

Red Cabbage Juice Soil pH Lab

Class time required:

45 minutes

- 5 minutes for students to prepare dirt mixtures and measure juice into vials (steps 1-9)
- 15 minutes for lecture/PowerPoint while allowing the dirt to settle in the cups
- 5 minutes for the juice and water color reactions (steps 10-15)
- 5 minutes for cleanup
- 10 minutes to complete worksheet

Materials: (per group of 3 to 4 students)

- 50 mL graduated cylinder
- 5 flat-bottomed vials
- 100 mL beaker containing 60 mL cabbage juice
- 400 mL beaker containing 300 mL of distilled water
- 5 clear plastic Solo cups
- Permanent marker
- 5 plastic spoons
- 5 coffee filters
- 5 small funnels
- 1 laminated student handout with pH scale and plant pH preference table
- Student analysis sheets (1 per student)
- Colored pencils

Materials for entire class:

- 5 ziploc bags of soil samples containing 150 cc of soil and envelopes of premeasured chemicals (clearly marked A, B, C, D, and E)
- 5 scoops, one for each bag of soil

Preparations prior to class

1. On arrival in classroom, empty the envelopes of pre-measured chemicals into the appropriate bags of soil. Seal the bags and thoroughly mix the chemicals into the soil. DO NOT mix ahead of time!
2. Place one scoop in each bag.
3. Distribute the bags around the room in stations.
4. Pour 60 mL of cabbage juice into each of the 100 mL beakers.
5. Pour 300 mL of distilled water into each of the 400 mL beakers.
6. Distribute the rest of the materials (as described above), handouts, and worksheets to each group.

Procedure for students

1. Label each plastic Solo cup using the letters A, B, C, D, and E.
2. Label each vial using the letters A, B, C, D, and E.
3. Place a level scoop of each soil sample in the appropriate cup.
4. Add 40 mL of distilled water to one of the cups.
5. Stir with one of the plastic spoons for 5 seconds.
6. Set the spoon aside.
7. Repeat steps 4– 6 for the rest of the soil samples, using a clean spoon each time.
8. Allow the soils to settle to the bottom of the cups for 15 minutes. DO NOT stir again.
9. Measure 10 mL of cabbage juice into each of the vials.
10. When the 15 minutes is up, place a coffee filter into one of the funnels.
11. While holding the funnel and vial, place the tip of the funnel into the top of one of the vials. BE SURE THE LETTERS ON THE VIAL AND THE CUP MATCH!
12. Gently tip the cup and pour the liquid into the funnel. Try to avoid pouring soil from the bottom of the cup into the funnel or overflowing the vial.
13. Remove the funnel and discard the coffee filter.
14. Repeat steps 10 – 12 for the rest of the soil samples.
15. Observe the color changes (it may take up to 5 minutes for a complete color change).
16. Look at the order of colors on the pH scale on the handout and color in the blank scale on the worksheet showing the five observed colors in the vials.
17. Label each color with the letter of the soil that produced that color.
18. Pour the cabbage juice in the vials into the sink or waste container.
19. Throw away the plastic Dixie cups.
20. Return rest of equipment to gallon bag.

Assessment:

Students complete the worksheet:

- color and label the pH scale with their observations
- complete the crop pH preference data table
- respond to the short answer questions