ATTITUDE OF REVIEWER

by prof. Dr. Anton Naydenov
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for the scientific and scientific-applied contributions of the works on Assistant Professor Dr. Ivaylo Georgiev Tankov, Department of Chemical Technology, FTN University "Prof. Dr. Asen Zlatarov "- Burgas, submitted for participation in a competition for the academic position of "Associate Professor" in a professional field 4.2. Chemical Sciences, scientific specialty "Chemical Kinetics and Catalysis" at the University "Prof. Dr. Asen Zlatarov "- Burgas, published in the State Gazette, issue 95 of 16.11.2021

To date, the candidate has 33 publications, 31 of which have been published in impact factor publications (Web of Science) and impact rank (Scopus), and 2 in proceedings of scientific conferences presented in Conference Proceedings in Thomson Reuters and / or Scopus. The number of citations of Scopus data published is 136. The scientific papers presented for participation in the competition are entirely focused on obtaining and characterizing new active and stable homogeneous and heterogeneous catalysts for esterification. The physicochemical characterization of the obtained catalysts includes a wide range of instrumental methods. The catalytic activity of the synthesized samples was studied in the processes of preparation of butyl acetate and methyl oleate. The mechanisms of the esterification process are proposed, and models for studying the kinetics and thermodynamics of obtaining the target products are developed. Quantum chemical (DFT) analysis on the thermal and catalytic properties of the samples as a function of their molecular geometry, electronic structure and intramolecular interactions is applied.

Studies on the production of new ionic liquids and their composition and structure have revealed changes in the textural properties of pure carriers (α-Al2O3 and RHA and AC) and the heterogeneous systems obtained on their basis (PHS / α-Al2O3, PHS / RHA and PHS / AC), which are attributed to surface interactions. Pyridine dihydrogen phosphate (P2HP) ionic liquid was synthesized and data on its molecular geometry were obtained. The aromaticity of an inorganic anion in the structure of ionic liquids is documented and the heterogeneous systems PHS / α-Al2O3, PHS / RHA and PHS / AC are described, and their textural characteristics are studied. For the first time, the vibrational relations in the ionic liquids PHS and TAHSSM and the heterogeneous systems obtained on their basis (PHS / α-Al2O3, PHS / RHA TAHSSM / α-Al2O3 and xPHS / AC) were studied. The nature of the surface interactions in PHS / α-Al2O3, PHS / RHA TAHSSM / α-Al2O3 and xPHS / AC as a function of the nature of the carrier has been clarified. The spatial location of the immobilized active phase on the carrier surface has been established in heterogeneous systems PHS / α-Al2O3, PHS / RHA and xPHS / AC. For the first time, the thermal behavior of ionic liquids PHS, P2HP and PN and the heterogeneous

systems obtained on their basis (PHS / α-Al2O3 and PHS / RHA) were studied. The mechanisms of melting and decomposition of the samples as a function of the degree of intramolecular hydrogen bonding and the nature of the carrier have been established. The kinetics of thermal decomposition of pyridine nitrate was studied for the first time. In order to optimize the conditions of production of butyl acetate and methyl oleate, studies were performed on the influence of the catalyst content, the initial molar ratio between the reactants and the reaction temperature on the degree of conversion of the substrate (acetic or oleic acid). Data on the rate constant, activating energy and the pre-exponential factor were obtained, as well as thermodynamic data on the reaction. It has been shown that as the catalyst content increases, the yield of ester (butyl acetate or methyl oleate) and the esterification rate constant also increase due to the presence of a significant number of active substrate conversion centers. Regarding the influence of the initial molar ratio of reagents, it is shown that the optimal values for the reactions of butyl acetate or methyl oleate production are 5 and 7. For the first time P2HP, ATN, TAHSSM, PN, PHS / α-Al2O3, PHS / AC and PHS / RHA have been studied in the form of catalytic systems. The mechanism of butyl acetate production by the formation of an active complex involving ionic liquid (PHS) as a catalyst has been shown for the first time. Based on detailed kinetic and thermodynamic analysis, the optimal conditions for the production of butyl acetate and methyl oleate in the presence of PHS, ATN and PN were determined.

The research of Assistant Professor Dr. Ivaylo Georgiev Tankov fully meet the topic of the announced competition for the award of the academic position "Associate Professor". The publishing activity, the quotations on the published results, the participation in projects of Assistant Professor Dr. Ivaylo Georgiev Tankov fully meet all the requirements of the Law on the Development of Academic Staff and the Regulations on the terms and conditions for obtaining scientific degrees and holding academic positions at the University "Prof. Dr. Asen Zlatarov "- Burgas Therefore, I strongly recommend to the members of the esteemed Scientific Jury and the esteemed Scientific Council of the University "Prof. Dr. Asen Zlatarov "- Burgas to sentence Assistant Professor Dr. Ivaylo Georgiev Tankov the academic position "Associate Professor" in the field of 4.2. Chemical sciences (Chemical kinetics and catalysis).

Sofia, 04.03.2022.

Reviewer:

Prof. Dr. Anton Nayuchov