

SYNTHESIS AND ANALYSIS OF THE ANTIMICROBIAL ACTIVITY OF VOLATILE ORGANIC COMPOUNDS

Low-molecular carbonyl compounds belong to a large group of organic chemical compounds that are characterized by high volatility and, therefore, can give the impression of smell. Synthetic-derived olfactory compounds are an alternative to natural substances in economic and ecological terms. The search for new fragrances is also important because some commonly used fragrances (such as, e.g., geranyl nitrile) are being withdrawn from the market because of their toxicity. The synthesis of new fragrances is a huge contribution to many industries, and these substances are used primarily as ingredients in fragrance compositions. In addition to attractive sensory properties, low-molecular organic compounds may also inhibit the growth of certain microorganisms.

The increase in drug resistance associated with the presence of bacterial and fungal pathogens in the environment is a real threat to human functioning due to the excessive use of antibiotic therapy and the rapid adaptation of microorganisms to changing living conditions. Therefore, new antimicrobial substances that could play the role of antibiotics and preservatives, as well as the role of disinfectants, are being sought in various fields and areas of use. For the cosmetics industry, which has developed dynamically in recent decades, not only are effective disinfectants that guarantee microbiological purity in the production stage, but also substances that will protect these products against obsolescence are sought.

As a result of the versatile potential of natural products, it is worth using these substances to create new derivatives that, in addition to interesting fragrance profiles, can show biocidal or biostatic properties. Volatile carbonyl compounds are commonly used in fragrance compositions, but the antimicrobial activity of many of these compounds has not yet been adequately studied. On the other hand, nitrogen derivatives of these compounds, which are oximes, are not often used in fragrance compositions because of their reduced volatility in relation to the substrates. Although many oximes exhibit various biological activities, there is still not much available research in the literature on oximes, which are derivatives of olfactory compounds. However, ethers derived from oximes can be an interesting alternative to commonly used aromas because, unlike the oximes themselves, they have high volatility. These substances are not commonly used in fragrance compositions, although they often exhibit

interesting fragrance profiles. Additionally, the presence of nitrogen in these molecules may contribute to increased antimicrobial activity. The combination of fragrance properties with antimicrobial activity can be a valuable property with the use of oxime ethers in the cosmetic and cleaning industries.

The purpose of this study was the synthesis of previously undescribed oxime ethers with a fragrance potential and verification of their antimicrobial activity (determination of the minimum inhibitory concentration, MIC) against pathogenic strains covered by standards covering the effectiveness of disinfectants, preservatives used in cosmetics production and microorganisms responsible for secondary infections of cosmetics. Research showed that some oxime ethers have antimicrobial activity comparable to that of other substances of natural origin, such as essential oils or other aromatic compounds. Three of the new low molecular weight oxime ethers synthesized from volatile carbonyl compounds showed a sufficiently low MIC value to be considered as potential preservatives. Twenty-seven of the synthesized compounds may find potential use as ingredients in disinfectants. The derivatives with the highest odor potential were subjected to olfactory analysis, and their odor profiles and odor detection thresholds were determined. These compounds were subjected to a patent procedure, and this application was introduced to the industry on the basis of a license agreement.