

ACIDS AND BASES

NGSSS:

1. **SC.8.N.1.1** Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
2. **SC.8.N.1.2:** Design and conduct a study using repeated trials and replication.
3. **SC.8.N.1.3:** Use phrases such as “results support” or “fail to support” in science, understanding that science does not offer conclusive ‘proof’ of a knowledge claim.
4. **SC8.N.1.6:** Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
5. **SC.8.P.8.8:** Identify basic examples of and compare and classify the properties of compounds. Including acids, bases, and salts.

COMMON CORE:

CCSS.ELA-Literacy.RST.6-8.3

Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

CCSS.ELA-Literacy.RST.6-8.4

Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6-8 texts and topics.

CCSS.ELA-Literacy.RST.6-8.7

Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

CCSS.ELA-Literacy.RST.6-8.9

Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

OBJECTIVES:

Students determine the point of neutralization of an acid mixed with a base while they recognize that if substances react in similar ways, they are placed in categories or groups such as acids or bases. They also identify other variable sin an experimental design that must be controlled in order to isolate one variable.

SKILLS:

- Students gain experience conducting the following procedures:
- Setting up the equipment and work area to measure change in pH
- Performing a simple titration of two different concentrations of vinegar and baking soda
- Using the pH sensor, students determine the endpoint of a titration.
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MATERIALS:

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|-------------------------|------------------------------------|
| • Eurosmart datalogger | • Pipet or eyedropper |
| • pH sensor | • Vinegar |
| • Erlenmeyer flasks (2) | • Baking soda |
| • Balance | • Sample paper |
| • Graduated cylinder | • Water |
| • Beaker | • Distilled water in a wash bottle |

DRIVING QUESTION: *Can common kitchen substances be neutralized?*

LAB SUMMARY: Students measure mix water and baking soda in a flask. They insert the pH sensor into the solution and begin data recording. They use the pipet to drop vinegar into the solution in the flask one drop at a time, counting each drop and swirling the flask after each drop. They continue adding drops of vinegar and swirling the flask until the pH of the solution reaches 7.0. They record the number of drops on a table along with the amount of baking soda and initial and final pH. Next they will double the amount of baking soda with the same amount of water in the flask and record the initial pH of their solution. They will begin adding drops of vinegar to the solution, counting the drops and swirling the solution after each. They will continue adding drops of vinegar until the pH is 7.0. They will not the total number of drops of vinegar and pH readings on the table. Students will analyze their results.