

Wastewater remediation with formaldehyde free tannin-furanic foam powders

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Materials of a new generation have to be integrated into favourable life cycles. This means that every product has to be exploited as much as possible, considering extensive cascade usages and long serving time (Höglmeier *et al.* 2014).

Tannin foams are copolymers of two bioresources, tannin extract and the furfuryl alcohol obtained by dehydration and catalytic reduction of hemicellulose moieties. This material can be produced with tailored chemical and physical process parameters so that the range of product obtainable is very broad (Tondi and Petutschnigg 2016). These foams can be considered for the insulation of buildings because of their lightness (40-50 kg/m³), their good thermal conductivity (30-40 mW/m. K) and their good fire resistance (Tondi *et al.* 2016). From the chemical viewing angle, these foams have a strong aromatic and hydrophilic character due to the presence of flavonoid and furanic components in their matrix (Reyer *et al.* 2016).

Three different tannin extract from *Acacia mimosa* and namely, industrial original extract (OIE), methanol soluble (MeS) and acetone soluble (AcS) fractions, have been foamed with furfuryl alcohol under acid environment at 90 °C. The formaldehyde free foams were then pulverized, repeatedly washed with water and ethanol to remove any impurities and unreacted material and finally dried before undergoing the pollutant absorption capacity test.

Riboflavin and methylene blue have been selected as new generation pollutants. The adsorption trials were conducted as follows: An equivalent of 1 mg tannin foam powder was mixed with 5 ml of pollutant solution containing riboflavin or methylene blue at a concentration of 20 ppm and magnetically stirred for 48 h in the dark. Concentration of the pollutants was determined by UV/vis spectroscopy at 450 nm for riboflavin and 656 nm for methylene blue before and after the foam treatment.

In Fig. 1 the absorption capacity of tannin foams against the two pollutants is reported as percentage of removal. Standard deviation is indicated by error bars.