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"IMPROVEMENT OF METHODOLOGY OF EXPERIMENTS IN ORGANIC CHEMISTRY"

Saydakhmetova Shakhnoza Ravshanbekovna
Senior Lecturer Tashkent State Pedagogical University
Saydaxmetova_shaxnoza77@mail.ru
+998 900098144

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Abstract:

Organic chemistry is an experimental science, and you learn about "how we know what we know about it" in the laboratory. The laboratory is dedicated to organic chemists' scientific research procedures. It shows the experimental basis for what your textbook claims to be true. The major purpose of the laboratory is to teach you how to do organic chemistry by doing it yourself. This article goes through the various ways for studying and improving organic chemistry in depth.

Keywords: Organic chemistry, methodology, experiment, improvement, techniques, science.

Learning how to gather, understand, and draw appropriate conclusions from experimental evidence is at the heart of science. Your laboratory work will allow you to put your critical thinking skills to the test and participate in the scientific process—observing, reasoning, and acting. To learn experimental organic chemistry, you must master a variety of procedures for performing and interpreting chemical reactions, separating products from reaction mixtures, purifying products, and assessing the results.

Techniques in Organic Chemistry is intended to give you a solid foundation in the techniques used by organic chemists and the basic principles on which they are founded. Mastering these approaches necessitates meticulous attention to detail and thorough observation, which will allow you to achieve reliable data and draw logical conclusions from your chemical experiments.[1]

You will have a variety of experiences in the laboratory, ranging from learning basic methods to running chemical reactions. The relationship between theory and experiment will be considered when interpreting your experimental results, which will reinforce what you've learned. You may have the opportunity to do guided-inquiry experiments that ask you to answer a question or solve a problem by drawing conclusions from your experiments.[2] You may also have the opportunity to synthesize an interesting organic compound by adapting a generic experimental procedure from the chemical literature Science is often done by teams of people working together on problems, and your experiments may involve teamwork with other students in your lab section.

Some of your lab work will likely entail multiweek studies, which provide the flexibility to allow you to successfully redo a reaction technique if it didn't work the first time.

In fact, almost all experimental results reported in chemical journals have been replicated multiple times before being published. Learning how to do organic chemistry in the lab safely is an important part of the process. Technique 1 covers laboratory safety as well as safe handling procedures for the compounds you'll be working with. Before you begin laboratory work, we strongly advise you to read it thoroughly. As you begin your study of experimental organic chemistry, you need a basic understanding of safety principles for handling chemicals and equipment in the laboratory. Consider this chapter to be required reading before you perform any experiments.

Accidents can and do happen in the organic chemistry laboratory, thus everyone's safety is a priority. You are protected while working in the laboratory by the experiment's instructions as well as the laboratory itself, which is designed to protect you from most common hazards. However, neither the experimental instructions nor the laboratory facilities can shield you from the most serious threat: your own or your neighbors' irresponsibility. You must also learn how to work safely with organic chemicals in addition to basic laboratory safety.

Local safety issues will be reviewed at the first meeting of your lab class, including the chemistry department's policies on safety goggles and protective gloves, the placement of safety showers and eye wash stations, and emergency protocols. This chapter's information is meant to supplement your instructor's safety regulations and

[1] March's Advanced Organic Chemistry by Michael B. Smith; Jerry March, New York : Wiley, 2001,. 112-114-p

[2] https://www.sciencedirect.com/book/9780128038932/experimental-organic-chemistry

instructions. Accidents involving flames and explosions, accidents resulting in cuts or burns, and mishaps resulting from inhalation, absorption via the skin, or ingestion of poisonous compounds are the three types of laboratory accidents.

Explosions and fires. The chemical reaction of a fuel with an oxidizing agent, usually molecular oxygen, results in fire, which is followed by heat and flame. The majority of fires are caused by common flammable elements such as hydrocarbons or their derivatives. Such fires are put out by eliminating oxygen or flammable material, or by lowering the fire's heat. Keeping combustible things away from a flame source or oxygen helps to prevent fires (obviously, the former is easier). Open flames, heated surfaces such as hot plates or heating mantles, malfunctioning electrical equipment, and chemicals are all causes of ignition in the organic laboratory.

A hot surface, such as a hot plate or a heating mantle, is a more difficult challenge to solve. An organic solvent that has been poured or heated carelessly on a hot plate surface may catch fire. Most hot plates have an open thermostat that can spark when it cycles on and off. A flammable vapor from an open container, such as a beaker, can be ignited by the spark. Before pouring a volatile organic liquid, remove any hot heating mantle or hot plate from the area since the fumes from the solvent can be ignited by the hot surface of a hot plate or a heating mantle. Electrical equipment that isn't working properly. Appliances with frayed or damaged electrical cords should not be used since they may cause an electrical fire.

Chemical reactions can occasionally generate enough heat to result in a fire or explosion. The hydrogen gas formed in the reaction of metallic sodium with water, for example, can erupt and ignite a volatile solvent that happens to be nearby. Cuts and mechanical injuries are a danger in any environment, including the lab. shattered glass rods or tubes When you break a glass rod or tube on purpose, make sure you do it correctly. With a file, score (scratch) a small line on one side of the tube. Using a drop of water, wet the scored line. Then, holding the tube on both sides with a paper towel and drawing the ends toward you, snap it by pulling the scored area away from you.

Carefully and correctly insert thermometers or glass tubes into corks, rubber stoppers, and thermometer adapters. To begin, lubricate the glass tube's end with a drop of water or glycerol. Then carefully and firmly rotate the tube into the stopper while holding it with a cloth near to the greased end. Holding the thermometer by the end away from the stopper might cause it to break, and the fragmented end can pierce your hand. Look for chips on the rims of beakers, flasks, and other glassware. Any chipped glassware should be thrown away since the sharp edge might easily cut you.

The hoods in the lab protect you from inhaling unpleasant gases, harmful vapors, or dust from finely powdered materials, as well as from skin absorption. A hood is a closed chamber with a constant flow of air that sweeps over the bench top, eliminating any vapors or pollutants. Because many of the substances employed in the organic laboratory are potentially hazardous, it is advisable to conduct all experiments in a hood if at all possible. When an experiment requires the use of a hood, your instructor will inform you. Before you use the hood, be sure it is turned on. Adjust the sash to allow the most airflow through the hood.[3]

Reducing or eliminating waste and by-products from chemical reactions and manufacturing processes that involve chemical reagents and solvents is one strategy to safeguard the environment. The purpose of green chemistry is to make chemical synthesis and use as ecologically friendly as possible, both in the laboratory and in industrial and manufacturing applications. How may an existing chemical technique be converted to a green chemistry procedure? The first step is to find out about the safety of the reagents and solvents that are currently being employed, as well as any harmful by-products that may remain after the reaction is completed. The next stage is to examine safer, less toxic options for the reactants and solvents, as well as to see if a different process could produce the desired result with less hazardous components. Consider substituting solvents that are less hazardous to human health and the environment.

In short, organic chemistry research and development, as well as additional system improvement, are critical in this field. Experiments indicate that research has led to the growth of organic chemistry in recent years.

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