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# **“Current trends in pharmaceutical chemistry and standardization of medicines”**

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*Усі матеріали збірника подаються в авторській редакції. Відповідальність за представлені  
результати досліджень несуть автори тез.*

**COMPARATIVE INVESTIGATION OF TOXICOLOGICAL CHARACTERISTIC AND  
SPECIFIC BIOLOGICAL ACTIVITY OF THE MEDIUM-CHAIN ALIPHATIC MONO- AND  
DIPEROXYCARBOXYLIC ACIDS**

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Peracids are characterized by high oxidation potential and therefore are very reactive oxidizing species and antimicrobial agents. The peroxy bond is weak and can be cleaved readily which results in low stability of peracids. Peracids can decompose spontaneously and explosively under thermal and can undergo uncontrolled decomposition which can be catalyzed by organic or metal compounds. Therefore, peracids are treated as explosive materials and are covered by special regulations for shipping and storage. The shorter the alkyl chain the more unstable the peracid is. This is the result of a higher percentage share of active oxygen in the molar mass of peracid. The average dissociation energy of the peroxy bond of peracids is low which causes the lowest stability in the group of organic peroxides. Aromatic Perbenzoic acid caused skin tumors in mice but it is safer than peracetic or performic acid. However, there are no appropriate results for safety measures for this species. Short-chain aliphatic peracids are miscible with water while the longer-chain ( $C_6$  and higher) are not. As a result, short-chain peracids exhibited low toxicity on animals and longer-chain are non-toxic and non-irritant. The most popular peracids are the short-chain and the hazard with handling these hazardous materials limits their commercial application. For example, the transport and storage of peracetic acid is prohibited. High stability of the dodecanebis(peroxoic acid) at room temperature and non-shock sensitivity was confirmed with DSC. The stability tests for medium-chain aliphatic monoperacids ( $C_6$ – $C_{12}$ ) which can be the safe alternative to very reactive short-chain analogs also was presented. Replacing of short-chain peracids with less hazardous medium-chain peracids may lead to an economically viable process. Moreover, the application of a more effective antimicrobial analog, which minimizes the potential for chemical accidents, including explosions, is in compliance with the idea of green chemistry.

Increasingly stringent environmental regulations of technological processes, mostly with regard to safety, forced the modification of a number of preventive processes, in particular concerning chemical disinfection and sterilization processes. The results discussed expanded and developed safe agents based on medium-chain peracids. The key development was to study comparative toxicological characteristics in vitro and to perform stability tests of several linear medium-chain aliphatic monoperoxyacids ( $perC_8$ – $C_{12}$ ) and medium-chain aliphatic diperoxyacid ( $diperC_9$ ). Substances of peroxide acids:  $perC_8$ ,  $perC_{10}$ ,  $perC_{12}$ , diperoxyazelaic acid ( $diperC_9$ ) are in 5.6; 22.8; 64 and 1.6 times less toxic than reference substance – peracetic acid ( $perC_2$ ). This work delivered a new knowledge concerning a comparative antimicrobial (bactericidal) activity of studied medium-chain aliphatic peracids and their thermal sensitivity. These fundamental stability studies resulted in the emergence of safe antimicrobial agents. Nonanebis(peroxoic acid) and Peroxyoctanoic acid were proposed as an agent in the chemical disinfection processes for the first time. Medium-chain aliphatic peracids were demonstrated to be very robust. Sufficiently high bactericidal activity was achieved after relatively short exposition times (from 10 min to 2 h for spores of *B. anthracoid*), at near-ambient temperature (20 °C).

In summary, in this work it has been demonstrated how stability studies can underpin the rational design of antimicrobial agents that in turn lead to a both safer and economically viable chemical disinfection and sterilization process.

**USAGE OF TLC IN TOXICOLOGICAL ANALYSIS OF BISOPROLOL**

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Bisoprolol is medication, which belongs to beta blockers. It is used with or without other medications to treat high blood pressure. Lowering high blood pressure helps prevent strokes, heart attacks, and kidney problems. It works by blocking the action of certain natural chemicals in the body such as epinephrine on the heart and blood vessels. This effect lowers the heart rate, blood pressure, and