104. Structural investigation of carbon-based sorbents synthetized from Caribbean biomass for water processing

C. Yacou[1],V. Loubens[1], S. Altenor[1], C. Jean-Marius[1], N. Brehm[2] and S. Gaspard[1]*

[1] Chimie des Matériaux - Connaissance et Valorisation (COVACHIM M2E - EA 3592)- Faculté des Sciences Exactes et Naturelles, Université des Antilles, B.P. 250, 97 157 Pointe-à-Pitre Cedex Guadeloupe, France.

[2] NBC company, BP70743, 97300 Cayenne, French Guyana, France.

sgaspard@univ-ag.fr

Caribbean biomass has the great potential to simultaneously deliver renewable energy, bio-products and also improves water quality, which can obviously lead to a greatest economic development of the area. A pathway toward the realization of these benefits is through the development of valuable chemicals or materials. Pyrolysis is a processing technique involving thermal degradation of the biomass in the absence of oxygen. Among the many components obtained through this process, bio-char forms a very convenient starting point for valorizing lignocellulosic as well as algal biomass feedstocks for the production of activated carbon, carbon fibers or carbon nano-tubes. Depending of the application, such materials become highly desirable because of the stability, low cost, versatile preparation and outstanding adsorption characteristics. Although commercially available carbon materials exist, their generation and regeneration are relatively costly, thus limiting their applications.

In this work, we focused on developing original carbon-based sorbents derived from highly available organic waste, collected in the Caribbean and Guadeloupe Island, including seaweeds (*Sargassum fluitans*, *Turbinaria turbinata*) and terrestrial biomass (*Calophyllum Calaba* and Banana trunk). The resultant carbonaceous materials were then extensively characterized using different techniques, such as nitrogen sorption for textural characterization, as well as X-ray photoelectron spectroscopy, scanning electron microscopy, Fourier transform infrared and RAMAN spectroscopies, to better understand their structures and functionalities. In the production of activated carbon, the preparation conditions are crucial as well as the properties of the precursor used. Therefore the thermal behavior and the effect of the activation temperature and activation agent were systematically investigated using a very simple thermogravimetric method. Experimental results will be given, in tandem with kinetics and thermodynamics data obtained from adsorption of a model molecule on the prepared sorbents, in order to determine their potential application in the market of water purification.

Keywords: Biomass, Activated carbon, Characterization techniques, Water purification