Rehabilitation of water contaminated with an organic solvent by an aerobic bacterium: Toxicological and bioremoval assays

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1. Introduction - The increasing use of organic solvents, and their consequent disposal in water streams without an effective treatment, continues to be one big environmental problem. The use of biological processes to rehabilitate contaminated systems has been seen as a cost-effective option and an environment friendly alternative to the conventional methods currently employed [1]. In the present work, the objective was to evaluate the tolerance and bioremoval capacity of an aerobic bacterium strain, *Rhizobium viscosum* CECT 908 (previously classified as *Arthrobacter viscosus*), when exposed to different methylethylketone (MEK) concentrations in aqueous solutions. Although MEK may act as a source of carbon for the bacteria to ensure its biological activity, MEK's toxic properties may have an inhibitory effect on the microbial development.

2. Experimental – *R. viscosum* was exposed to different concentrations of MEK in batch system. To evaluate the ability of *R. viscosum* to bioremove MEK as the only carbon and energy source, experiments were performed using concentrated biomass, in a range of MEK concentrations between 1.6 $g.L^{-1}$ and 7.5 $g.L^{-1}$.

3. Results and Discussion - According to Image 1 (a) the maximum specific growth rate achieved was 0.335 h^{-1} for 1.6 $g.L^{-1}$ of MEK, thus suggesting an inhibitory effect for higher concentrations. The bioremoval percentages of MEK varied between 43 % to 79 %, Image 1 (b), being the experimental data best fitted by the pseudo-first order model.

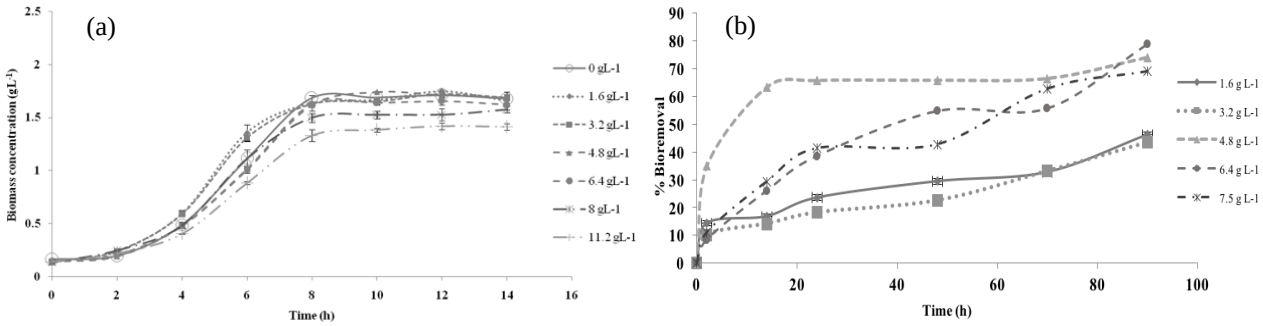

Image 1. Biomass concentration of *R. viscosum* versus time when exposed to different initial MEK concentrations (a); Bioremoval percentages for all concentrations tested as function of time (b).

5. Conclusions - The present work demonstrates the ability of *R. viscosum* to grow in the presence of high concentrations of MEK in aqueous solutions. As *R. viscosum* revealed a good capacity to remove MEK, further studies are necessary to be performed in order to explore the use of this bacteria to remove ketones from water.

5. References

[1] M.H. El-Naas et al, *J. Environ. Chem. Eng.*, **2**, (2014) p. 1104.