Organic Chemistry Essay, Research Paper

Chemistry has been called the science of what things are. Its intent is the exploration of the nature of the materials that fabricate our physical environment, why they hold the different properties that depict them, how their atomic structure may be fathomed, and how they may be manipulated and changed.

Although organic reactions have been conducted by man since the discovery of fire, the science of Organic chemistry did not develop until the turn of the eighteenth century, mainly in France at first, then in Germany, later on in England. By far the largest variety of materials that bombard us are made up of organic elements. The beginning of the Ninetieth century was also the dawn of chemistry, all organic substances were understood as all being materials produced by living organisms: wood, bone, cloth, food, medicines, and the complex substances that configure the human body. Inorganic material was believed to come from the Earth: salt, metals, and rock, just to name a few.

Because of the human s wonder of natural life, organic materials were believed to possess an enigmatic Vital Force. Thus organic chemistry was separated from inorganic chemistry, and it became it s own field of science. By the turn of the Nineteenth the Vital Force theory was immensely discredited, but this branch of science still stayed separated from inorganic chemistry. Back when Organic chemistry was the chemistry of living matter, Professor Wohler succeeded in synthesizing in the laboratory an organic compound previously observed in living tissue as Urea. Professor Wohler made this organic compound from non-living chemical substance, Ammonium Cyanate. He evaporated a solution of Ammonium Cyanate to produce Urea. Thus rendering the Vital Force theory to be with flaws. Other famous experiments proved the vitalism theory was wrong. In 1845 Kolbe synthesized acetic acid, the chief component in vinegar, in a flow of reactions starting with Carbon, the experiment is demonstrated better defined since acetic acid (C6H4O2) is a carbon-carbon bond. The theory of vitalism, like many other scientific theories, disappeared slowly under the weight of accumulated evidence rather than as a consequence of any one brilliant and enlightening experiment.

Structural theory, which developed in the 1860 s, started the second major period of growth in the organic chemistry field. The development of a detailed picture, by using pure reasoning of both atomic organization and the shapes of molecules stands as a great milestone of the development of human intellect. At almost the same point in time, Kekule in Germany, and Couper of Scotland suggested that atoms in molecules are fused together by bonds. Their theory was that every atom is distinguished by having the same number of bond availability or valence number, where ever that particular atom appears in any compound. The main notability of organic compounds is having strong carbon to carbon bonds. This was recognized in the theory, and was used to help understand large molecules, possessing many bonded carbon atoms. Carbon is the cement that holds their molecules together. So far, this theory has gone through rigorous testing, and has not been proven inadequate to this day, as of now it is a law.

Kekule and Couper s theory was not all without fault; it is suprising that they did not recognize atoms as three-dimensional objects if they were to be understood as true particles of matter in space. It was not until 1875 when van t Hoff and LeBel proposed their hypothesis of compounds and atoms taking up space. Their hypothesis went as follows: Four bonds of carbon were located at equal angles to each other in space, this would be a rectangular tetrahedron. Immense amounts of proof have been supplied to support this theory, but is not universally accepted. It is believed today that this hypothesis is pure nonsense, proving that van t Hoff and LeBel were misdirected. It goes to show science is not always a constant law, theories, and even laws can be proved wrong. This Hypothesis was no exception; science can adapt to the world around it. After all, the mission statement of science is the attempt to understand the world around you, and without change there is no growth.

The structural theory is not only a focal point of organic chemistry, but an amazingly simple idea. It states that by grasping that each carbon atom to form four bonds, tetrahedrally arranged in space, we are able to map the architecture of even the most complex molecules. Hence, even though the molecules are too minuscule to be seen in most powerful, cutting edge, electron microscopes. Scientists are still able to possess a clear understanding of how a molecule is constructed. Although the atoms may have minor different physical characteristics than scientists expected such as, carbon atom being an elliptical shape, or the bonds may not line up in a compound as neatly as we envisioned them. Nevertheless, the truth of their basic physical architectural hypothesis has been substantiated literally millions of times by successful outcome of prediction. The power of the theory is demonstrated by the statement that there has been no chemical observation that cannot be basically understood by structural theory. Finally, although structural logic is extremely rigorous, it involves no mathematics. Unlike most sciences of equal complexity, much of organic chemistry is conducted without the use of formal math beyond elementary levels.

The third and presently used theory in the history of organic chemistry ends with the description of chemical bonds as electron pairs, Lewis came up with this in 1917. Although a great amount of chemical reactions were already known and in active use to synthesize organic compounds into other compounds, only with this understanding of the nature of a chemical bond did a clear reason of the nature an mechanism of chemical reactions begin to appear. This will be clear when one realizes that the transformation of one molecule to another, a chemical reaction, requires the breaking of some bonds and the making of others. This process could not be understood until one knew what a bond is. Thus if the nineteenth century was devoted to unraveling the fixed structures of molecules, the twentieth century will be devoted to the study of their transformations.

The study of science and more specifically the study of organic chemistry is an on going affair. In the scientific community one never rests, there is a continual stream of experimentation and the desire to explore new realms. The cutting edge in science is grounded in the medical field. How can we manipulate genetic codes the building blocks of life? The things we have learned over the years are allowing us to build those bridges to the future, a future that might see an improvement in the human condition by way of organic chemistry.