

Abstract (Novel methods of dihydrogen trioxide preparation and its use in oxidation of organic compounds)

The thesis describes the preparation of pure dihydrogen trioxide (HOOOH) solutions, free from contaminants, as in the hitherto known methods of preparing HOOOH could not be reached. A simple and efficient method of immobilization of dimethylsilyl groups on the cross-linked polystyrene, its low-temperature ozonation ($-78\text{ }^{\circ}\text{C}$) and catalytic (methyltrioxorhenium(VII), heteropoly acids) transformation of silyl hydrotrioxy groups (ROOOH) on the polymer resin with simultaneous release of HOOOH into the solution, was developed. In the first part of the study, the attempted immobilization of 4-(dimethylsilyl)phenol on Merrifield resin is presented. With the newly developed method for this purpose, a series of silylated phenols and benzonitriles was prepared. As the reaction of Merrifield resin derivatization did not take place as planned, a new quantitative immobilization of dimethylsilyl groups was successfully achieved, using cross-linked 4-bromopolystyrene, Oshima's reagent ($i\text{-Pr}(n\text{-Bu})_2\text{MgLi}$) and dimethylchlorosilane. In the further process of ozonation and catalytic transformation of dimethylsilyl-derivatized polystyrene, HOOOH was quantitatively released into solution, and HOOOH was concentrated by low temperature ($-60\text{ }^{\circ}\text{C}$) vacuum evaporation of the solvent. The solvent could be either completely removed, or replaced with another solvent. Developed method opens new possibilities for further research in diverse fields of chemistry HOOOH, as well as numerous applications. In the second part of the thesis, the prepared solutions of HOOOH were tested on oxidation reactions with sulfides, olefins, triphenylphosphine and phenylhydroxylamine as model substrates.

Keywords: dihydrogen trioxide, ozone, methyltrioxorhenium(VII), derivatized polystyrene, oxidation