Biology
Core Experiment

Standard ## 3520-08Students will investigate the interdependence of organisms with each other and with the environment. **Objective ##** 3520-0802Analyze the effects of human activities on matter cycles and energy flow. **ILOs:**Use basic science process skills. Use integrated science process skills, i.e., collect data, evaluate, construct models to describe natural phenomena.	**Topic:** Ecology 3520-08

Description of Activity

Activity Title: Biogas Generator

Activity Overview: Construct a system which will demonstrate the biological production and use of gas fuel (Biogas)

Duration: 1-4 weeks.

Background Information

Students should understand how carbon is trapped by producers in photosynthesis and released by organisms as they use and decompose the compounds from photosynthesis. They should also understand energy flow - how the energy available to organisms decreases as you move from the energy producers toward the ultimate consumers.

Teaching and Learning Strategies

Ensure inquiry: Do not offer suggestions on the design, materials or conditions needed in the experiment. Group size: 2-4 students.

Development of Laboratory Skills and Tools

Students will need the following skills:
A.Understand research methods.
B.Collect and analyze data.
C.Graphing skills.
D.Weighing organic matter.

You will most likely need to design activities to assess and remediate these skills. Cooperative groupings may also make it possible for you to assign one or two highly skilled students to a group with special instructions for them to help the others learn the skills required.
An example of an activity that may help in developing these laboratory skills would be to have students answer the students answer the question... How many carrots (or peanuts, or beans, etc.) are in a pound? Have the students weigh ten of the assigned item, record data, get an average, then determine how many will be needed to make a pound of that item. Students might then compare data for different items and create graphs, etc.

Invitation to Learn

Landfills of the present are not a productive part of our environment. Through your experiment maybe you can give an alternative.

Design and construct an experiment to answer the question... How can organic garbage be used to generate a fuel or some other positive product?

Materials, Facilities and Resources:

containers (e.g., milk jugs, 2 liter pop bottles)
rubber tubing
organic wastes
balloons
sealants (e.g., silicon, Vaseline, gaskets)
flasks
stoppers
scales or balances

A warm, secure area to incubate experiments.
The following "Student Designed Experiment - Laboratory Report" may prove useful for students during the inquiry session.

Student Designed Experiment - LABORATORY REPORT

Name_____ Period _____

1.State the problem:
_____
_____
_____
_____

2.State your hypothesis:

_____
_____
_____
_____

3.Describe your procedure in detail and sketch your experimental setup:

_____
_____
_____
_____
_____
_____
_____
_____

4.List the materials you will use

_____
_____
_____
_____

5.Identify the control and variables for your experiment.

_____
_____
_____
_____

6.Results:
TABLE (If needed)

GRAPH

7.Analysis of data.

8.Conclusion.

_____
_____

9.Were any problems encountered in carrying out the procedure?

_____
_____
_____
_____

10.Were any problems involved in taking data?

_____
_____
_____
_____

11.Did any ideas develop that can be used in future investigations?

_____
_____
_____
_____

Summary of Learning

1.Would a biogas be a (an):
A.Fossil fuel?
B.Organic compound?
C.Part of the carbon cycle?
D.All of the above.

2.As you go to the top of an ecological pyramid the energy at each level:
A.Increases.
B.Decreases.
C.Stays the same.
D.Cannot determine.