Influence of the demineralisation on the chemical activation of Kraft lignin with orthophosphoric acid

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Dr Fierro will present the results and conclusions on the preparation of activated carbons (ACs) from the thermal decomposition of mixtures of orthophosphoric acid (PA) and either as-received softwood Kraft lignin, KL, or demineralised one, KL₃d, has been investigated.

Activation with PA were studied for a PA/lignin ratio of 1 (dry ash-free basis) and 1h carbonisation time at final temperatures of 400, 500 and 600 °C. The yield, surface area, porosity, surface chemistry and methylene blue adsorption capacity were determined. All ACs were found to be essentially microporous, with surface areas higher than 800 m²/g and a maximum value of nearly 1200 m²/g for the carbon prepared at 600 °C from KL. In order to study the influence of temperature on the properties of the ACs prepared from KL and KL₃d, the latter precursors were analysed by Fourier transform infrared spectroscopy (FT-IR), scanning electron microscopy (SEM) and X-ray diffraction (XRD).

We concluded that the very different characteristics of the ACs obtained from KL and KL₃d are due to the presence or not of mineral matter during carbonisation, but mainly to the demineralisation process itself, which produces polymerisation of the raw lignin. Methylene blue adsorption was found to be higher for ACs prepared from KL, mainly because of their higher ash and sulphur contents.

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