

Egg Dye Diffusion Lab

Introduction:

In this lab you will soak a whole egg and a piece of egg in water colored with food dye and examine how far into each egg substance the dye diffuses. The purpose of this lab is to help you better understand the process of diffusion and why cell size is limited by surface area.

Materials:

- Hard-boiled egg
- egg cube
- 150 mL beaker
- Knife or scalpel
- Spoon
- Food coloring
- Water
- Paper towels
- Metric ruler

Procedure:

1. Carefully remove the shell from a hard-boiled egg. Try not to damage the egg white below.
2. Fill a 150-mL beaker with 100 mL of water. Add 10 drops of food coloring to the water and stir with a spoon. *Caution:* the food coloring may stain your clothes and hands.
3. Place the peeled egg and an 8mm² piece of egg cube into the food coloring solution. Make sure both are completely submerged (covered in the solution).
4. Allow the egg and egg cube to sit in the solution for the amount of time assigned to your group:
 - Table 1: 4 minutes
 - Table 2: 8 minutes
 - Table 3: 12 minutes
 - Table 4: 16 minutes
 - Table 5: 20 minutes
 - Table 6: 24 minutes
5. Remove the egg and egg cube from the solution and carefully pat each dry with the paper towels.
6. Carefully cut the egg in half. Then clean the knife/scalpel and carefully cut the egg cube in half.
7. Measure how far the dye diffused into each piece. Use the area where the dye moved furthest for your measurement. Add your measurement to the table.
8. Measure how far the dye reached from the center of each piece. Use the area where the dye moved furthest for your measurement. Add your measurement to the table.
9. Draw a diagram of the egg and the egg cube that shows the dimensions of each (length, width, and height for the egg cube, length and width radius for the egg) and how far the dye moved.
10. Clean up. Put the egg waste in the receptacle designated by your teacher. Throw away the used paper towels. Wash out the beaker and wash the knife/scalpel and spoon, and then return these items to the counter prep area. Scrub down your work area with soap and water and a disinfecting wipe.

Prelab Questions:

1. Why will food coloring soak into the egg? How does this happen?
2. What is surface area?
3. What is volume?
4. What is the relationship between surface area and volume?
5. As a cell grows larger, how does the ratio of its volume to surface area change?
6. How does the ratio of a cell's volume to surface area affect the dye's ability to diffuse into the egg? Do you think the dye will make it to the center of the egg and egg cube?