PORE FORMATION AND POROUS STRUCTURE EVOLUTION ON CO_2 ACTIVATION PROCESSES

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It has been experimentally proved that activated carbon, obtained from biomass waste precursors, presents adsorption properties comparable to those obtained from traditional precursors [1]. However, there are hardly any models that focus on the development of porosity during the process, so it is not possible to predict the final properties that characterize the adsorption capacity of activated carbon from the properties of the precursor material and the conditions of the activation process. Within the so-called pore models, the random pore model (RPM) is the most popular and predicts with great precision the evolution of the porous structure due to the growth and coalescence of the pores [2,3]. However, in activation processes with a low degree of conversion, in which pore formation is the dominant mechanism, the RPM does not correctly predict the evolution of the specific surface area since it does not consider the appearance and creation of new porosity. In this work, the relative influence of pore formation, growth and coalescence mechanisms are analyzed using a new model (Porous Evolution Model) that allows predicting the specific surface area created due to all these contributions. Experimental results on activated carbon samples obtained at different conversions times in a heated quartz tubular reactor that shows the feasibility of the Porous Evolution Model predicting the specific surface area and pore distribution evolution throughout the activation process are also provided.

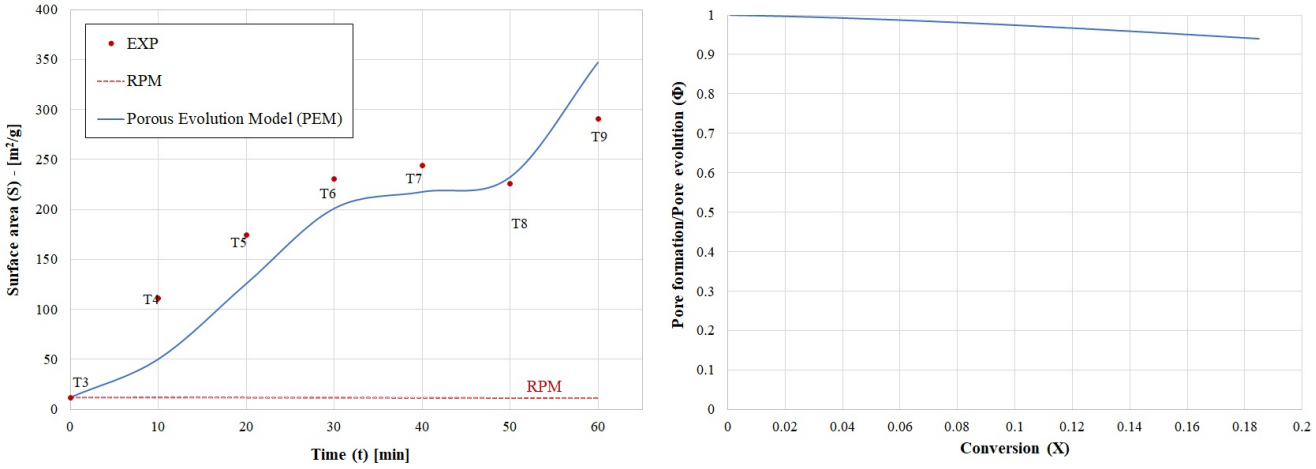

Figure 1 – (left) Porous evolution model validation and (right) relative influence of pore formation and growth/coalescence mechanisms

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