the copper strip in the flask.
 5. Observe each of the five reactions and record their appearance in the table below.
 6. Use the electronic balance in the front of the room to determine the mass of the materials and record it in the table below.
 7. Do you find any of the other strips? Use the data you have. Write the results in your table.
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 11. Do you find any of the other strips? Use the data you have. Write the results in your table.
 12. Do you find any of the other strips? Use the data you have. Write the results in your table.

Reaction 2:

1. Add sodium acetate to the Erlenmeyer flask to a depth of 1 cm.
 2. Weigh the flask and its contents on the electronic scale.
 3. Carefully place the flask into the 500 mL beaker.
 4. Place the copper strip in the flask.
 5. Observe each of the five reactions and record their appearance in the table below.
 6. Use the electronic balance in the front of the room to determine the mass of the materials and record it in the table below.
 7. Do you find any of the other strips? Use the data you have. Write the results in your table.
 8. Do you find any of the other strips? Use the data you have. Write the results in your table.
 9. Do you find any of the other strips? Use the data you have. Write the results in your table.
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 11. Do you find any of the other strips? Use the data you have. Write the results in your table.
 12. Do you find any of the other strips? Use the data you have. Write the results in your table.

Reaction 3:

1. Add sodium acetate to the Erlenmeyer flask to a depth of 1 cm.
 2. Weigh the flask and its contents on the electronic scale.
 3. Carefully place the flask into the 500 mL beaker.
 4. Place the copper strip in the flask.
 5. Observe each of the five reactions and record their appearance in the table below.
 6. Use the electronic balance in the front of the room to determine the mass of the materials and record it in the table below.
 7. Do you find any of the other strips? Use the data you have. Write the results in your table.
 8. Do you find any of the other strips? Use the data you have. Write the results in your table.
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 12. Do you find any of the other strips? Use the data you have. Write the results in your table.

Reaction 4:

1. Add sodium acetate to the Erlenmeyer flask to a depth of 1 cm.
 2. Weigh the flask and its contents on the electronic scale.
 3. Carefully place the flask into the 500 mL beaker.
 4. Place the copper strip in the flask.
 5. Observe each of the five reactions and record their appearance in the table below.
 6. Use the electronic balance in the front of the room to determine the mass of the materials and record it in the table below.
 7. Do you find any of the other strips? Use the data you have. Write the results in your table.
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 12. Do you find any of the other strips? Use the data you have. Write the results in your table.

Reaction 5:

1. Add sodium acetate to the Erlenmeyer flask to a depth of 1 cm.
 2. Weigh the flask and its contents on the electronic scale.
 3. Carefully place the flask into the 500 mL beaker.
 4. Place the copper strip in the flask.
 5. Observe each of the five reactions and record their appearance in the table below.
 6. Use the electronic balance in the front of the room to determine the mass of the materials and record it in the table below.
 7. Do you find any of the other strips? Use the data you have. Write the results in your table.
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Introductory Chemistry Labs - Sample

Chemical Reactions Lab

This lab will allow us to explore various types of chemical reactions and help us learn about predicting products. Think in groups of 4 to carry out the following reactions. Make sure you are wearing goggles AT ALL TIMES. Be sure to clearly make note of your observations and complete the chemical equations.

These are the reactions:

1. $Mg + HCl \rightarrow$
 Add 1 strip of magnesium metal to 2 drops of hydrochloric acid in a test tube. Carefully record your observations and determine the product(s) of the reaction. Dispose of the products in the waste be at the front of the room and clean the test tube.

2. $CaCl_2 + Na_2CO_3 \rightarrow$
 Place 2 drops of calcium chloride into a test tube. Add 2 drops of sodium carbonate into the same test tube. Allow to stand for 1 minute and record your observations. Dump contents down the sink and wash the test tube.

3. $MgO + H_2O \rightarrow$
 Take a very small scoop of MgO (about 2 cm up the scoop) from the reaction dish and place it into a test tube. Tilt the test tube back to your desk and enough water to submerge the MgO and observe what occurs. Bring your test tube to the front of the room and add 2 drops of phenolphthalein indicator and observe. Then add 2 drops of vinegar and observe. If nothing happens with the vinegar add 1 more drop. Keep doing this until you are something. Record all results. Dump contents down the sink and wash the test tube.

4. $CH_4 + O_2 \rightarrow$
 Teacher demonstration. Make and record your observations.

5. $Na + H_2O \rightarrow$
 Teacher demonstration. Make and record your observations.
 One of the products from this reaction becomes one of the reactants in the second reaction to form H_2O and energy. Write out both equations fully.

This is a formal lab write up. As a group, you will be submitting a lab including the following sections:

- Title**
 - The title should indicate exactly what you have studied.
 - It should contain what you want to investigate and the parameters measured.
 - Ex. The Effect of Conductivity and Melting Temperature on Ionic and Covalent Compounds.
- Purpose**
 - Why did you study this problem?
 - What was the purpose?
- Materials**
 - A full list of materials is required.
 - Numbered and organized.
- Procedure**
 - Write a lab heading for each part.
 - Numbered and organized.
 - Explain what was found in each reaction.
 - Include the fully balanced chemical reaction with notes.
 - What was the result?
- Discussion (conclusion)**
 - Interpretation of results.
 - Should consider the purpose is some way.
 - Explain changes in, or problems with procedure.

Attach your raw data sheets to the end of your lab report.

Chemical reactions lab data table

Reaction	Lab 1	Lab 2	Lab 3	Lab 4
Reaction 1	Reaction 1	Reaction 1	Reaction 1	Reaction 1
Reaction 2	Reaction 2	Reaction 2	Reaction 2	Reaction 2
Reaction 3	Reaction 3	Reaction 3	Reaction 3	Reaction 3
Reaction 4	Reaction 4	Reaction 4	Reaction 4	Reaction 4
Reaction 5	Reaction 5	Reaction 5	Reaction 5	Reaction 5