

Exploring Landfills

0707.Inq.5
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Adapted from Prentice Hall Real-World Lab

More than half of municipal solid waste ends up in landfills. During this lab, you will explore how landfills are constructed to be the safest and most effective possible.

Problem

How do landfills work?

Materials

measuring cup (metric)	ruler (metric)	cheesecloth
plastic wrap	tweezers	bowl
thick plastic bag	red food color	5 rubber bands
newspaper	3 clear wide-mouthed jars	12 small sponge squares
small pebbles	soil	water

Safety

Wear safety goggles and a lab apron.
Handle breakable materials with care.

Procedure

1. You are going to model three landfill systems. After reading the rest of the procedure, write a prediction about the way each system will respond to the test you are going to conduct in Part II. When making the prediction, consider what each item in the experiment will represent.

PART I - Modeling Landfill Systems

2. Cover work area with newspaper.
3. Label the jars, System 1, System 2, and System 3.
4. Pour water into each jar 5 cm deep.
5. Add pebbles to the jars so the water just covers the pebbles.
6. For System 1 - Cover the pebbles and water mixture with 2.5 cm of soil.
7. For System 2 – Suspend cheesecloth in the jar about 5 cm above the water. Hold the cloth in place with a rubber band. Carefully pour a handful of pebbles into the cheesecloth.

8. For System 3 – Suspend the plastic bag in the jar about 5 cm above the water. Hold the bag in place with a rubber band. Carefully pour a handful of pebbles into the bag.
9. Observe the water and pebbles in each system. Record what you see.

Part II – Testing the Systems

10. Place some water in a bowl and tint it with red food color.
11. Soak the sponges in the tinted water.
12. Using the tweezers, place 4 sponges onto the top surface of each jar.
13. Do nothing to the sponges in System 1.
14. Cover the sponges in System 2 and System 3 with a thin layer of soil.
15. Draw and label each system.
16. Pour 150 mL of water over each system.
17. Cover each jar with plastic wrap. Hold in place with a rubber band.
18. Allow each system to remain undisturbed overnight.
19. Observe each system Pay special attention to any changes in color or clarity of the water along the bottom. Record what you see.

Concluding

1. Explain what each item represents:

Pebbles in the bottom	Plastic bag	Red water
Pebbles in the bag/cheesecloth	Cheesecloth	Water along the bottom
Sponges	Soil	Water poured over the top

- Determine which system represents three different landfills

A well-designed landfill
A poor designed landfill
An open dump

- Compare the way the three system work?
- How does the leachate (water that passed through buried wastes in a landfill) affect the ground water in each system?
- How well did each landfill system protect the ground water from the leachate?
- Based on your results which landfill system is the safest for the environment? Explain your answer.