

BIOLOGICAL ACTIVITY OF THE REACTION PRODUCTS OF ETHYLENECHLOROHYDRIN WITH TERTIARY AMINES

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Abstract

Currently, there is a renewal in the purpose and content of teaching all sciences. The reason for this is the rapid development of science and technology. This development is also reflected in innovations in organic chemistry. Today, the need for biologically active substances in agriculture and medicine is increasing day by day. Filling the needs of our country in biologically active substances, as well as synthesizing and applying new import-substituting compounds in practice is one of the urgent tasks facing chemists.

Keywords: ethylenechlorohydrin, tertiary amines, reaction, biological activity of their products, etc.

Introduction

Today, the need for biologically active substances in agriculture and medicine is increasing day by day. Filling the need for biologically active substances in our country, as well as synthesizing and implementing new import-substituting compounds, is one of the urgent tasks facing chemists.

The use of new catalysts and new methods in the synthesis of organic compounds leads to further simplification of processes, the development of convenient methods, an increase in product yield, and acceleration of the reaction. Such methods can also be used when studying the entry of tertiary amines into nucleophilic substitution reactions. To study the interaction of reagents, several groups of reagents of the same type were used, in which the nature of the hydrocarbon residues in the molecules was changed. It is these factors that determine their ability to react. In this case, the activity of amino groups in nucleophilic substitution reactions is affected by the spatial and induction effects of substituents on the nitrogen atom.

For many years, the reactions of representatives of various classes of organic compounds have been studied. These include the reactions of alcohols, carboxylic acids, amino compounds, aromatic hydrocarbons, and phenols. In recent years, various infectious and tumor diseases have been increasing among humans. This requires chemists to synthesize drugs with high biological activity that can be used to treat these diseases. Medicinal products with such activity can be obtained from the products of the reaction of ethylene chlorohydrin with tertiary amines.

Many compounds have been synthesized based on the reactions of tertiary amines with ethylene chlorohydrin, and due to the high water solubility of the resulting compounds, they exhibit high biological activity. The relevance of the systematic study of the reaction of ethylene chlorohydrin with tertiary amines is the presence of substances used in medicine and agriculture in the reaction products. For example, the most important of them are choline and acetylcholine. Of the derivatives of choline, acetylcholine chloride and carbocholines are used in glaucoma and in the prevention of blood pressure. They are used as emulsifiers, stabilizers, humectants, and disinfectants (cleaners).

Choline— $[(CH_3)_3N-CH_2-CH_2-OH]^+OH^-$ - a substance that is part of the cell structure as part of two phospholipids—lecithin and sphingomyelin, and is a substance that provides methyl groups in methylation reactions in the body. For the normal functioning of the body, choline must enter the body from the external environment. Choline is not considered a vitamin. It can be included in non-exchangeable amino alcohols. It participates in the structure of cells as a plastic substance.

Choline is necessary for all living organisms. In particular, it is necessary to add 0.15–0.20% choline to the diet of chicks and turkeys. Choline participates in the biosynthesis of the essential amino acid methionine and some other amino acids. When choline is deficient in methyl group transfer reactions, it can be partially replaced by methionine, betaine, or betaine-aldehyde.

Some salts of choline, such as phosphotungstate, reinectate, and auroplatinate, are insoluble in water and alcohol and can be used for choline analysis. Biological methods based on its formation from acetylcholine are also used to determine choline. Physicochemical methods are also used to determine it.

Choline is widely distributed in animal and plant tissues, as well as in microorganisms, and it is especially abundant in nerve tissues, brain, liver, kidneys, and heart muscle.

Choline plays an important role in metabolism, so it is important for animals and humans to have it in their diets. In the body, acetylcholine is synthesized from choline under the influence of enzymes, which plays an important role in the transmission of nerve impulses.

Since the biosynthesis of choline in animals and humans is limited, it must be obtained from food as a supplement. The human need for choline has not been clearly studied and depends on the supply of protein, vitamin B12, folic acid in the diet. According to various sources, it ranges from 0.25 g to 4 g per day.

Choline deficiency in the body causes hemorrhagic degeneration and fatty infiltration of the liver and kidneys, involution of the thyroid glands. Choline is a representative of lipotropic substances that prevent or reduce fatty infiltration of the liver. It is an important source of methyl groups necessary for the course of biochemical processes in the body.

Protein and choline deficiency cause cirrhosis of the liver. Among the foods rich in choline are meat, fish, egg yolk, soybean meal.

Choline is found naturally in egg yolk, liver, and bitter plants such as hawthorn berries, cabbage, soybeans, and the seeds of legumes. Choline chloride is used for medical purposes in the treatment of Alzheimer's disease, liver diseases, atherosclerosis, high blood pressure, and a number of nervous system diseases.

Choline chloride— $[(CH_3)_3N-CH_2-CH_2-OH]^+Cl^-$ is a vitamin-like substance that is part of phospholipids. Choline chloride is a dry, yellow-brown, highly hygroscopic powder with a slight amine odor, and is an additive added to livestock and poultry feed as a source of choline. It has a significant effect on the health and reproduction of young and adult animals.

According to the law of the European Economic Community, choline chloride is considered to belong to the class of vitamins. In nature, choline is found in a number of plants, for example, in hawthorn berries, cabbage, spinach, soybeans, cereals, and vegetable oils.

For medical purposes, choline chloride is used to treat Parkinson's disease, Alzheimer's disease, liver disease, atherosclerosis, high blood pressure, nervous system diseases, muscular dystrophy, hair loss, chronic alcoholism, and to improve brain function. Choline chloride is necessary for almost everyone: athletes, the elderly, those who want to lose weight, etc.

Under the influence of choline chloride, brain function improves, high blood pressure decreases, and a person begins to feel better.

Of the choline derivatives, acetylcholine chloride and carbocholines are used in glaucoma and to prevent high blood pressure.

Quaternary ammonium salts containing at least one long alkyl chain have surface-active and antiseptic properties. They are used as emulsifiers, stabilizers, wetting agents, disinfectants (cleaners). Quaternary salts are used as pharmaceuticals (methacin, quaternary, benzohexane, etc.), and as interfacial catalysts in organic reactions.

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