BIOLOGICAL REDUCTION OF HEXAVALENT CHROMIUM WITH BIOFILMS USING IXTLE AS SUPPORT

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Introduction. Chromium (VI) is one of the most toxic heavy metals discharged into the environment through various industrial wastewaters. While Cr(VI) is highly toxic and is known to be carcinogenic and mutagenic to living organisms [1], Cr(III) is generally only toxic to plants at very high concentrations and is less toxic or non-toxic to animals. At present, the most commonly used technology for treatment of heavy metals in wastewaters are physical-chemical treatments [2], however, this method is not completely satisfactory because of the large amount of secondary waste products due to various reagents used in the above-mentioned processes. Biological treatments arouse great interest because of their lower impact on the environment as opposed to chemical treatments. The aim of present study was to assess Cr (VI) by removal a microbial mixed culture fixed in ixtle, using different concentrations of acetate and glucose like carbon source.

Methods. Cr (VI) removal experiments were carried out using a adapted bacterial consortia with Cr(VI) concentration of 50 mg/L under aerobic conditions. The biofilms were developed on acrylic tubes coated with ixtle as support and mineral media as described by Dermou et al.[3], during 45 days. The experiments were carried out in three series of reactors, operating with the biofilms. The first series 10, 20 and 25 mg/L of Cr(VI) were used with 1.5 g/L glucose, the second series operated with 5 and 10 g/L of acetate with an initial concentration of Cr(VI) of 20 mg/L. In the last series was varied the concentration of glucose (2.5, 4 and 5 g/l) and an initial concentration of Cr(VI) of 20 mg/L. The spectrophotometric method described on the NMX-AA-044-SCFI-2001 was used for the determination of hexavalent chromium.

Results. Figure 1 shows the kinetics of the first series of reactors. Where it is possible to see that when using 10 mg/L are obtained 70% of removal of Cr(VI) from 6 days. Figure 2 shows the kinetics of the second series of reactors, and that 7 days there was a 60% removal of Cr(VI) with 10g/L of acetate. Figure 3 shows the kinetics of reactors using different concentrations of glucose and removed more than 70% of Cr(VI) using 2.5 g/L glucose to the third days

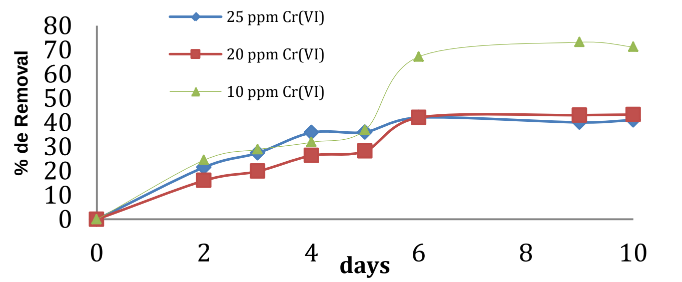

Fig.1 CR (VI) removal by microbial mixed cultured fixed in ixtle using 1.5 g/L glucose as co-sustrate.

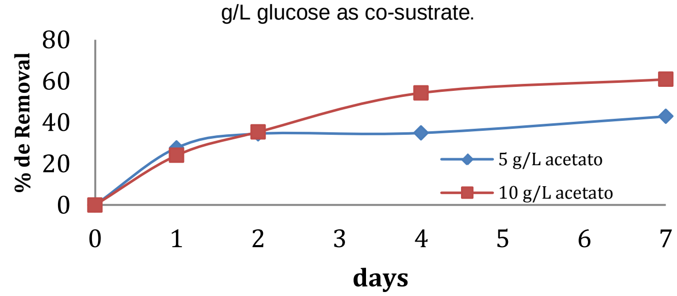

Fig.2 CR (VI) removal by microbial mixed cultured fixed in ixtle using different concentrations of acetate as co-sustrate

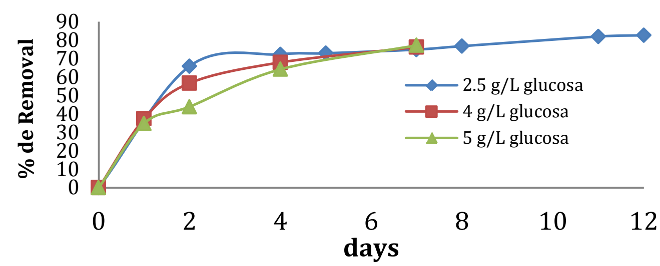

Fig.3 CR (VI) removal by microbial mixed cultured fixed in ixtle using different concentrations of glucose as co-sustrate

Conclusions. The best removal of Cr(VI) was obtained in 3 days (70 %) using 2.5 g/L glucose and operating with a biofilm supported on a coated tube of ixtle formed by a microbial consortia obtained from municipal wastewater treatment plant.

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