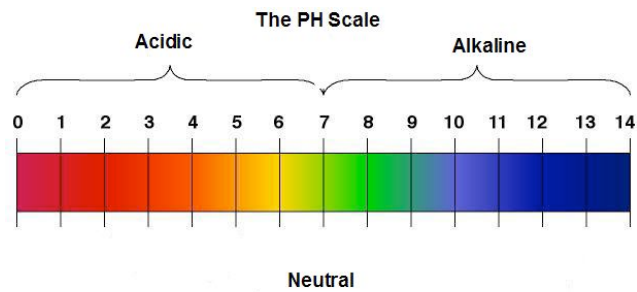


Lab: pH of Household Substances

SNC 2D Scientific Inquiry Investigation

Introduction

Chemicals can be classified as either an acid or base (alkaline) or neutral. Acids are usually found in foods, particularly fruits and vegetables, whereas bases are often used in cleaners and soaps. Indicators can be used to identify the pH of the chemicals and, thus whether they are acids, bases (alkaline) or neutral.



INQUIRY PROBLEM:

Given various household substances, you are to predict and verify whether they are an acid, base (alkaline) or neutral.

ASSIGNMENT

Design and carry out an investigation to answer the inquiry problem above. Follow the "Steps to Inquiry" process, outlined below. Record and show all your work on the worksheet provided.

STEP 1 - INITIATE AND PLAN

Design your investigation using the "Initiate & Plan" section of your worksheet. Record your Inquiry Title, Purpose, Hypothesis, Variables, Materials, Diagram of setup, Safety Precautions, Step-by-step Procedure and Observation Chart to record data.

Submit your design to your teacher for approval prior to beginning your actual experiment. Your teacher will need to initial the "Checkpoint" on your worksheet.

STEP 2 - PERFORM AND RECORD

Carry out your procedure as approved by your teacher and record your results in the data table you constructed on your worksheet.

STEP 3 - ANALYZE AND INTERPRET

Examine, review, interpret, summarize, reflect and evaluate the results of your investigation by answering the questions posed on your worksheet.

"pH of Household Substances"

Scientific Inquiry Investigation

Use the following outline to record the steps of inquiry you use to investigate your problem.

INITIATE & PLAN
Inquiry Title: (descriptive)
Purpose/ Problem/ Question: (what is your investigation about?)
Hypothesis: It is believed that _____ are acids, because: _____ It is believed that _____ are bases, because: _____ It is believed that _____ are neutral, because: _____
Materials: (what will you use in the lab)

Procedure: (step-by-step)

You may not need all of the spaces. If you need more space, attach a sheet or use the back.

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PERFORM & RECORD

Carry out your procedure and fill in your observations in your observation chart.

ANALYZE & INTERPRET

Discussion:

1. Based on your results, which chemicals were acids, which were bases and which were neutral?
2. For which substances were your predictions incorrect? What do you think led to these incorrect predictions?
3. Toothpaste manufacturers often make their products slightly basic. Using your knowledge of acids and bases, evaluate why they do this.

Error analysis:

Explain any sources of error and changes you would make if you repeated your investigation.

Conclusion:

Did your results match your hypothesis? Why or why not?

Timing

This lab should be conducted after students have learned the difference between acids and bases and conducted the labs involving Acid/Base Indicators and Identifying Household Substances

Curriculum links

A1.6	gather data from laboratory and other sources, and organize and record the data using appropriate formats, including tables, flow charts, graphs, and/or diagrams
A1.11	communicate ideas, plans, procedures, results, and conclusions orally, in writing, and/or in electronic presentations, using appropriate language and a variety of formats (e.g. data tables, laboratory reports, presentations, debates, simulations, models)
C2.4	investigate simple chemical reactions including synthesis, decomposition, and displacement reactions and represent them using a variety of formats [PR, AI]
C2.5	plan and conduct an inquiry to identify the evidence of chemical change (e.g., the formation of a gas or precipitate, a change in colour or odour, a change in temperature) [IP, PR, AI]

Materials (per group)

- appropriate PPE
- evaporating dish
- 10 mL graduated cylinders (or 10 mL syringes without needles)
- 1.0 mol/L HCl (5 mL)
- approximately 1.0 mol/L NaOH (5 - 10 ml depending on the concentration)
- phenolphthalein (2 – 3 drops)
- dropper
- crucible tongs
- hot plate

Safety Precautions

- Review the Section and Appendix on Heating Substances of the DSBN Science Safety Manual prior to beginning this experiment.
- If students are using gloves for the mixing of the chemicals, ensure they are removed
- during the heating portion of the lab.
- If the sample is heated, ensure heating is stopped early enough to avoid “popping” of the salt.
- If the sample is evaporated to dryness at room temperature, ensure samples are correctly stored during the drying process.