๑OB2๑ Mercury(II) and Arsenic(V) biosorption onto low cost biosorbent

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Mercury and arsenic are the two most toxic pollutants which pose a great threat to both human health and organism security. A great deal of research over recent decades has been motivated by the requirement to lower the concentration of these heavy metals in water and the need to develop low cost techniques which can be widely applied for heavy metals remediation. In recent years, biosorption appears to be the most promising method because of its cost effective, easy regeneration of biosorbents, and possibility of metal recovery[1]. Inexpensive naturally occurring lignocellulosic materials such as coconut coir pith, rice straw, rice husk ash and sugarcane bagasse have been studied for heavy metal removal by several researchers[2-4]. These lignocellulosic biomass waste materials mainly composed of cellulose, hemicellulose and lignin. Various chemical groups exist including hydroxyl group play a critical role in the biosorption processes by cation exchange phenomena.

Figure 1: Fibers extract from *Musaceae* family

In this work, stem fibers extracted from *Musaceae* family (**Figure 1**) as a low cost biosorbent for Hg(II) and As(V) removal was evaluated. A simple pretreatment by HCl and NaOH on the biosorbent show a great potential for sequestering both cationic and anionic heavy metal ions from aqueous solution. The performance of the biosorbent was tested by the biosorption of Hg(II) and As(V) in a batch system under varying pH, biosorbent dosage, and initial metal concentration. Biosorption of Hg(II) and As(V) ions reached equilibrium in 90 min. It was observed that the adsorption yield for both metal ions was found to be pH dependent. The maximum adsorption capacity of Hg(II) takes place at pH 7 while As(V) at pH 5. Their adsorption behaviour can be described as Langmuir isotherm with maximum adsorption capacities of 15.7 and 2.2 mg/g for Hg(II) and As(V) ions, respectively. The adsorption kinetics was best described by the pseudo-second order model. The results show that this biosorbent which belongs to the *Musaceae* family could be used as a low-cost material for the biosorption of Hg(II) and As(V) in water treatment.

1. Ayhan, D. J. Hazard. Mater. 2008, 157, 2.
2. Anirudhan, T.S.; Divya, L.; Ramachandran, M. J. Hazard. Mater. 2008, 157, 620-627.
3. Rocha, C.G.; Zaia, D.A.M.; da Silva Alfaya, R.V.; da Silva Alfaya, A.A. J. Hazard. Mater. 2009, 166, 383-388.
4. Hoi, L.W.S.; Martincigh, B.S. Ind. Crop. Prod. 2013, 47, 1-12.

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