



Elements of Life

ENE-1.A.1

Organisms must exchange matter with the environment to grow, reproduce, and maintain organization.



Elements of Life

ENE-1.A.2

Atoms and molecules from the environment are necessary to build new molecules—

- a. Carbon is used to build biological molecules such as carbohydrates, proteins, lipids, and nucleic acids. Carbon is used in storage compounds and cell formation in all organisms.**
- b. Nitrogen is used to build proteins and nucleic acids. Phosphorus is used to build nucleic acids and certain lipids.**

AP BIO INSTA-REVIEW

TOPIC

1.2



A macromolecule is found to have C, H, O, N, and S. Identify?

- A. Carbohydrate**
- B. Lipid**
- C. Nucleic Acid**
- D. Protein**

AP BIO INSTA-REVIEW

TOPIC

1.2

A macromolecule is found to have C, H, O, N, and S. Identify?

D. Protein



All of the macromolecules have carbon (C), hydrogen (H), and oxygen (O). Nitrogen is found in proteins and nucleic acids.

Sulfur is found in the R group of some amino acids. Proteins are the only macromolecule with C, H, O, N, and S.



A macromolecule is found to have C, H, O, N, and P. Identify?

- A. Carbohydrate**
- B. Lipid**
- C. Nucleic Acid**
- D. Protein**

A macromolecule is found to have C, H, O, N, and P. Identify?

C. Nucleic Acid



All of the macromolecules have carbon (C), hydrogen (H), and oxygen (O). Nitrogen is found in proteins and nucleic acids.

Phosphorous is found in nucleotides (and phospholipids) which is found in nucleic acids. Nucleic acids are the only macromolecule with C, H, O, N, and P.

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What macromolecule also has phosphate?

What macromolecule also has phosphate?



Phospholipids

Note: lipids wasn't the answer earlier because they don't have a Nitrogen (and all the members don't have Phosphate)

AP BIO INSTA-REVIEW

TOPIC

1.2



Two students are attempting to recreate the Hershey and Chase experiment to identify the genetic information for a cell. They use radioactive Nitrogen to track the material of interest. Why can't they identify the genetic material?

AP BIO INSTA-REVIEW

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Two students are attempting to recreate the Hershey and Chase experiment to identify the genetic information for a cell. They use radioactive Nitrogen to track the material of interest.

Why can't they identify the genetic material?

Nitrogen is found in both Nucleic Acids and Proteins. So, by using radioactive Nitrogen you marked both macromolecules and were unable to track the material of interest.

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Where is the Nitrogen in proteins?

Where is the Nitrogen in proteins?



The Nitrogen is found in the Amine group (NH_2) on the central carbon in each amino acid.

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Where is the Nitrogen in nucleic acids?

Where is the Nitrogen in nucleic acids?



The Nitrogen is in the nitrogenous bases (A, T, C, G, U) that branch from the pentose sugar in each nucleotide (specifically the 1' BUT THAT'S NOT IMPORTANT)



How many valence electrons
does Carbon have?

- A. 2
- B. 3
- C. 4
- D. 5

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How many valence electrons does Carbon have?

c. 4



Valence electrons are the electrons found in the outermost energy level. The first energy level can hold 2 electrons and the second energy level can hold 8 electrons. If you look at the periodic table, carbon has 6 electrons. There are 2 in the first level leaving 4 for the outermost energy level.



**What type of bond does Carbon
make other atoms?**

- A. Covalent**
- B. Hydrogen**
- C. Ionic**
- D. Van der Waals**

**What type of bond does
Carbon make other
atoms?**

A. Covalent



**Carbon has four valence
electrons (so it is equidistant
from a complete valence shell).
Due to this, carbon will share
its valence electrons. Sharing
valence electrons is due to
covalent bonding.**

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**Why is the carbon/carbon bond
non-polar but with
carbon/oxygen polar?**

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Why is the carbon/carbon bond non-polar but with carbon/oxygen polar?

Carbon/Carbon have the same electronegativity, so equal pull of electron (nonpolar)

Carbon/Oxygen have different electronegativity, so unequal pull of electron (polar)



**Which of the following
macromolecules include
nitrogen?**

- A. Carbohydrates & Lipids**
- B. Lipids & Nucleic Acids**
- C. Nucleic Acids & Proteins**
- D. Proteins & Carbohydrates**

Which of the following macromolecules include nitrogen?

C. Nucleic Acids & Proteins



Nitrogen is

- > found in the amine group of amino acids (which is protein's monomer)**
- > found in the nitrogenous base of nucleotides (which is nucleic acid's monomer)**

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Where is the nitrogen in nucleic acids and proteins?

Where is the nitrogen in nucleic acids and proteins?



Nucleic acids' monomer (nucleotide) have nitrogenous bases containing nitrogen. Proteins' monomer (amino acid) have the functional group of an amino.



Which of the following macromolecules has phosphate?

A. Carbohydrate

B. Fat

C. Nucleic Acid

D. Protein

**Which of the following
macromolecules has
phosphate?**

C. Nucleic Acid



Phosphate is

- > found in phospholipids which has a glycerol bound to one phosphate and two fatty acids**
- > found in nucleotides which is the monomer of nucleic acids**



**Which of the following
macromolecules has sulfur?**

A. Carbohydrate

B. Fat

C. Nucleic Acid

D. Protein

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**Which of the following
macromolecules has
sulfur?**

D. Protein



**Sulfur is found in the R group of
some amino acids
(methionine and cysteine).**



Which macromolecule has a ratio of 1:2:1 ratio with C:H:O?

- A. Carbohydrates**
- B. Lipids**
- C. Nucleic Acids**
- D. Proteins**

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1.2



Which macromolecule has a ratio of 1:2:1 ratio with C:H:O?

A. Carbohydrates

Each carbon in a carbohydrate has a hydrogen (H) and a hydroxyl (OH) attached. This means that carbohydrates have approximately a **1C: 2H: 1O** ratio.



Phospholipids are a type of lipid that include...

- A. Nitrogen**
- B. Phosphorus**
- C. Sulfur**

Phospholipids are a type of lipid that include...

B. Phosphorus



Phospholipids have:

- > phosphate
- > **2** fatty acids
- > glycerol

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Describe the difference between the dehydration and hydrolysis

Describe the difference between the dehydration and hydrolysis



Dehydration involves the building of a polymer. When two monomers are joined, a water molecule is removed and a bond formed between the two monomers.

Hydrolysis involves the breaking up of a polymer. A water molecule is added to break bonds.

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What are the four components bound to a central carbon in an amino acids?

What are the four components bound to a central carbon in an amino acids?



- >Amine group (NH_2) making up the N terminus**
- >Carboxyl group (COOH) making up the C terminus**
 - >Hydrogen**
- >R group (or variable group) is a side chain. This is the first thing that's different in the 20 amino acids)**

AP BIO INSTA-REVIEW

TOPIC

1.2



What elements are found in all lipids?

- A. CHO**
- B. CHON**
- C. CHOS**
- D. CHOP**

**What elements are found
in all lipids?**

A. CHO



There are three types of lipids:

- > Steroids: four fused rings with different functional groups**
- > Fats: glycerol and 3 fatty acids**
- > Phospholipids: glycerol, one phosphate, and 2 fatty acids**

**So, overall they are made up of
carbon, hydrogen, and oxygen**