

# CHEMICAL REACTIONS AND BIOLOGICAL ACTIVITY OF CARBAMATE DERIVATIVES

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## ABSTRACT

Currently, satisfying the needs of the national economy for bioactive substances and searching for new compounds, developing and implementing the technology for their production are among the urgent tasks facing the chemical science. In this article, the methods of synthesis of new bioactive substances based on the chemical reactions of hexamethylene bis-[(alkyl)-carbamate] and the reaction of substances with biological activity, diisocyanates with aliphatic alcohols, creation of a harmless and waste-free technology for their production, and the search for biostimulants among the obtained substances and methods of implementation were thoroughly studied.

**KEYWORDS.** Carbamate, diisocyanate, isocyanate, pesticide, fungicide.

Currently, in our Republic, special attention is paid to the rational use of natural resources, the creation of waste-free technologies that save resources and energy. The emergence of some economic problems in the production of the Commonwealth countries caused the price increase and shortage of imported raw materials, which began to negatively affect the rapid development of our chemical industry.

Today, meeting the needs of the national economy for bioactive substances and searching for new compounds, developing and implementing the technology for their production are among the urgent tasks facing the chemical science.

From this point of view, derivatives of carbamates and bis-carbamates are undoubtedly of interest as substances with various biological and pharmacological activities. They are also used in agriculture as pesticides, herbicides, fungicides, insecticides, nematocides, acaricides, bactericides, and growth accelerators. For this reason, it is of great importance to synthesize new bioactive substances based on the reaction of diisocyanates with aliphatic alcohols, to create a harmless and waste-free technology for their extraction, and to study the chemical properties of substances with biological activity among the obtained substances.

Mono- and diisocyanates are highly reactive substances that are used to obtain various compounds of great theoretical and practical interest. This importance of isocyanates can be further increased in the production of urea derivatives, which are products of the reaction of isocyanates with alcohols. Before studying the chemical properties of isocyanates, we found it necessary to dwell on the structure of  $-N=S=O$ -groups and the distribution of electron clouds in isocyanate molecules in both static and dynamic states, because these factors often determine the nature of reactions involving isocyanates.

Isocyanate groups are a linear (cumulative) arrangement of atoms. Therefore, p-orbitals can be divided into two orthogonal systems  $p_x$  and  $p_u$ -orbitals. In this case, it is necessary to emphasize the unshared electron pair of nitrogen ( $p_{x,n}$ ), whose true hybridization is unknown. Due to the splitting of orbitals by energy, the interaction of the electrons in this orbital with the electrons in the p-system, the localized s-content should be significantly larger than that of the electrons. The presence of such  $\pi$ ,  $\pi$ -connection indicates that the length of the  $-N=C$  bond in  $O=C=NRN=C=O$  and  $-N=C=O$  molecules is reduced. Therefore, in isocyanates, a model is used that treats the orbital as if it were a p-orbital (Figure 1).

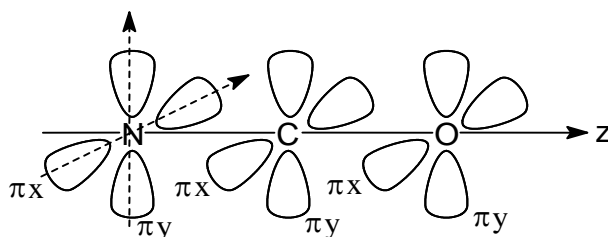


Figure 1. Wiring of electron clouds in the molecule of isocyanates

The reactivity of the NSO group is determined by its electronic structure. Since we are interested in the question of the relative reactivity of  $-N=S$  and  $>S=O$  bonds, as an index, the order of  $-N=S$  and  $>S=O$  bonds is the reactivity of N, S and O atoms from

full p-electron charges. use will be appropriate. It is these factors that determine the bond's reactivity in coupling reactions [1].

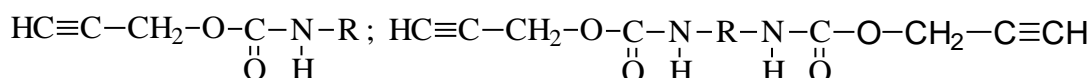


p -electron density in methyl-, phenyl-isocyanates using the Pariser Parra-Poplot approximation of the mutual coordinated field method ( method) done.

There are also data obtained by the enhanced Hueckel method on the electronic structure of some isocyanates occupied by



However , there are no clear ideas about the accumulation of negatively charged isocyanate group with respect to nitrogenous oxygen .



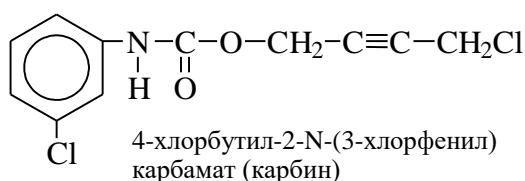
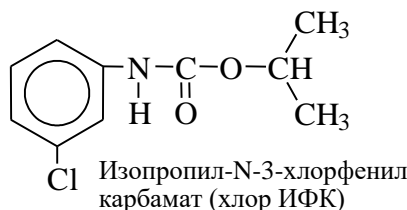
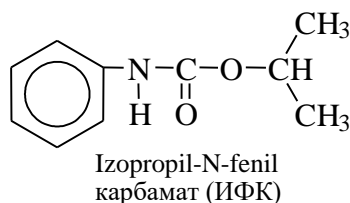
In addition, copper acetylenide mono- and dipropargyl carbamates, various heterocycles, and mono- and dipropargyl carbamate derivatives from diazomethane were synthesized. Mono- and dipyrazoles from diazomethane and benzofuran derivatives were synthesized from Kado-Sladkov reaction from ortho-iodophenol with copper acetylenide. Most of the carbamate derivatives obtained by the authors show

phosphorus and halide atoms. The results of these studies show that carbon atoms in the NCO-group often have a large positive charge, which determines the ability of isocyanates to bind to nucleophilic reagents:

AG Makhsumov and his staff [3] synthesized, characterized and determined the biological and pharmacological activity of phenylpropargyl carbamates, their high number of derivatives and their  $\gamma$  ,  $\gamma$  -diodo-, dibromo and monohaloid substituted derivatives obtained from their chemical transformations:

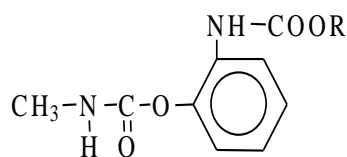
antimicrobial and anti-inflammatory, fungicidal and many other activities.

Most carbamates are biologically active and exhibit good insecticidal and herbicidal properties. Herbicides widely used against annual weeds are IFK ester of carbamic acid, chlor-IFK, carbin (barban):



The pesticidal activity of aryl-N-alkylcarbamates is explained by the nature and position of the substituents on the benzene ring. Synthesis and biological testing of 45 compounds in which R-OCO or R-OC(O)-NH (where R-alkyl, aryl -N=CZ (Z- alkyl,

aryl) groups are substituted for the ortho position of the benzene ring. 2 -aminophenol -Cl-C(O)OR and  $SN_3 N=S=O$  reaction compound with the formula was synthesized .



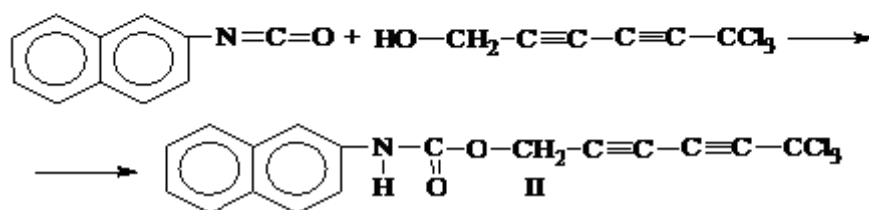
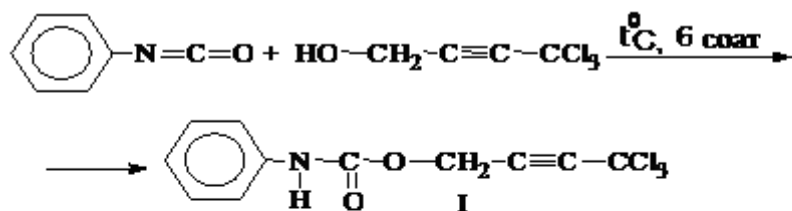
Formula 3-(2-Cl-4-CF<sub>3</sub>C<sub>6</sub>H<sub>3</sub>O) The compound C<sub>6</sub>H<sub>4</sub>OC(=O)NHR ( where R=N, alkyl , Rh, haloidphenyl) is 3-(2-chloro -4- trifluoromethyl phenoxy ) is obtained with 57% yield as a result of interaction of phenol with CH<sub>3</sub>-N=C=O. The reaction products are herbicidal in both early and post-emergence applications against ryegrass and broadleaf weeds.

of the formula X<sub>n</sub>UC<sub>6</sub>H<sub>4-n</sub>NHCOSR (R=CH<sub>3</sub> , C<sub>2</sub>H<sub>5</sub> , cycloalkyl, X-halogen, U-alkyl) form X<sub>n</sub>UC<sub>6</sub>H<sub>4n</sub>N=C=O ni R With -SH, in the presence of tertiary amines in inert solvents, the yield is 64%. A dose of 0.5–1 kg will kill most weeds without harming peanuts and wheat.



English scientists have developed a quick and convenient method of carbamate insecticides, including methiocarb (I), carbaryl (II) and others, using N-bromosuccinimide as a reagent.

Russian scientists studied the kinetics of the reaction of a number of diols, phenylisocyanates, with dry dioxane at 50 °C



Synthesized carbamates have a herbicidal effect far superior to the effect of  $\text{CCl}_3\text{COOH}$ . Also, drugs I and II show fungicidal and insecticidal activity. Compound I is considered an insecticide and is widely used in agriculture.

Emulsion extraction of isoprenoids in raw materials of plants and use of pulsation technology to obtain substances with regulatory properties is shown. Polyene alcohols, a substance that performs the function of transporting hydrophilic particles through the cell membrane, was isolated. These substances serve as the basis for the creation of substances with a broad spectrum of action against the fast-growing virus. Systematic testing of biopreparations, seed recycling, and when sprayed on plants during the growing season, have been found to have growth-regulating activity. Taking into account the seriousness of the ecological situation and the increase in oncological diseases, the technology of obtaining bioregulators was developed.

## LIST OF REFERENCES

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using the titration of isocyanate groups. Up to 50-70% conversion, the reaction on diol and diisocyanates is first-order, followed by an effective increase in the rate constant.

German scientists synthesized esters and carbamates in order to study the dependence of pesticidal activity on the structure.