

## Chemical Synthesis: An Overview Ahmed Hegazi\*

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### Brief Report

In chemistry chemical synthesis is the artificial execution of useful chemical reactions to obtain one or several products. This occurs by physical and chemical manipulations which is usually involving one or more reactions. In modern laboratory uses the process which is reproducible and reliable.

A chemical synthesis involves one or more compounds which will undergo a transformation when subjected to certain conditions. Various reaction types can be applied to formulate a desired product. This requires mixing of the compounds in a reaction vessel, such as a chemical reactor or a simple round-bottom flask. Many reactions require some form of work-up or purification procedure to isolate the final product.

Chemical synthesis the construction of complex chemical compounds from simpler ones. It is the process by which many substances important to daily life are obtained. It is applied to all types of chemical compounds, but most syntheses are of organic molecules.

Chemical synthesis is the process by which one or more chemical reactions which is performed with the aim of converting a reactant or starting material into a product or multiple products. Chemical synthesis is at the heart of much chemistry research as it is the basis for discovering compounds with new physical or biological properties.

Chemists synthesize chemical compounds that occur in nature in order to gain a better understanding of their structures. Synthesis enables chemists to produce compounds that do not form naturally for research purposes. In industry synthesis is used to make huge products.

Chemical synthesis of polymers has been majorly carried out by following polymerization methods:

1. Addition polymerization: This involves the addition of monomers without loss of any atom or molecules. These reactions may proceed by free radical cationic or anionic mechanisms. Addition polymerization is classified into four types: Bulk, emulsion, solution and suspension.
2. Condensation polymerization: In this polymerization, a monomer having a reactive group joins each other by releasing small molecules. Condensation polymerization is classified into three types: solution, Melt and azeotropic dehydration.

3. Ring opening polymerization: It is also known as chain-growth polymerization. In this type of polymerization terminal end of polymer attack on cyclic monomer to form a polymer chain. It can follow anionic, cationic, radical, and coordination or insertion mechanism.

Many strategies exist in chemical synthesis that go beyond converting reactant A to reaction product B in a single step. In multistep synthesis a chemical compound is synthesized through a series of individual chemical reactions, each with its own work-up. For example, a laboratory synthesis of paracetamol can consist of three individual synthetic steps. In cascade reactions multiple chemical transformations which take place within a single reactant, in multi-component reactions up to 11 different reactants form a single reaction product and in a telescopic synthesis one reactant goes through multiple transformations without isolation of intermediates.

Organic synthesis which is a special branch of chemical synthesis dealing with the synthesis of organic compounds. In the total synthesis of a complex product it may take multiple steps to synthesize the product of interest and an inordinate amount of time. A skill in organic synthesis is prized among chemists and the synthesis of exceptionally valuable or difficult compounds has won chemists such as Robert Burns Woodward the Nobel Prize for Chemistry. If a chemical synthesis starts from basic laboratory compounds, it is considered a purely synthetic process. If it starts from a product isolated from animals or plants and then proceeds to new compounds, the synthesis is described as a semisynthetic process.