

Coherent-synchronized oxidation of methane by hydrogen peroxide to methanol on a biomimetic catalyst

Nagiev T.M

Baku State University, Azerbaijan

Abstract

The paper is devoted to the synthesis and study of the structure, physicochemical properties and activity of a biomimetic catalyst, which is a model of the heme iron-containing enzyme cytochrome P-450, in the reaction of direct conversion of methane to methanol by hydrogen peroxide. The biomimetic catalyst consists of iron pentafluorotetraphenylporphyrin applied to a mesoporous solid carrier of acid-base nature Al₂O₃. A study of the specific surface area, adsorption capacity, structure, character and sizes of the carrier pores, which play an important role in the synthesis and activity of the biomimetic catalyst, and measured as functions of relative or absolute pressure using a fully automated 3Flex analyzer, was conducted. The adsorption was carried out with liquid nitrogen at a temperature of 77.3 K. As a result, the value of the specific surface area of the Al₂O₃ carrier measured by BET method was 239 m²/g, while the catalyst was 216.9 m²/g. The mesoporosity of the carrier and its pore sizes were determined using the BJH method; pores with an average diameter of 2.42-22.2 μm have maximum total volume of V = 0.35-0.33 cm³/g. Mesopores with a diameter of 11.26-22.2 μm have a total volume of 0.132-0.0135 cm³/g and correspond to the size and structure of the iron porphyrin complex (16-18 μm).

Received: March 7, 2022; **Accepted:** March 12, 2022; **Published:** March 31, 2022

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.