

STABILITY OF CLAY-BASED CATALYSTS IN CONTACT WITH WATER VAPOUR

Isabel P.P. Cansado¹, M. Manuela L. Ribeiro Carrott¹, Peter J.M. Carrott¹, Paula Castilho², Cezar Catrinescu², César Fernandes^{2,3}, Chris Breen⁴

¹*Centro de Química de Évora, Instituto de Investigação e Formação Avançada, Departamento de Química, Escola de Ciências e Tecnologia, Universidade de Évora, Colégio L. A. Verney, 7000-671 Évora, Portugal. E-mail: manrc@uevora.pt*

²*Centro de Química da Madeira, Universidade da Madeira, Campus da Penteada, 9000-390 Funchal, Portugal*

³*Laboratório Regional de Engenharia Civil, R. Agostinho Oliveira, 9000-264 Funchal, Portugal*

⁴*Materials and Engineering Research Institute, Sheffield Hallam University, City Campus, Howard Street, Sheffield S1 1WB, United Kingdom*

The search for cleaner processes is one of the major challenges in modern chemical industries. In this context clay derived materials are environmentally friendly catalysts that can be easily tailored to optimize their catalytic activity for a precise reaction of interest. Furthermore, clay-based catalysts can be easily separated, recovered and reused and their versatility, low cost, high catalytic activity and/or selectivity render them very attractive materials.

Considering that the stability towards water vapour is a crucial aspect for catalytic performance and reuse of the catalysts, we present a study of the pore structure stability, in the presence of water vapour, of clay catalysts prepared by acid activation with HCl solutions and ion-exchange with sodium, aluminium and iron, from a natural clay collected at Serra de Dentro (Porto Santo Island, Portugal) [1]. For elucidating the influence of water vapour on the pore structure stability, water vapour adsorption-desorption isotherm, at 298 K, was determined on each sample by gravimetric method as well as n-pentane adsorption-desorption isotherms, at 298 K, which were determined before and after the corresponding water adsorption-desorption isotherms. Prior to the measurements, the samples were outgassed during 5 h at 473 K and the adsorptives were outgassed by repeated freeze-thaw cycles.

The results to be reported in the communication allow us to state that, upon contact with water vapour, the less acid activated catalysts suffered some reduction in pore volume reflecting changes in the pore structure, while the more acid activated catalysts and those prepared by ion-exchange presented excellent stability upon one cycle of water vapour adsorption-desorption. The results are corroborated by nitrogen adsorption-desorption isotherms determined, at 77 K, before and after the water and n-pentane adsorption-desorption measurements.

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