Enhanced EPS production by an *Arthrobacter viscosus* biofilm supported on zeolite for biosorption purposes

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Oral Presentation

The pollution caused by heavy metals, specially by hexavalent chromium, deserves special attention because their deposition in aquatic systems is very detrimental for animals and for the human being. The search for new technologies for the treatment of chromium polluted solutions leads to methods using sorbents of biological origin.

Several factors influence the bacterial production of exopolysaccharides, EPS, and consequently the biosorption process, and those include solution pH, temperature, ionic strength, biosorbent dosage, biosorbent particles size, initial solute concentration, work volume and agitation rate.

The use of a biosorption system consisting of a biofilm supported on a specific zeolite ~~carbon~~ allows to combine and even to enhance the ability of both, bacteria and zeolite, to remove chromium and consequently to increase the maximum removal of each one.

The objective of this work was to optimize the EPS production of an *Arthrobacter viscosus* biofilm supported on a 13X zeolite aiming the application of this system to the biosorption of Cr(VI). The parameters optimized were agitation rate, work volume, pH and glucose concentration. After the EPS production optimization, the biofilm was used in the biosorption of hexavalent Cr from liquid solutions. Differences between the use of dead or active biomass and between zeolites in powder or in pellets were also studied.

An optimized method to increase the EPS production by *Arthrobacter viscosus* was found and the application to the biosorption of Cr(VI) was tested. A maximum quantity of EPS (5 g/L) was obtained with an agitation rate of 175 rpm, 20 % of work volume, pH 7 and 20 g/L of glucose in the culture medium. Total Cr removal ranged from 96.4% to 89.2% at initial Cr(VI) concentration of 20–60 mg/L, for the active biomass and optimal conditions of EPS production, from 95.8% to 86.2%, for the dry biomass and optimal conditions of EPS production and from 100% to 80.2%, for autoclaved biomass and optimal conditions of EPS production. For assays using active biomass, the removal percentages were 88% and 65%, respectively, for optimal conditions of EPS production and poor conditions of EPS production, for an initial Cr(VI) concentration of 20 mg/L. The optimal conditions of EPS production allow to obtain a maximum accumulation of 7.88 $mg/g_{sorbent}$, for an initial concentration of 60 mg/L. The poor conditions of EPS production represent a decrease of 10% on the removal percentage of chromium and the use of pelleted zeolites represent a decrease of 46.5% on the removal percentage of the same metal. The use of active biomass allows to remove chromium faster than the inactive one.