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VALORIZATION OF GLASS WASTES AS SUPPORT FOR LIPASE IMMOBILIZATION

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Abstract

This work focuses on treatment of lead polluted waste glass from urban collection (Pb≈5% wt) for its valorization as support in the immobilization of lipase, because soda-lime glasses are used in enzymatic catalysis.

First of all, an extraction process of surface Pb was performed. The process is based on nitrilotriacetic acid (NTA) chelating agent. The operating conditions are: T=80°C, t=1h, pH 10, solid/liquid weight ratio=1/10, reagent concentration=0.1 M. Leaching tests at controlled pH performed on treated glass confirmed the typical inert nature of the glass and the effectiveness of the NTA treatment.

Afterwards lead polluted waste glasses, both untreated and treated with NTA, together with a commercial reference glass, were used as physical supports for the adsorption of *Rhizopus oryzae* lipase, in order to investigate their immobilization capability after specific washing/activation treatments to make functional their surface. The biocatalytic activity of the immobilized enzyme on the glasses was tested through the hydrolysis of *para*-nitrophenyl acetate to *para*-nitrophenol, quantifying the conversion percentage after 60 min of reaction by means of UV analyses at 410 nm.

From the first results, lipase immobilization on waste glasses appears to be encouraging. In particular, lipase immobilized on lead polluted glass from urban collection showed an activity comparable to that of reference glass.

Key words: chelating agents, enzymatic catalysis, leaching tests, lead extractive method, waste lead-glass

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