

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Life Science

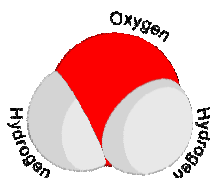
Period: \_\_\_\_\_

Section 2.1: *Chemical reactions take place inside cells.*

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## Investigation: Oil and Water

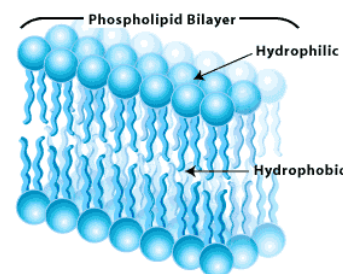
All of the chemical reactions inside the cell take place in water. Additionally, water surrounds the cells. 46% of your body's mass is comprised of water located inside cells, with another 23% comprised of water located outside of the cells. Add it up...and your body consists of approximately 70% water!



Water is a molecule that consists of two atoms of hydrogen and one atom of oxygen – its chemical formula is  $H_2O$ . Water is considered to be a **polar** molecule because it has a slightly positive charge near the hydrogen atoms and a slightly negative charge near the oxygen atom. The ends of polar molecules attract opposite charges and repel like charges, just like a magnet.

Because of its polarity, many substances dissolve easily in water. However, not all molecules dissolve in water.....

Most **lipids** do not dissolve in water. A cell's membrane is composed of a type of lipid that has two parts: a water-loving ("hydrophilic") head and a water-hating ("hydrophobic") tail. The cell membrane is called the **phospholipid bilayer** because it is made of two layers of lipid molecules, with the nonpolar tails meeting each other in the middle.



Why is it important that cell membranes be composed of lipids?

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Investigation Activity:

1. In one open container you will find water with food coloring in it, and in the other, milk. In a closed water bottle, oil has already been added to water with food coloring in it.
2. Pour the milk into the colored water and stir it using the provided rod. Shake the water bottle to mix the oil into the water. Record your observations below:

Describe what happened when you mixed milk and water	Describe what happened when you mixed oil and water

**Analysis Questions:**

1. Why does a mixture of oil and water behave differently from a mixture of milk and water?

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2. From what you have observed in this activity, why is it important for the cell membrane to be composed of lipids?

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3. The outside of a cell is surrounded by water. Explain how the water-hating nature of lipids can keep a cell's inside separated from its outside.

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4. Predict what you think would happen if the cell membrane was made out of a water-soluble molecule instead of the water-hating lipid.

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