

Coherent Synchronized Oxidation of Pyridine Bases with “Green Oxidants” - H_2O_2 and N_2O

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Abstract

The Experimental data on the oxidation of pyridine and piperidine with “green oxidants” - H_2O_2 , N_2O is presented in this article. Reactions were carried out in the gas phase without the use of special catalysts and at atmospheric pressure in a flow-through quartz reactor. The study of coherent synchronized oxidation of pyridine bases using H_2O_2 and N_2O was carried out in a wide range of varying process parameters; feed rates of H_2O_2 , N_2O and pyridine base, and temperature. The kinetic regularities of coherently synchronized reactions of hydrogen peroxide decomposition and oxidation of pyridine bases were studied experimentally. Quantitative assessment of inducing action of the primary reaction (decomposition of hydrogen peroxide and nitrous oxide) on the secondary one (oxidation of the pyridine base), is presented using the determinant equation. Experiments proved that reaction products in the oxidation of pyridine and piperidine with hydrogen peroxide are as following: 2,2-oxydipyridyl (yield: 24.5 wt.%) and pyridine (yield: 65.2 wt.%) respectively. Optimal conditions for the oxidation of piperidine with nitrous oxide in coherent synchronization mode, where 19.4 wt.% of 2,3,4,5-tetrahydropyridine is formed, were identified.

Speaker Publications:

1. “Catalytic monooxidation of cyclohexane by hydrogen peroxide in the gas phase”; Reaction Kinetics, Mechanisms and Catalysis, vol 126, 2019.
2. “Coherent-Synchronized Biomimetic Monooxidation of Cyclohexane by Hydrogen Peroxide”; Russian Journal of Physical Chemistry, vol 92, 2018, 2455-2463.
3. “Carbonaceous nanostructures in hydrocarbons and polymeric aerobic oxidation mediums”; 2018.
4. “NITROGEN FIXATION AT CONJUGATED OXIDATION”; 2018.
5. “THE PILOT PLANT WITH SECTIONAL SUPPLY OF LIQUID REAGENTS FOR THE PROCESS OF MOLECULAR NITROGEN OXIDATIVE FIXATION”; 2018.

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Biography:

Tofik Nagiev is a Vice-president of Azerbaijan National Academy of Sciences, Director of Research Center of “Azerbaijan National Encyclopedia” and Department chief of Nagiev Institute of Catalysis and inorganic chemistry of ANAS. The Professor of the department of the physical and colloid chemistry of Baku State University.