Name _____ Date _____ Period _____

ZornScience
zornscience.org

Do Dead Leaves Breathe?

Biology

Work with your group. Record every measurement with its unit. Answer questions in complete sentences.

Draft lab. This lab has not been tested in a classroom yet. Your teacher may change some steps, times or amounts.

The Puzzle

Every fall, tons of leaves drop to the ground. A year later most of them are gone. Where does all that matter go? You will seal leaf litter in a jar with a small cup of **bromothymol blue (BTB)**, a dye that turns from blue to green to yellow as carbon dioxide (CO_2) dissolves in it.

Question

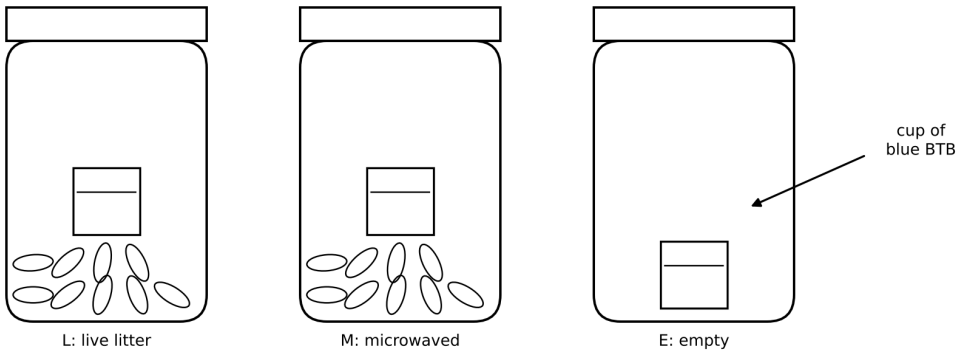
Does moist leaf litter release CO_2, and is something living in the litter responsible?

Safety

- Wear goggles. BTB stains skin and clothes.
- Wear gloves when handling leaf litter, and wash your hands after.
- Microwaved litter is hot. Let your teacher handle it until it cools.

Materials (per group)

- 3 pint jars with lids, labeled L (live litter), M (microwaved litter), and E (empty)
- 3 small cups (film-canister size) with 5 mL of blue BTB each
- About 2 handfuls of moist leaf litter, split into two equal piles
- BTB color card, timer, gloves, goggles



A small cup of BTB sits on top of the litter. The BTB never touches the leaves.

Before the Lab

1. Predict the order in which the three jars will turn yellow. Explain your reasoning.

CC BY-NC-SA 4.0 | zornscience.org

2. What is the purpose of the empty jar (E)?

Procedure

1. Your teacher has already microwaved one pile of litter for 2 minutes and let it cool. Put it in jar M.
2. Put the other pile of litter (same amount) in jar L. Leave jar E empty.
3. Gently set a cup of BTB on top of the litter in each jar so it stays upright. Do not let litter fall into the cup.
4. Close each lid tightly. Record the starting color (time 0) using the color card.
5. Record the color every 10 minutes for 40 minutes. Do not open the jars.
6. Optional: leave the jars sealed overnight and record the color the next day.

Data

Color scale: 1 = blue, 2 = blue-green, 3 = green, 4 = yellow-green, 5 = yellow

Table 1. BTB color score

Jar	0 min	10 min	20 min	30 min	40 min	Next day
L (live litter)						
M (microwaved litter)						
E (empty)						

Analysis

3. Which jar changed fastest? What does the color change tell you was added to the air in that jar?

4. Dead leaves cannot respire. What living things in the litter released the CO_2? What were they using for food?

5. Jar M changed slowly (or not at all). What does this tell you about the cause of the CO_2 in jar L?

6. If jar M turned yellow by the next day, suggest a reason.

7. Use the carbon cycle: where was the carbon in the leaves before they fell, where did it go in this lab, and where could it go next?

CC BY-NC-SA 4.0 | zornscience.org

8. Claim, evidence, reasoning: Does decomposition make matter disappear?

Claim

Evidence

Reasoning

CC BY-NC-SA 4.0 | zornscience.org