

INVESTIGATING PHOTOSYNTHESIS USING LIGHT AND PH LEVELS

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.L.18.1:** Describe and investigate the process of photosynthesis, such as the roles of light, carbon dioxide, water and chlorophyll; production of food; release of oxygen.
6. **SC.8.L.18.2:** Describe and investigate how cellular respiration breaks down food to provide energy and releases carbon dioxide.

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 investigate the process of photosynthesis by looking at an aquatic ecosystem. They will use their pH data to demonstrate the relationship between photosynthesis and light. They will also understand that sunlight is transferred by producers into chemical energy through photosynthesis.

SKILLS:

- Students gain experience conducting the following procedures:
- Using the pH sensor
- Collect, organize and analyze data
- Interpret graphs
- Identify dependent and independent variables

MATERIALS:

- Eurosmart datalogger
- pH sensor
- Plastic bags (2)
- Graduated cylinder
- Aquatic Snails (2)
- Aquatic plants (2)
- Fluorescent lamp
- Aluminum foil
- Stream or pond water
- Marking pen

DRIVING QUESTION: *How does light affect the pH of an aquatic ecosystem?*

LAB SUMMARY: Each plastic bag will contain a snail, a small aquatic plant and pond water. One plant will be placed in the light, the other will be covered with the foil, so it is in the dark. Students should know that the snail is in the bag to provide CO₂ for the plant. Students will take measurements of the pH of each bag every hour over the course of 24 hours and record the pH levels for each hour on a chart. Students will explain the differences in pH as it relates to photosynthesis and that the unused carbon dioxide causes the pH to decrease.