Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION X
New Frontiers in Multifunctional Material Science and Processing

Serbian Ceramic Society
Institute of Technical Sciences of SASA
Institute for Testing of Materials
Institute of Chemistry Technology and Metallurgy
Institute for Technology of Nuclear and Other Raw Mineral Materials

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Knez Mihailova 35
Serbia, Belgrade, 26-27. September 2022.

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P6
Thermodynamic and kinetic study of nicotine adsorption on acid-modified smectite

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Kinetic and thermodynamic parameters of nicotine adsorption onto acid-activated standard Wyoming clay were investigated to obtain the optimum conditions for adsorption. The nicotine adsorptions were performed in a batch system, using 0.75 mM solution of nicotine, the mass of adsorbent of 25 mg at native pH=9.26, in temperature range from 25°C – 60 °C. The pseudo-first (PFO) and pseudo-second kinetics (PSO) models in both linear and non-linear forms were apied for experimental data in the temperature range 25 °C – 60 °C. Error analysis parameters such as correlation coefficient (R^2) and χ^2 (chi-square) have been used to determine the best kinetics interpretations of adsorption data. The analyzed parameters suggested that nicotine adsorption can be best described by tested models in the following order: non-linear PSO = linear PSO >non-linear PFO>linear PFO. The Weber-Morris intra-particle diffusion model was applied in order to predict the rate-limiting step. The calculated values for C_{id} were in the range 0.452 mmol g^{-1} to 0.484 mmol g^{-1}, indicating effective role of the boundary layer on the adsorption rate. Thermodynamic study revealed that nicotine adsorption is spontaneous ($\Delta G°$=-18.93 kJ mol^{-1}) physisorpton process with calculated value of enthalpy change of 4.99 kJ mol^{-1} and activation energy of 21.95 kJ mol^{-1}.
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P7
Cobalt impregnated mixed Al, Fe-pillared montmorillonite as a catalyst for decolorization of tartrazine in the reaction with Oxone®

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Mixed Al, Fe pillared clay (AlFePILC) was synthesized from Na-exchanged Wyoming clay (Na-Wy) rich in montmorillonite. In the pillaring process Na-Wy was modified with a mixed intercalating (Al, Fe) solution with molar ratio of $Fe^{3+}/(Al^{3+}+Fe^{3+})$ = 10%. The obtained AlFePILC was impregnated with cobalt using the incipient wetness impregnation method, dried at 110 ºC and calcined at 450 ºC (Co-AlFePILC). Co-AlFePILC was tested as a catalyst in catalytic oxidation of tartrazine in the presence of Oxone®. Decolorization was monitored at wavelength λ=426 nm, while degradation of aryl groups was followed at λ=257 nm using UV-Vis spectroscopy. The influence of the mass of the catalyst on degradation process was