

PHENANTRENE ABATEMENT FROM COMBUSTION HOT GAS

A.M. MASTRAL ^{a*}, T. GARCÍA ^a, M. S. CALLÉN ^a, M. V. NAVARRO ^a and J GALBÁN ^b

^a Instituto de Carboquímica, CSIC, P O Box 589, 50080-Zaragoza, Spain
AMastral@carbon.icb.csic.es, Phone: 34-976-733977, Fax: 34-976 733318

^b Department of Analytical Chemistry, Zaragoza University, 50007-Zaragoza, Spain

ABSTRACT

This is the first time that the abatement of Phenantrene (Phe) from combustion hot gas has been studied. For this goal, the adsorption capacity of ten active carbons with different origins and a wide range of textural characteristics have been assessed for Phe removal from hot gas emissions. The study was carried out at laboratory scale and the main aim has been to test the Phe adsorption capacities by the porous materials at the ranges that Phe could be emitted from new energy systems generation. The protocol followed in this work was firstly, to check the influence of the bed mass on the Phe adsorption capacity and, secondly and once it was shown that the bed mass is not relevant for the studied Phe concentration range, the adsorption capacity of the ten adsorbents was analyzed. The CA-3 adsorbent was selected to check the inlet concentration at three different temperatures, 125°C, 150°C and 175°C, within the range of atmospheric emissions from the power stations.

The results obtained show that there is a good correlation between the Phe adsorption capacity and the total micropore volume of the adsorbents calculated with the Dubinin-Radushkevich equation for the N₂ isotherm data. No relationship was found between Phe adsorption capacity and mesopore volume calculated by BJH method. Besides, no relationship was found between chemical surface (CO and CO₂ groups desorbed on Thermal Program Desorption (TPD)) and adsorption capacity.

Keywords: Phenanthrene, PAH, VOC, Emissions, Adsorption, Hot Gas Cleaning