

Overview of Lesson In this short lesson students will explore the properties of hydrophobic and hydrophilic substances with a quick activity using oil and water. Students will then relate this activity to the basic structure of a phospholipid and how these molecules form the cell membrane of a cell.

Materials Needed Bottle of salad dressing
Clear plastic cups
Vegetable oil
water

Content of Lesson Divide the class into small groups and pose the following question: *What happens to salad dressing when it sits still for a few days? Why do you think this is?* Allow the groups to discuss and then do a quick share out.

Distribute the materials to each groups. Have the students fill their plastic cups with water and add a few drops of oil. Have them observe what happens and discuss with their peers.

Explain that to two substances do not mix because oil is **hydrophobic**, meaning it repels water. This is the reason the oil droplets remain intact on the surface of the water, and why there are two layers in unmixed salad dressings. On the other hand, substances in the water layer of the salad dressing are **hydrophilic**, or water loving, such as salt or sugar.

Relate the activity to the **phospholipid bilayer** present in the **cell membrane** which creates a barrier between the outside and inside of the cell. This barrier is made of a molecule called a **phospholipid** that is both hydrophobic and hydrophilic. It has two main parts: a phosphate group (hydrophilic) and a lipid (hydrophobic). Draw a basic structure for the class and label its corresponding parts.

Conclude the lesson with the following question: *What would happen if we took some of these phospholipids and threw them into our bottle of salad dressing?* Allow the groups to

discuss and then do a quick share out.

Vocabulary Cell membrane
Hydrophilic
Hydrophobic
Phospholipid
Phospholipid bilayer

Learning Objectives Students will be able to model the basic properties of hydrophilic and hydrophobic molecules using water and oil.

Students will be able to explain how the cell membrane is composed of a phospholipid bilayer.

Educational Standards

- (MS-LS1-2)** Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.
- (RST.6-8.7.)** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table)
- (RST.6-8.9.)** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic