ETHIOPIAN INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH

eISSN: 2349-5715 pISSN: 2349-5707

Volume: 10, Issue 09, Sep-2023 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980

CHEMICAL STRUCTURE AND PRACTICAL SIGNIFICANCE OF BENZOXAZOLE

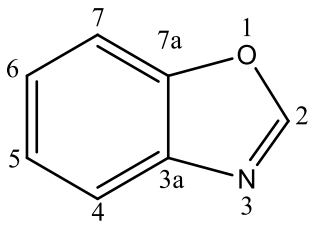
Khakberdiev Shukhrat Mahramovich
Khamidov Sobir Khodiyevich
E-mail: h.shyxrat81@gmail.com
Jizzakh Polytechnic Institute

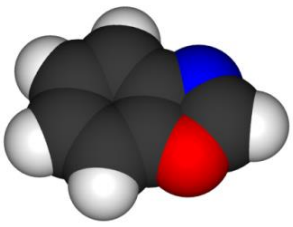
Abstract: Biologically active compounds and their derivatives have been the basis for many studies and are of great practical importance due to their versatile biological activities, including antifertility, antiviral, anticancer, antioxidant, antitrypanosomal, antimicrobial and antimalarial activities. The article explains the practical importance of one such compound-benzoxazole and some of its derivatives.

Keywords: Benzoxazole, crystal, bicyclic, condensation, hygroscopic, anthelmintic, antioxidant.

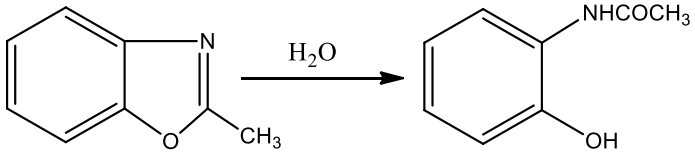
Biologically active compounds are important for living organisms. They play a major role in the normal functioning of all vital processes in the body. It directly participates in the growth of the body, carbohydrate and lipid metabolism. Biologically active compounds include nucleic acids, hormones, vitamins, etc. Currently, the processes of action of biologically active substances at the level of molecules, cells and systems are being studied.With the discovery of new physical and physico-chemical methods, supramolecular complexes and new derivatives of biologically active compounds are being synthesized, these researches are important for ensuring the normal functioning of the human body, increasing the resistance of cultivated plants to diseases, and obtaining new medicinal substances.

Benzoxazole is a crystalline heterocyclic organic compound with a colorless, pyridine-like odor containing C_7H_5NO. It is used in the chemical industry and for research purposes. It is mainly used to synthesize biologically active substances and obtain cyanine dyes. The molar mass of benzoxazole is 119,1. Liquefied at 30,5 ℃, boiling at 182,5 ℃. It has poor water solubility, but is well soluble in concentrated hydrochloric acid. Easily driven by water vapor. Exhibits weak base property. Both benzoxazole itself and its derivatives are hydrolyzed with water, aqueous acids and alkalis.





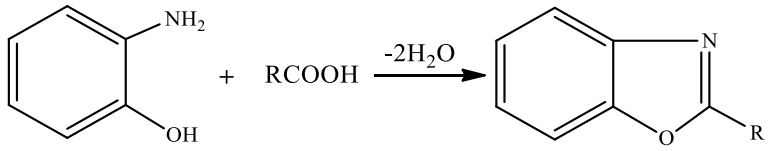
Benzoxazole is stable to the action of oxidants just like benzene, with alkylbenzoxazols only oxidizing the alkyl group when $KMnO_4$ solution interacts. Benzoxazole and its derivatives are hydrolyzed under the influence of water solutions of acids and alkalis:



In obtaining 2-alkylbenzoxazoles, o-aminophenols are dehydrated with carbonic acids:

eISSN: 2349-5715 pISSN: 2349-5707

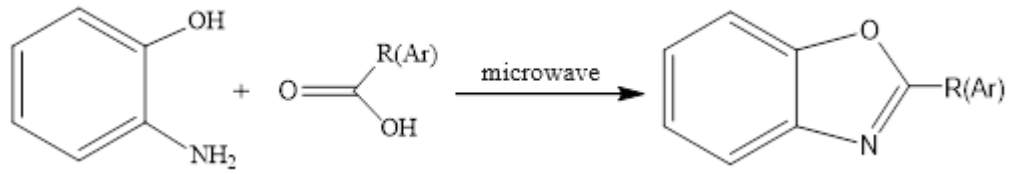
Volume: 10, Issue 09, Sep-2023 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980



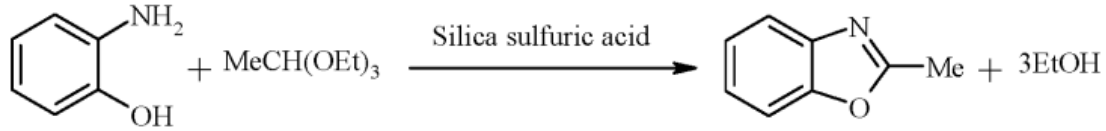
Here, benzoxazole is formed if R='H (taking formic acid carbonic acid).

1. In recent years, the use of microwave radiation to simplify and improve the organic reaction has become a very popular method, since it often leads to a high yield, a clean reaction and a reduction in reaction time. Synthetic methods have been opened to synthesize 2 - substituted benzimidazole and benzoxazole derivatives such as microwave radiation conditions and classical conditions.

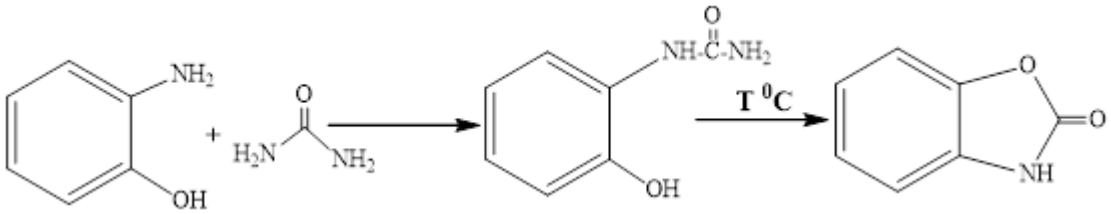
According to the method carried out by Chakraborti and et al, 2 - substituted benzoxazoles were synthesized directly under solvent-free conditions from the interaction of carbonic acids with-2-aminophenol. In this case, the yield of the product with aliphatic, aromatic and heteroaromatic carbonic acids was especially high:



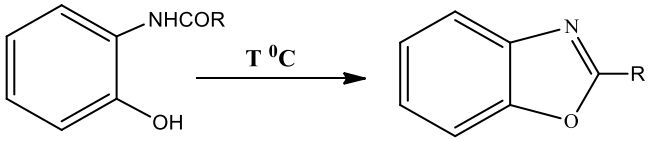
2. Benzoxazole can be obtained by the reaction of orthoephyrs with o-aminophenols under insoluble conditions in the presence of silica sulfuric acid. [3]



3. In the synthesis of 2-benzoxazole on-3 from the interaction of 2-aminophenol and urea, a dry O-hydroxyphenyl urea (5 g) tube was placed in a round flask and heated for 15 minutes at 160 oC. The cooled solutions were dissolved in hot methanol, the productate crystallized. (product yield 78%) [4]

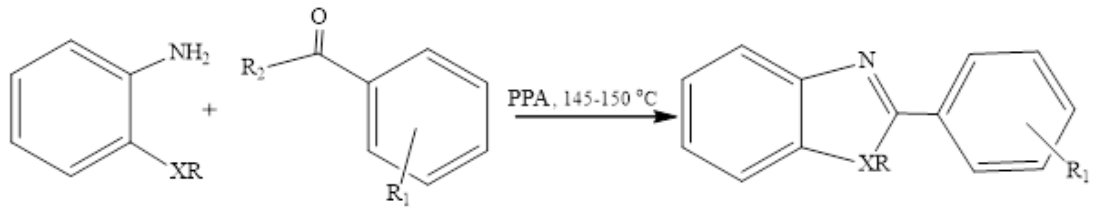


4. High-temperature dehydration of o-acetylaminophenols in the presence of anhydrous potassium carbonate or triethylamine [5]



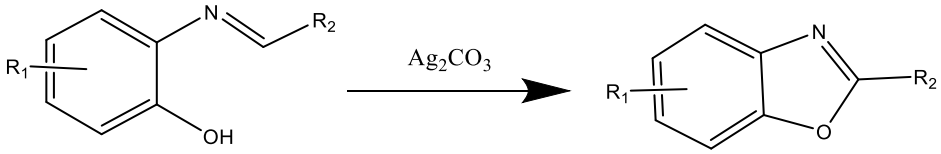
5. 2 substituted benzimidazole and benzoxazole can be synthesized using polyphosphate acid (PPA-polyphosphate acid):

eISSN: 2349-5715 pISSN: 2349-5707
Volume: 10, Issue 09, Sep-2023 SJIF 2019: 4.702 2020: 4.737 2021: 5.071 2022: 4.919 2023: 6.980



R=H, CH_3; X=N, O; R_2=H, OH, R_1=F, Cl.....

6. Ring closure of Schiff bases under the action of oxidizing and solvent [6]



LIST OF REFERENCES:

1. Khakberdiyev Shukhrat Mahramovich, Khamidov Sobir Khodiyevich, Azizova Safina Isroiljon qizi, Mamatova Farangiz Qodir qizi, Rabbimova Marjona Ulug'bek qizi. (2023). STUDY OF THE PRACTICAL SIGNIFICANCE OF BENZIMIDAZOLE AND SOME OF ITS DERIVATIVES. *Open Access Repository*, *4*(02), 80–85. https://doi.org/10.17605/OSF.IO/XR54F

2. Microwave-assisted direct synthesis of 2-substituted benzoxazoles from carboxylic acids under catalyst and solvent-free conditions/ R. Kumar, C. Selvam, G. Kaur, [at al.] // Synlett. 2005. V. 2005. № 09. P. 1401-1404

3. Mohammadpoor-Baltork, I., Moghadam, M., Tangestaninejad, S. et al. Silica sulfuric acid catalyzed synthesis of benzoxazoles, benzimidazoles and oxazolo[4,5-b]pyridines under heterogeneous and solvent-free conditions. JICS 5 (Suppl 1), S65–S70 (2008). https://doi.org/10.1007/BF03246491

4. L.Srikanth, Usha Naik, Ramesh Jadhav, N.Raghunandan and J.Venkateshwar Rao, Synthesis and Evaluation of New Phenylaminothiadiazolo- Oxadiazolo-1,3benzoxazoles for Their Antibacterial Activity, International Journal of Pharma and Bio Sciences Vol.1/Issue-4/Oct-Dec.2010

5. Alan R. Katritzky, Zuoquan Wang, C. Dennis Hall, Novruz G. Akhmedov, Aleksandr A. Shestopalov, and Peter J. Steel, Cyclization of r-Oxo-oximes to 2-Substituted Benzoxazoles, Center for Heterocyclic Compounds, Department of Chemistry, University of Florida, Gainesville, Florida 32611-7200, and Department of Chemistry, University of Canterbury.

6. Chloe D. Wong, Kimiya Ganjooi, Maetja Verbarendse, Jessica M. Travis, Mark H. S. Troftgruben, Hannah R. Mora, Isabella Oldenburg, Robert Lammert Jr., Horacio Lazaro & Scott Eagon (2022): Synthesis of benzoxazoles *via* a silver mediated oxidation, Synthetic Communications, DOI: 10.1080/00397911.2022.2148223

a