

Membrane Structure POGIL™ Activities for AP® Biology

What molecules make up a membrane?

Why?

Imagine your bedroom without closets, drawers, shelves, bags or boxes—just a room with a bed. Where would your stuff be? Would you be able to find the things you needed? How efficiently could you get ready for school in the morning? Would all of your school items be together when you sat down to study? The compartments you use in your room—the closet, drawers, etc.—help you organize items by category so that all the items you need to get dressed are in one place. All the items you need for studying are in another place. This **compartmentalization** improves efficiency. Cells also need organization to improve efficiency. The compartmentalization of cells is achieved by dividing up areas in the cell with membranes. A plasma membrane compartmentalizes internal structures while the cell membrane acts as a boundary between the cell and the external environment.

Model 1 – Phospholipids

1. Refer to Model 1. Identify at least two organic functional groups in a phospholipid molecule.

2. Consider the term phospholipid.

a. What portion of the molecule in Model 1 is responsible for the “phospho-” part of the name?

b. What portion of the molecule in Model 1 is responsible for the “-lipid” part of the name?

3. Part of a phospholipid is polar.

a. Circle the portion of the molecule in Model 1 that is polar.

b. Would this portion of the phospholipid mix well with water? Explain your reasoning.

4. Part of a phospholipid is nonpolar.

a. Draw a square around the portion of the molecule in Model 1 that is nonpolar.

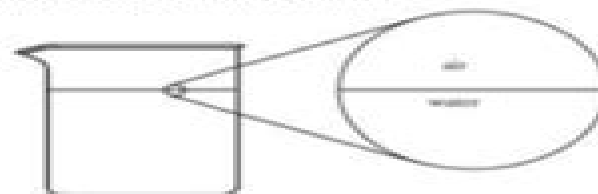
b. Would this portion of the phospholipid mix well with water? Explain your reasoning.

5. Label the regions of the molecule in Model 1 with the phrases “hydrophilic head” and “hydrophobic tail.”

6. Scientists often use a cartoon representation like the one shown below to represent a phospholipid. Which portion of the cartoon represents the hydrophilic head of the phospholipid?



7. When phospholipids are placed on the surface of water they form a thin layer. Consider carefully which portion of the phospholipid will be in the water and which will be in the air in order to obtain the most stable (lowest potential energy—maximum attractions) system. Draw a cartoon-like representation below to show the proper orientation of three phospholipid molecules on the surface of water.



8. When a small amount of oil is added to a beaker of water containing phospholipids, the phospholipids will surround the oil droplets forming **micelles**. Use several cartoon representations of phospholipid molecules to show the arrangement or orientation of phospholipids in a micelle.

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