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Drhová, Magdalena
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M. Drhova[1], S. Hejda[2], P. Kluson[1], J. Kristal[1]
Institute of Chemical Process Fundamentals of the ASCR, v.v.i., Rozvojova 2/135, 165 02 Prague 6, Czech Republic, Phone: +420220390237, e-mail: kristal@icpf.cas.cz; [2]Department of Technical Sciences, Faculty of the Environment, University of J. E. Purkyne, Kralova Vysina 3132, 400 96, Usti nad Labem, Czech Republic

Application of photocatalyzed reactions in the continuous microreactors successfully combines the advantages of microreactor technology with the light as the clean and traceless reagent. Photochemical reactions are initiated by the electron-excited molecules after the absorption of suitable radiation. Among these molecules, phthalocyanines are macrocyclic organic compounds, which after the irradiation produce the high reactive singlet oxygen. We selected a model reaction, the oxidation of the 4-chlorophenol in presence sulphonated zinc phthalocyanine in deuterium oxide. Concentration of oxygen directly influences generation of singlet oxygen and thus the degradation of 4-chlorophenol. This study was focused on the precise concentration measurement of the dissolved oxygen in the reaction solution at different temperatures. The experiments were carried out in the advanced opto-chemical apparatus with photo microreactor with the thin liquid layer. Concentration of oxygen was measured by the in-line oxygen probe, which was part of the photo microreactor arrangement. As a result, the reaction rate constant of the model reaction was evaluated in the dependence on the concentration of the dissolved oxygen in the microreactor.