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Introduction to Macromolecules Answer Sheet

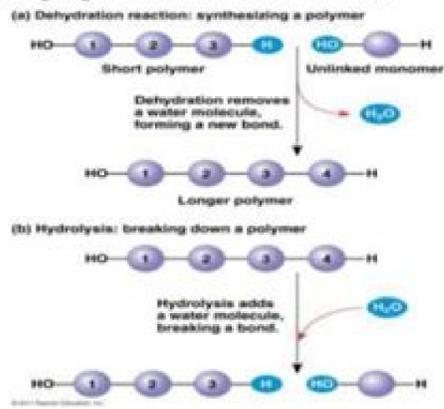
Biological Macromolecules:

Most common elements in living things are carbon, hydrogen, nitrogen, and oxygen. These four elements constitute about 95% of your body weight. All compounds can be classified in two broad categories --- organic and inorganic compounds. Organic compounds are all based on carbon. Carbon can form single bonds with another atom and also bond to other carbon molecules forming double and triple bonds. This allows carbon based molecules to form single and double rings, chains, and branching chains. Most organic compounds are built primarily of carbon, hydrogen, and oxygen but in different ratios. Each small organic molecule can be a unit of a large organic molecule called a macromolecule.

If the small organic units are identical or form patterns they are called monomers and the large organic molecule they form is called a polymer.

When monomers are joined together the reaction is called dehydration synthesis or condensation as water is produced when the monomers are bonded together. To break the polymers down again the reaction is called hydrolysis. Notice how water is used or produced in these two reactions shown to the right

There are four classes of macromolecules: carbohydrates, lipids, proteins, and nucleic acids. Heterotrophs, like us, must get these biological macromolecules from our food which we break down into monomers through digestion. This makes the molecules small enough to cross cell membranes. Our cells use them either as energy sources or to build the carbohydrates, proteins, lipids, and nucleic acids that our body needs.



Questions:

1. What atom makes up the backbone of biological macromolecules?

Carbon

2. What kinds of shapes can carbon based molecules form:

single and double rings, chains, and branching chains.

3. What are macromolecules?

a large organic molecule

4. How are monomers related to polymers?

If the small organic units are identical or form patterns they are called monomers and the large organic molecule they form is called a polymer

2.3 - 2.5 STUDY GUIDE

2.3—Carbon Compounds

- Monomer – small repeating units
- Polymer – large molecules
- Polymerization - process that joins small repeating units (monomers) together to form large molecules (polymers)
 - o Dehydration synthesis - removes water (dehydration) to make a bond (synthesis)
 - o The opposite process is **Hydrolysis**
 - Hydrolysis adds water (hydro) to break a bond (lysis)
- There are 5 important carbon-based molecules in all organisms
 - 1) Carbohydrates
 - 2) lipids
 - 3) nucleic acids
 - 4) protein
 - 5) ATP

MOLECULE	PICTURE	ELEMENTS	MONOMERS	POLYMERS	USE
Carbohydrates		C,H,O	Monosaccharides	Polysaccharides	Quick energy source in body
Lipids		C,H,O	Glycerol Fatty acids	Fat, lipid	Long term energy source in body
Nucleic acids		C,H,O,P,N	Nucleotides	Nucleic Acid DNA RNA	Instructions to make proteins in body

Appendix 10.1: Review of Organic Compounds

Review of Major Life Molecules (see the review in 10.1)

1. Why is water unique? It doesn't have a double bond.
2. How are molecules transported in water? Diffusion (down to water) and active transport (up to water). Active transport uses energy (ATP).
3. How are ions transported in water? Diffusion (down to water) and active transport (up to water). Active transport uses energy (ATP).
4. What are the most important organic compounds? Carbohydrates, lipids, proteins, and nucleic acids.
5. List the major organic compounds: Carbohydrates, lipids, proteins, and nucleic acids.

MOLECULE	STRUCTURE	FUNCTION	IMPORTANCE
Carbohydrates	Simple sugars, polysaccharides	Energy source	Quick energy (energy storage in plants)
Lipids	Fats, oils, waxes, steroids	Energy storage, insulation, protection	Energy storage in animals
Proteins	Amino acids, polypeptides	Enzymes, structural proteins, transport proteins	Most of our body is made up of proteins (enzymes, antibodies, hormones)
Nucleic Acids	DNA, RNA	Genetic information, protein synthesis	Information storage, heredity

Resonance Structures and Arrow Pushing

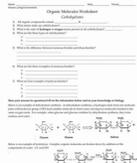
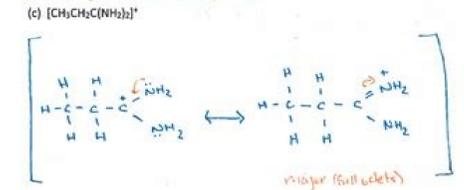
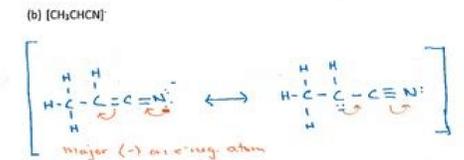
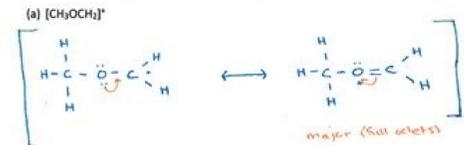
Are the following pairs resonance structures or different compounds (from 1-36)?



a) different (H atoms have moved)

b) different (same)

Draw all resonance structures for the following compounds. Where possible, label the major and minor contributors. Use curved arrows to show how each structure is converted to the next.



Thank you for your participation! Organic chemistry is the study of carbon compounds. Because there are so many of these in living things, organic chemistry is sometimes thought of as living chemistry. Read More... Differentiated, editable worksheets providing a wide range of assessment questions to support key topics in organic chemistry in context worksheets ask learners to apply their knowledge of organic chemistry topics to interesting contexts from everyday life, helping them develop their skills in applying knowledge. The worksheets include calculation questions to practice mathematical skills within a genuine chemical context. Knowledge check worksheets provide a series of questions on specific topics that teachers can use to assess student learning, or for students to use as self-assessment. All the worksheets may be used for individual student work in class or at home. Or use questions to provide topics for discussion by groups of students or as a whole class. Fully editable versions are provided so you can select or group questions to suit your lesson plans. Student worksheets are available at two levels, foundation and higher for most topics. Teacher versions with suggested answers to all questions are also provided. Thank you for interesting in our services. We are a non-profit group that run this website to share documents. We need your help to maintenance this website. To keep our site running, we need your help to cover our server cost (about \$400/m), a small donation will help us a lot. Please help us to share our service with your friends.

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