AP BIO INSTA-REVIEW

TOPIC 1.3

Introduction to Biological Macromolecules

SYI-1.B.1

Hydrolysis and dehydration synthesis are used to cleave and form covalent bonds between monomers.

X EXCLUSION STATEMENT—The molecular structure of specific nucleotides and amino acids is beyond the scope of the AP Exam.

X EXCLUSION STATEMENT—The molecular structure of specific carbohydrate polymers is beyond the scope of the AP Exam.

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The process of breaking bonds by splitting water

A. Dehydration

B. Hydrolysis

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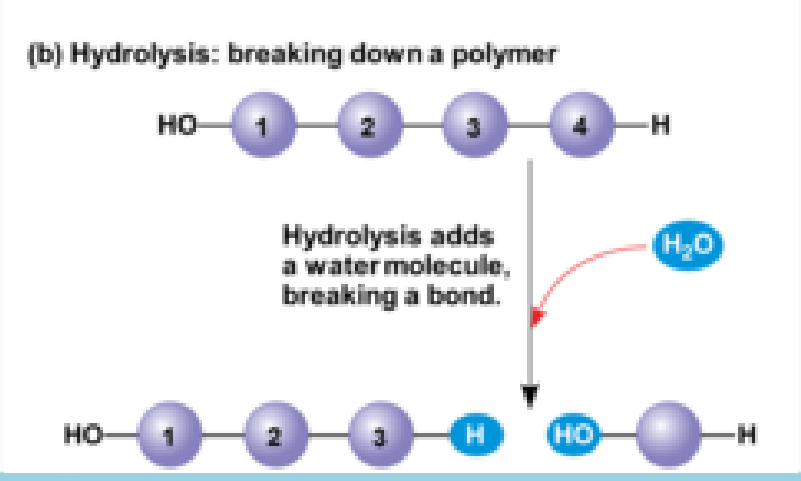
TOPIC 1.3

The process of breaking bonds by splitting water

B. Hydrolysis

Hydro for "water" and lysis for "to break". The water molecule is broken into a hydrogen and a hydroxyl. When the bond in a polymer is broken, the hydrogen binds to one side and the hydroxyl binds to the other.



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What is formed from hydrolysis of proteins?

A. Amino acids

B. Glycerol & fatty acids

C. Monosaccharides

D. Nucleotides

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What is formed from hydrolysis of proteins?

A. Amino acids

During hydrolysis, a bond is broken using water releasing a monomer of the polymer. When the peptide bond in a protein is broken, one of the monomers (an amino acid) is released.

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Process of forming bonds by removing water molecules

A. Dehydration

B. Hydrolysis

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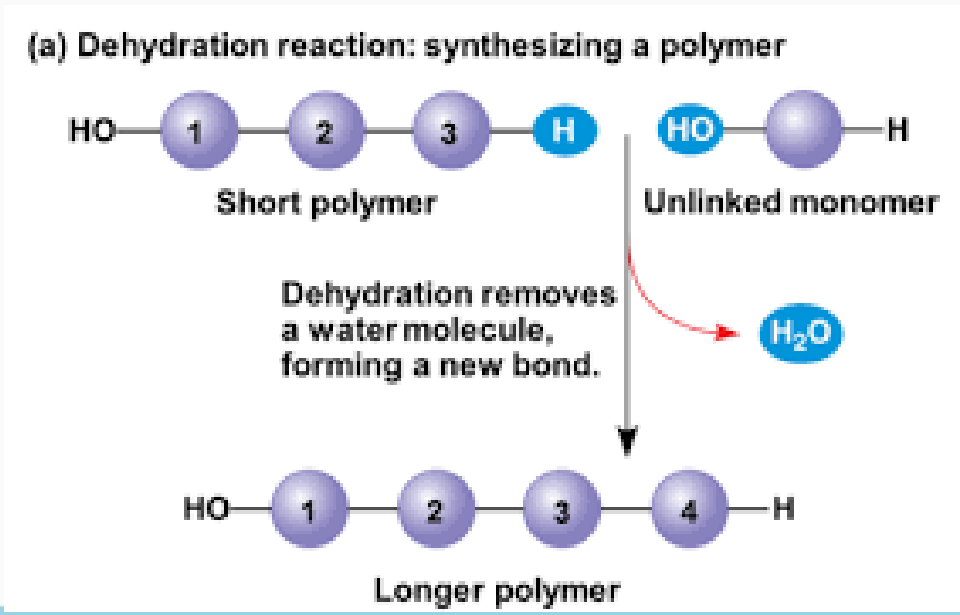
TOPIC 1.3

Process of forming bonds by removing water molecules

A. Dehydration

During dehydration, water is released forming a bond between monomers to form the polymer.



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Dehydration with nucleotides form what?

A. Carbohydrate

B. Nucleic Acid

C. Protein

D. Triglyceride

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Dehydration with nucleotides form what?

B. Nucleic Acid

During a dehydration reaction, the water is removed to bind together a monomer with a growing polymer. The nucleotide is the monomer of nucleic acids.

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Dehydration with glycerol and fatty acids forms what?

A. Carbohydrate

B. Nucleic Acid

C. Protein

D. Triglyceride

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Dehydration with glycerol and fatty acids forms what?

D. Triglyceride

During a dehydration reaction, the water is removed to form a bond. The fatty acids are bound to the glycerol in a triglyceride. Recall, the triglyceride is a fat molecule made up of one glycerol with three fatty acids.

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Describe how a peptide bond is formed

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Describe how a peptide bond is formed

Peptide bond is the bond between two amino acids. It is a type of covalent bond formed upon the removal of a water molecule. The hydroxyl comes from the carboxyl group of one amino acid and the hydrogen come from the amine group of another amino acid. This forms the bond between the carbon in the carboxyl group of one to the nitrogen of amine in the next amino acid.

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Why aren't lipids considered polymers?

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Why aren't lipids considered polymers?

There are three types of lipids. Fats formed from one glycerol and three fatty acids. Phospholipids formed from one glycerol, one phosphate (& choline) group, and two fatty acids. Steroids with four fused rings.

None of these involve a repeating subunit (monomer). Amino acids repeat to form proteins. Nucleotides repeat to form nucleic acids. Monosaccharides repeat to form carbohydrates (polysaccharides).

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Reaction to synthesize polymers from monomers

A. Dehydration

B. Hydrolysis

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TOPIC 1.3

Reaction to synthesize polymers from monomers

A. Dehydration

Dehydration reactions will form bonds between monomers to make polymers. The water molecule is removed with forms a bond between the two molecules.

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Reaction to remove monomers from polymers

A. Dehydration

B. Hydrolysis

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TOPIC 1.3

Reaction to remove monomers from polymers

B. Hydrolysis

Hydrolysis reactions will break bonds in polymers releasing the monomers. A water molecule is broken to break the bond between the molecules which detaches one of the monomers.

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Type of bond broken when amino acids released

A. Ester Linkage

B. Peptide Bond

C. Phosphodiester linkage

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Type of bond broken when amino acids released

B. Peptide Bond

The bond found between amino acids in a protein is a called a peptide bond. This is a type of covalent bonds specific to proteins. This is also why we call a protein a “polypeptide” since it has multiple peptide bonds.

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Specifically, where is the peptide bond in proteins?

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Specifically, where is the peptide bond in proteins?

Bond between the carboxyl group of one amino acid and the amine group of the next amino acid

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Where would you find the phosphodiester linkage in nucleic acids?

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Where would you find the phosphodiester linkage in nucleic acids?

This is the bond between the hydroxyl of the pentose sugar in the first nucleotide and the phosphate group in the second nucleotide