

SCIENCE 1108

CARBON CHEMISTRY

HYDROCARBONS

CONTENTS

I. CARBON COMPOUNDS	2
Classification of Organic Compounds	2
Sources of Organic Compounds	5
II. CARBON ATOMS	10
Structure	10
Forms	11
Bonding	13
III. HYDROGEN AND CARBON	17
Saturated Hydrocarbons	18
Unsaturated Hydrocarbons	23

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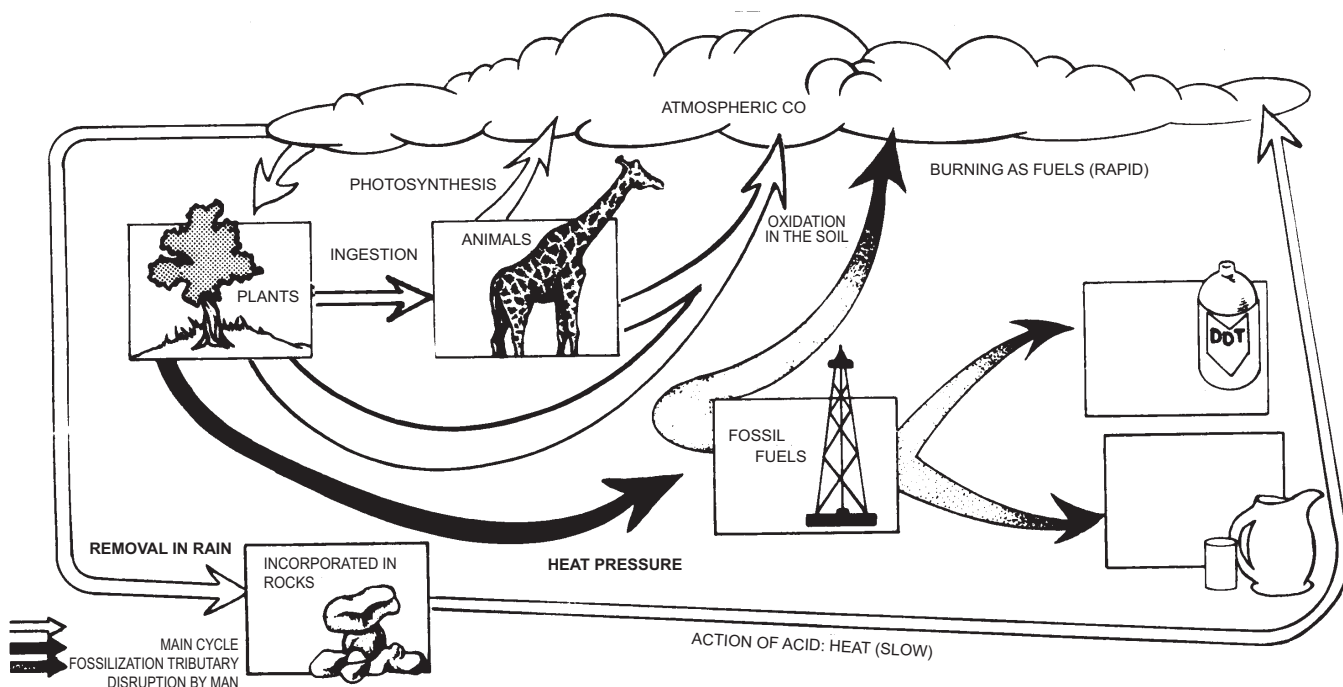
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I. CARBON COMPOUNDS

Carbon compounds are a part of what we call the carbon cycle. We see the carbon cycle as one part of God's plan to keep nature balanced. The picture below is a crude representation of the cycle, as we perceive it. We understand that God can add to or take away from any product or ingredient at any step as pleases Him in His plan. See Psalm 104:29-30. Also the fish and bread multiplied by Jesus and the oil and meal by Elijah no doubt entered into the carbon cycle as organic materials.

Many God-fearing scientists believe that many of the coal and petroleum resources were buried and formed during the Flood of Noah's day.

These carbon compounds are the basis of synthetic plastics and petro-chemicals used in modern society. Although man's greed continues to pollute our environment, we are thankful that God's manifold plan to keep nature in balance is still maintained, and functioning. This delicate balance of nature is included in Isaiah 45:18 where God says of the earth, "He formed it to be inhabited."



SECTION OBJECTIVES

Read these objectives. When you have completed this section, you should be able:

1. To classify compounds as organic or inorganic.
2. To identify the three major sources of organic compounds.

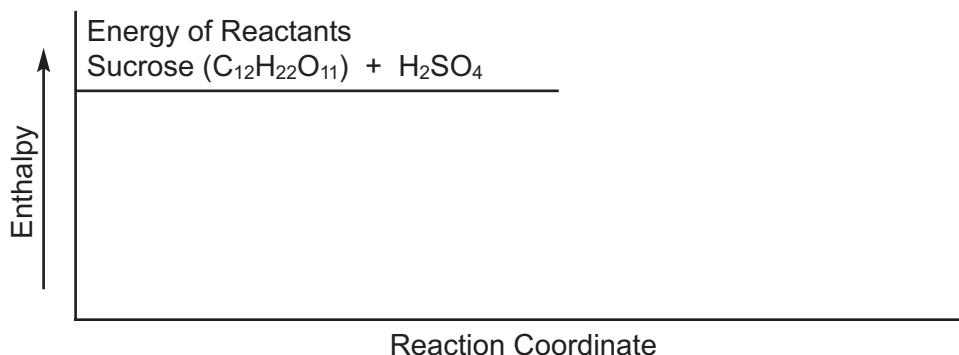
CLASSIFICATION OF ORGANIC COMPOUNDS

All natural substances can be classified into one of two categories, *organic* or *inorganic*. Chemists in the past defined these two categories slightly different than they do today. They thought of "organic" as things that are living or once lived and the substances they produced. Everything else was inorganic.

Today chemists consider any carbon compound other than CO, CO₂, and metal carbonates to be

organic and all else inorganic. Both of these definitions have weaknesses. With the first, the loaves and fishes from Jesus' multiplying to feed the multitude would not be classified as organic, strictly speaking. With the modern definition, CO₂, a product of combustion in plants and animals and a major part of the carbon cycle, would be considered inorganic. Thus the same substance swings back and forth between organic and

h. On the basis of these observations, complete the following diagram.



1.2 What is urea? _____

1.3 Describe the Theory of Vitalism. _____

1.4 What was Friedrich Wohler's contribution to science? _____

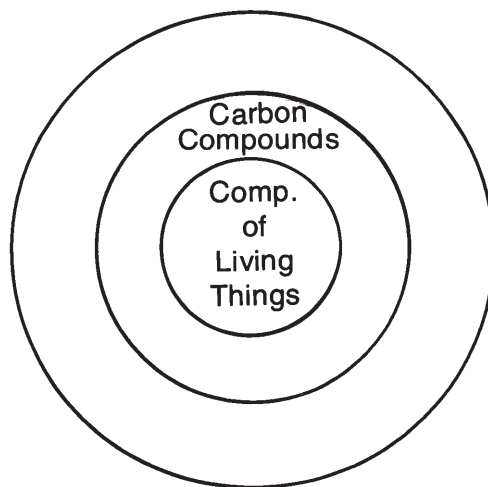
Many plastic materials burn and leave a charred, black residue like that of the H₂SO₄ - sugar reaction. The products of the preceding reaction are similar to the results of leaving bread in the toaster or meat and potatoes in the oven too long. A hot flatiron left on a piece of cloth yields the same charred products. Sugar, plastics, food, and

cloth are part of a large group of substances which have two things in common: (a) they all are or contain organic compounds, and (b) they all contain the element *carbon*. Examination of the compounds from living things shows an abundance of this element. *Organic chemistry is the study of compounds made of carbon.*



Do this activity.

1.5 The area within the following circle represents all chemical compounds. Crosshatch organic compounds vertically and inorganic compounds horizontally on the drawing.





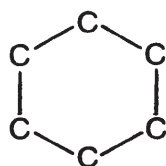
Write true or false.

- 1.6 _____ Compounds of carbon are organic.
1.7 _____ Compounds of living things are organic.

SOURCES OF ORGANIC COMPOUNDS

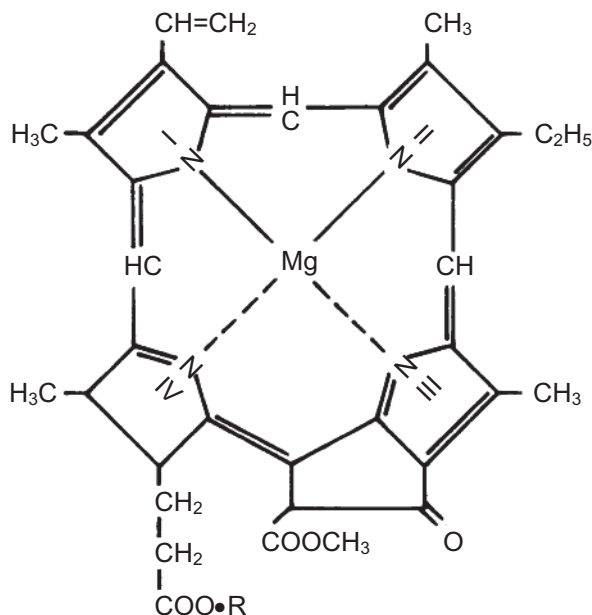
What is so special about compounds of carbon that they should be studied separately from the compounds of the other hundred or so elements? In part the answer seems to be that so many compounds of carbon exist. About 50,000 compounds of all the elements other than carbon are known to exist. Well over a million organic compounds are known, and every year more than 100,000 new organic compounds are produced.

What is so special about carbon that it should form so many compounds?



Carbon atoms can form chains thousands of atoms long or rings of all sizes, such as chains made of paper clips or strings of popcorn. The chains and rings can have branches and cross-links with atoms of other elements (chiefly hydrogen) attached to the carbon atoms. Each different arrangement of atoms corresponds to a different compound, and each compound has its own physical and chemical properties. Therefore, the order in which atoms are attached to each other and the electrons which hold them together are very important in accounting for the properties of compounds. Structural formulas and wood models representing molecules can be used to account for the physical and chemical properties of compounds.

Notice silicon's place in the periodic table—it is in the same column as carbon and the only non-metal in that column. Silicon is the only element other than carbon known to have chaining abilities with its atoms. This could be a whole new field of challenge to an open-minded scientist!



———— Chlorophyll A: A Green Pigment in Plants ————