

Selective oxidation of 2-picoline by “green oxidant” - N₂O

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Abstract

In recent years, nitrous oxide has been used as a selective oxidizing agent for the conversion of pyridine bases [1–2]. In this regard, we have experimentally studied oxidation of 2-picoline by nitrous oxide in the gas phase, without the use of catalysts, at atmospheric pressure.

For the first time, 2,2-ethylene dipyridine and 2,2-methylenedipyridine were obtained as a result of oxidation of 2-picoline by nitrous oxide. It was experimentally demonstrated that the yields of 2,2 ethylenedipyridine and 2,2-methylenedipyridine were as 30.3 wt.% and 1.5 wt.%, respectively. It was also shown that in the system of coherently synchronized free-radical reactions of nitrous oxide thermal decomposition and 2-picoline oxidation, the dimerization of 2-picoline mainly occurs.

Thus, the reaction of 2-picolinan oxidation by nitrous oxide demonstrates new development in heterocyclic synthesis, whereby 2,2-ethylene dipyridine was synthesized. The region where the reaction of coherently-synchronized oxidation of 2-picoline by nitrous oxide selectively occurs was identified and optimal conditions for obtaining the above products, necessary in the petrochemical, chemical, and pharmaceutical industries, were found.

Speaker Publications:

1. “Catalytic monooxidation of cyclohexane by hydrogen peroxide in the gas phase / Reaction Kinetics, Mechanisms and Catalysis (2019) Vol 126, Issue 5
2. “Coherent-Synchronized Biomimetic Monooxidation of Cyclohexane by Hydrogen Peroxide / Russian Journal of Physical Chemistry Vol 92 (2018) - Issue 12
3. “Carbonaceous nanostructures in hydrocarbons and polymeric aerobic oxidation mediums (2018) .
4. Nitrogen fixation at conjugated oxidation / Azerbaijan Chemical Journal (2019).
5. The pilot plant with sectional supply of liquid reagents for the process of molecular nitrogen oxidative fixation / Chemical problems / (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. He is author of the monography “Coherent Synchronized Oxidation Reactions by Hydrogen Peroxide”, Amsterdam: “Elsevier”, p. 325, 2007.