HELLENIC REPUBLIC

UNIVERSITY OF CRETE

Academic English

Section: Handout: Organic Chemistry introduction

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E2: Week 2 Handout: Organic Chemistry introduction

Task 1: DO YOU KNOW?

- *How do you tell the difference between an Organic and an Inorganic Compound?*
- *How do you classify organic compounds?*

Organic Compounds	Inorganic Compounds
	Mostly ionic bonding
	Are generally solids with high melting points
	Many are water soluble
	Most are not soluble in organic solvents
	When dissolved in water conducts electrical current
	Most not combustible
Slow to react with other chemicals	Often undergo fast chemical reactions

Task 2: Quiz

1. Hydrocarbons (compounds composed of carbon and hydrogen) in which all of the carbon-carbon bonds are bonds are called alkanes.

Single double triple quadruple

2. When *a small section* of an organic molecule is largely responsible for the molecule's chemical and physical characteristics, that section is called a ……. group.

Reactional organic structural functional

3. Compounds that contain the benzene ……..are called arenes or aromatics.

Cycle ring circle round

4. Ethers consist of two ……..groups surrounding an oxygen atom.

Carboxylic carbohydrate hydrocarbon carbonyl

Coherence and cohesion

> *"A paragraph is coherent when the reader can move easily form one sentence to the other and read the paragraph as an integrated whole rather than a series of separate sentences" (Mc Cimmons).*

To achieve this, there are several devices you might need to exploit, such as:

- Repetitive keywords, themes ---------- language appropriate to the theme -does not stray from the topic
- Repetitive structures ---------- sustain the logical connection of ideas
- Transitional phrases
- Pronouns as reference words

Task 3: Put the sentences in the right order so that the paragraph is then coherent and cohesive. Circle words or phrases that determined your choices.

> Others, like artificial sweetener saccharin, have become a part of everyday life.//Synthesis, or the making of molecules, is a very important part of organic chemistry. //Some, like cubane, which gave chemists the opportunity to study special kinds of bonding and reactivity, are of largely theoretical interest. //Since Wolher's time, nearly 10 million organic substances have been synthesized from simpler materials, both organic and inorganic. These substances include many that also occur in nature, such as penicillin antibiotics, as well as entirely new compounds.

Taks 4: Criteria for paragraph coherence:

- Is there a topic sentence in this paragraph? What are the key words in the topic sentence?
- Does every other sentence that follows contain more specific information than the topic sentence? Or, does it maintain the same focus of attention as the topic sentence?
- Is a key theme from sentence A repeated in sentence B and so on?
- Are there any synonyms or antonyms of the key themes repeated throughout the paragraph?
- Are there any parallel structures, transitions or reference words used to reinforce the logical connection of ideas in the paragraph?

Task 5: Read the text and answer the comprehension questions.

Task 6: Transformations: Rewrite the following sentences so that the meaning remains the same.

1. Organic molecules constitute the very essence of life.

…….

2. Proteins and nucleic acids are the principal components of carbon.

…….

3. The uncontrolled disposal of organic chemicals has polluted the environment, causing deterioration of animal and plant life.

……

4. We classify organic molecules according to the bonds that determine their chemical reactivity.

…….

5. Alkane bonds can be broken by heat, light, or chemical reagents.

……

6. These molecules exhibit stereoisomerism.

…….

7. These substances include man that also occur in nature as penicillin and antibiotics.

…….

8. The goal of organic synthesis is to construct complex organic chemicals from simpler ones.

…….

9. The knowledge of physical conditions that govern organic reaction processes is equally important in analyzing biological transformations.

…….

10. We study how changes in substrate structure affect the outcome of the reaction.

…….

Task 7: Organic chemistry close: Read and complete the gaps.

1.	compounds of carbon	carbon reactions	the element of carbon
2.	chemical solutions	chemical bonding	chemical conformation
3.	electron affinity	electron spin	electron configuration
4.	lone-pair	alone-pair	single-pair
5.	directed	directive	directional
6.	harvested	emerged	accumulated
7.	trace	particle	atom
8.	methane	ethane	methanol
9.	functioning group	functional group	operational group
10.	electron- withdrawing	electron-withdrawn	electron withdrawal
11.	mother	relative	parent
12.	alcohol	ether	ketone
13.	alcohol	ether	ketone
14.	cycloalkane	carbon hydroxide	carboxylic acid
15.	round	ring	circular
16.	aspects	factors	parameters
17.	colligative	coefficient	conjugation
18.	refrigency	resonance	retention

Organic chemistry is the study of the a)…….. It is the single largest branch of chemistry, and the one with the most direct impact on the daily lives of most people in the world. The number of organic compounds is well over a million, and thousands of new compounds are created or discovered every year. In addition to the practical uses of organic compounds as drugs, fuels, and industrial chemicals, the study of organic compounds provides new information about b)……., and other processes unavailable from the study of other types of compounds.

Why is carbon at the centre of this vast field of study, rather than, say, sodium? The answer is that carbon's c)…….allows it to form four bonds, and its size and electronegativity mean these bonds will be primarily covalent or polar covalent, rather than ionic. The ability to form multiple bonds means carbon can form chains, allowing the creation of large and complex carbon backbones, as it does in molecules such as proteins, DNA, plastics, and other polymers. In addition, carbon normally has no d) …….of electrons in its compounds, preventing this kind of repulsion that makes nitrogen or oxygen chains unstable.

The covalent character of carbon's bonds, even with such electronegative elements as oxygen, means that its bonds continue to be highly e)……., unlike the ionic bonds of sodium, for instance, which are equally strong in all directions. This directionality gives the individual molecule its identity separate from other molecules, allowing it to participate as a unit in the highly complex series of reactions found in living organisms or in the modern chemistry laboratory.

The first organic compounds, and still the most complex, are those from living organisms. Most organisms share perhaps a thousand or more similar or identical compounds, such as amino acids, sugars, and nucleotides. Many organisms, however, make unique compounds, which function in signalling, metabolic pathways, or defence. Such compounds have proven to be a potent source of new drugs and enzymes. Examples include aspirin, from the bark of willow trees. While many useful compounds originally isolated from living organisms are now made synthetically, others are either too complex or too expensive to synthesize, and continue to be f) ……. from the natural source.

While carbon's bonding characteristics form the theoretical basis of organic chemistry, it would be rather dull if carbon only bonded to itself. The vast range of organic compounds arises from the addition of different atoms onto a carbon skeleton. Hydrocarbons are compounds in which hydrogen is the only other g) ……. The simplest is h)……., CH_4. Larger hydrocarbons include all the compounds used as gasoline and heating fuels, as well as petrochemical-based waxes.

Substitution of a halogen such as chlorine for a hydrogen on a hydrocarbon creates a new class of compounds, the alkyl halides. The halogen is called the i) …….. of this class, meaning it is the group that gives the class its characteristic properties.

The study of functional groups provides the theoretical framework for understanding the reactions and behaviour of the various classes of organic compounds. For instance, a halide is an electronegative atom, which withdraws electrons from the carbon it is bonded to. This leaves carbon with a partial positive charge, which will, in turn, serve to attract negative groups during reactions. The j) ……..nature of the halides, then, strongly influences the chemical behaviour of the k) …….. compound. Compounds may have more than one functional group, which influence the behaviour in different ways.

Other important functional groups include: OH, the hydroxyl group, which makes the parent compound an l)…….; O, which makes the compound an m)……; C=O, the carbonyl group, which makes the compound an aldehyde if the group is on a terminal carbon, or a ketone if it is between two carbons; COOH, the n) ……. group, which makes the compound an acid; NH_2, the amine group, which makes the compound an amine; NH, the amide group, which makes the compound an amide; C_6H_5, the phenyl group; and SH, the thiol group.

In addition, the chemistry of a compound is strongly affected by whether it is a straight-chain molecule or a o) ……. compound, and whether that is aliphatic or aromatic.

The study of organic compounds includes the determination of the identity and structure of existing compounds, the synthesis of new ones, and the determination of the step-by-step mechanisms and other p)…… of reactions.

Analysis is concerned with determining the structure and identity of a compound. It requires the isolation and purification of a sample of the compound, followed by a series of physical and chemical tests. Simple tests include determination of melting and boiling point. Molecular weight was once commonly determined through q) …… property analysis, but is now more likely to be done with a mass spectrometer. Determination of the atomic makeup of the compound can be approached through combustion analysis combined with a variety of qualitative tests for various functional groups.

Structure determination is most often performed with one or another type of spectroscopy. Infrared spectroscopy is a principal tool for functional group analysis, while Nuclear Magnetic r) ……spectroscopy gives detailed information on the position of hydrogens and other atoms. X-ray crystallography can solve the three-dimensional structure, especially important for larger compounds that could exist in any one of many different conformations.

Retrieved from http://www.bookrags.com/sciences/chemistry/functional-group-woc.html

Notes

Reference Note

Licensing Note

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