



Properties of Biological Macromolecules

SYI-1.B.2

Structure and function of polymers are derived from the way their monomers are assembled—

- a. In nucleic acids, biological information is encoded in sequences of nucleotide monomers. Each nucleotide has structural components: a five-carbon sugar (deoxyribose or ribose), a phosphate, and a nitrogen base (adenine, thymine, guanine, cytosine, or uracil). DNA and RNA differ in structure and function.**



Properties of Biological Macromolecules

SYI-1.B.2

Structure and function of polymers are derived from the way their monomers are assembled—

- b. In proteins, the specific order of amino acids in a polypeptide (primary structure) determines the overall shape of the protein. Amino acids have directionality, with an amino (NH_2) terminus and a carboxyl (COOH) terminus. The R group of an amino acid can be categorized by chemical properties (hydrophobic, hydrophilic, or ionic), and the interactions of these R groups determine structure and function of that region of the protein.



Properties of Biological Macromolecules

SYI-1.B.2

Structure and function of polymers are derived from the way their monomers are assembled—

c. Complex carbohydrates comprise sugar monomers whose structures determine the properties and functions of the molecules.



Properties of Biological Macromolecules

SYI-1.B.2

Structure and function of polymers are derived from the way their monomers are assembled—

- d. Lipids are nonpolar macromolecules—
 - i. Differences in saturation determine the structure and function of lipids.
 - ii. Phospholipids contain polar regions that interact with other polar molecules, such as water, and with nonpolar regions that are often hydrophobic.

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TOPIC

1.4



**What are the three components
of a nucleotide?**

What are the three components of a nucleotide?



Nucleotides are composed of:

- > pentose sugar**
- > nitrogenous base**
- > phosphate group**

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What are the components of an amino acid?

What are the components of an amino acid?



Amino acids are composed of:

- > central carbon**
- > carboxyl group**
- > amine group**
- > hydrogen**
- > variable (R) group**



If R group is polar, how does the section fold? Why?

- A. Folds in because hydrophilic**
- B. Folds out because hydrophilic**
- C. Folds in because hydrophobic**
- D. Folds out because hydrophobic**

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If R group is polar, how does the section fold?

Why?

B. Folds out because hydrophilic



The exterior environment is polar as organisms have aqueous environments. Polar and charged R groups fold towards the exterior environment which nonpolar R groups fold toward the interior to “hide” from the polar region outside.



What level of structure does the R group interact effect?

- A. Primary**
- B. Secondary**
- C. Tertiary**
- D. Quaternary**

What level of structure does the R group interact effect?

C. Tertiary



Tertiary structure is the three - dimensional structure of the polypeptide. This involves the R groups interacting which provides that shape. Any bond is available in the tertiary structure to form but occurs between the R groups.

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Which lipid makes up the plasma membrane?

- A. Fats**
- B. Phospholipids**
- C. Steroids**

Which lipid makes up the plasma membrane?

B. Phospholipids



The plasma membrane or lipid bilayer is made up of two layers of phospholipids. They orient so the phosphate heads face the intracellular and extracellular regions while the fatty acids tails face the interior of the membrane.

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How do phospholipids associate to form a membrane?

**How do phospholipids
associate to form a
membrane?**



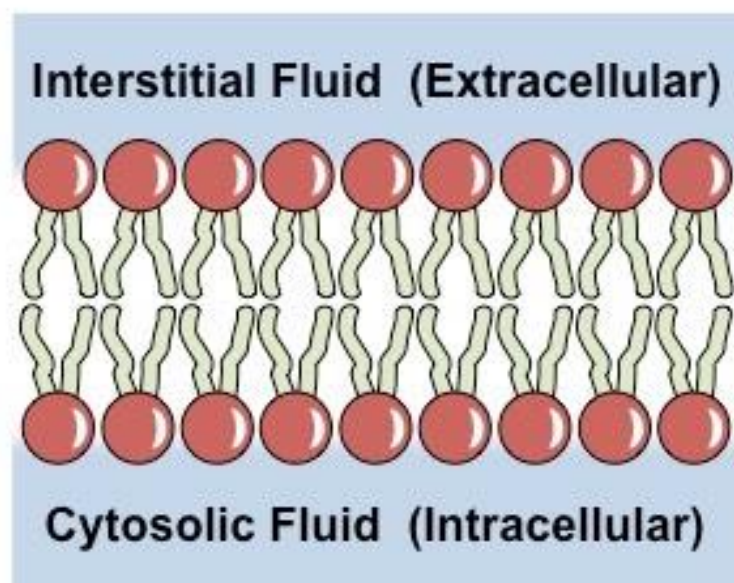
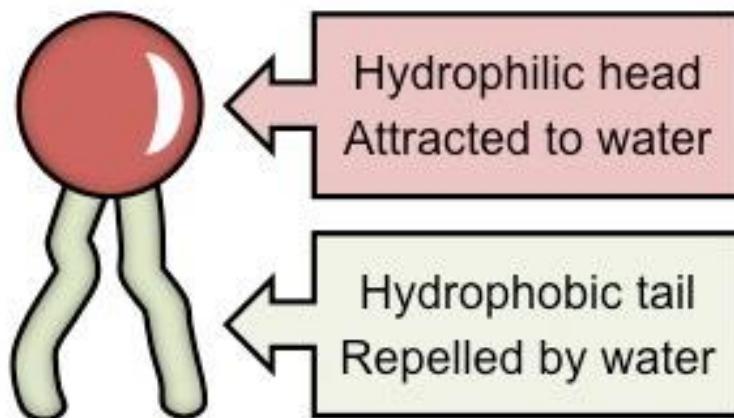
Phospholipids associate with the phosphate group facing the aqueous intercellular and extracellular regions of the cell and the fatty acid tails on the interior of the membrane. It forms a Bilayer so there are two layers of the phospholipids. The fatty acids face one another while the phosphate heads are facing out.

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TOPIC

1.4

**How do phospholipids
associate to form a
membrane?**





What is the function of cellulose?

- A. Storage carbohydrate for animals**
- B. Storage carbohydrate for plants**
- C. Structural carbohydrate for animals**
- D. Structural carbohydrate for plants**

**What is the function of
cellulose?**

**D. Structural
carbohydrate for plants**



**Cellulose is the polysaccharide
found in the cell walls of
plants. This provides structural
support for the plant cells.**

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What type of fatty acid has double bonds to inhibit compression?

- A. Saturated**
- B. Unsaturated**

What type of fatty acid has double bonds to inhibit compression?

B. Unsaturated



Unsaturated fatty acids have at least one double bond. I always say that the carbons are not saturated with hydrogens.

Traditionally in a saturated fatty acid, each carbon has 2 hydrogens, but an unsaturated fatty acid has 1.

AP BIO INSTA-REVIEW

TOPIC

1.4



Which of the following is the monomer of carbohydrates?

- A. Amino Acid**
- B. Fatty Acid**
- C. Monosaccharide**
- D. Nucleotide**

Which of the following is the monomer of carbohydrates?

C. Monosaccharide



Monosaccharides binds together to form polysaccharides which are carbohydrates.

An example of a monosaccharide is glucose, galactose, or fructose.

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Which of the following is the monomer of proteins?

- A. Amino Acid**
- B. Fatty Acid**
- C. Monosaccharide**
- D. Nucleotide**

AP BIO INSTA-REVIEW

TOPIC

1.4



Which of the following is the monomer of proteins?

A. Amino Acid

Amino acids bind together to form a polypeptide which are proteins.

An example of an amino acid is methionine, tyrosine, or alanine.



Which of the following is the monomer of nucleic acids?

- A. Amino Acid**
- B. Fatty Acid**
- C. Monosaccharide**
- D. Nucleotide**

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Which of the following is the monomer of nucleic acids?

D. Nucleotide



Nucleotides bind together to form a polynucleotide which is a nucleic acid (like DNA or RNA).

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1.4



**Lipids are not considered
polymers since they have no
monomers.**

A. True

B. False

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1.4

Lipids are not considered polymers since they have no monomers.

A. True



There are three different types of lipids, but there is no repeating structure that makes them up.

Steroids are four fused rings, fats are three fatty acids and a glycerol, and a phospholipid is two fatty acids, a phosphate, and a glycerol.

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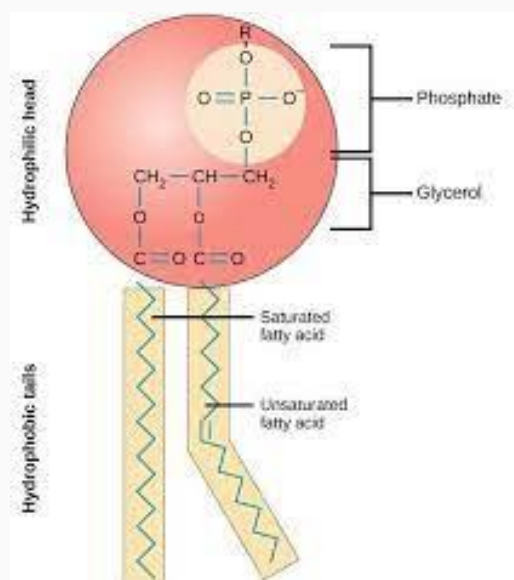


Identify the three components of a phospholipid.



Identify the three components of a phospholipid.

- > Phosphate Group
- > Glycerol
- > Two Fatty Acids



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1.4



DNA and RNA differ in their sugar and a nitrogenous base.

DNA has...

- A. Deoxyribose; Thymine**
- B. Deoxyribose; Uracil**
- C. Ribose; Thymine**
- D. Ribose; Uracil**

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TOPIC

1.4

DNA and RNA differ in their sugar and a nitrogenous base. DNA has...



A. Deoxyribose; Thymine

The D in DNA stands for deoxyribo- because DNA has deoxyribose.

DNA has thymine which binds with adenine.

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1.4



DNA and RNA differ in their sugar and a nitrogenous base.

RNA has...

- A. Deoxyribose; Thymine**
- B. Deoxyribose; Uracil**
- C. Ribose; Thymine**
- D. Ribose; Uracil**

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TOPIC

1.4

DNA and RNA differ in their sugar and a nitrogenous base. RNA has...

D. Ribose; Uracil



The R in RNA stands for ribo- because RNA has ribose.

RNA has uracil which binds with adenine.



Hydrophilic side chains will fold ___ of the polypeptide.

- A. Towards the exterior**
- B. Towards the interior**
- C. No affect on folding**

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**Hydrophilic side chains
will fold ___ of the
polypeptide.**

A. Towards the exterior



Hydrophilic means “water-loving”. They will fold towards the polar region which is the exterior environment of the protein.

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TOPIC

1.4



**Which side chain of amino acids
would fold inward?**

- A. Charged**
- B. Hydrophilic**
- C. Hydrophobic**

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TOPIC

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Which side chain of amino acids would fold inward?

C. Hydrophobic

Hydrophobic means “water-fearing” so it will fold interior to avoid the polar/hydrophilic exterior surrounding the protein.

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**Describe the difference between
a saturated vs. unsaturated
fatty acid?**

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TOPIC

1.4

Describe the difference between a saturated vs. unsaturated fatty acid?



Saturated fatty acids involve every carbon saturated (maximum bonding) with hydrogens.

Unsaturated fatty acids have a double bond reducing the number of hydrogen carbons (allowing them to be unsaturated)

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1.4



Which describes polarity of phospholipids?

- A. Polar head facing exterior, fatty acid tails face interior**
- B. Polar head facing interior, fatty acid tails face exterior**
- C. Both polar head and fatty acid tails is hydrophobic**
- D. Both polar head and fatty acid tails is hydrophilic**

AP BIO INSTA-REVIEW

TOPIC

1.4

Which describes polarity of phospholipids?

A. Polar head facing exterior, fatty acid tails face interior



The phospholipid is made up of a hydrophilic phosphate head which will face towards the polar exterior environment.

The phospholipid is made up of two fatty acid tails which will face towards the interior of the protein to “hide” from exterior.