Effect of Few Parameters on Removal of Atrazine from Waste Water

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Abstract: *Water has been contaminated due to modern agricultural practices, excessive use of pesticides and chemicals, mining and uncontrolled industrial activities. Wide range of chemicals and pesticides used for agriculture and other purposes have led to serious pollution of surface and groundwater. Atrazine, the second most widely used herbicide in world for controlling various weeds, has been found contaminating surface waters, soils and groundwater. Residual amounts of atrazine and its metabolites have been detected in the soil, water bodies, vegetables, grains and other foods products. It is extremely toxic to fish and aquatic invertebrates and it has been implicated increasingly in mammalian gonadal toxicity, genotoxicity and neurotoxicity. Conventional methods for the removal of pesticides are found to be either uneconomical or insufficient. The present study is directed towards the development of alternative technology based on biosorption for removing atrazine from wastewater environment.*

Thirteen different biosorbents were prepared from fungal cultures isolated from atrazine contaminated soil. These biosorbents were screened on the basis of growth of base strain,kinetics of atrazine removal and maximum atrazine uptake capacity. The biosorbent IITB-LP emerged out to be the best absorbent on all counts and was selected for detailed biosorption study. Sorption equilibrium studies were conducted to establish the biosorption uptake capacity of the biosorbent. The biosorption kinetics was studied at different initial concentrations of atrazine as 0.5 mg/L, 1 mg/L, 1.5 mg/L, 2 mg/L and 4 mg/L. The time required by atrazine to reach the equilibrium condition was determined using the kinetic profiles. The effect of biosorbent size on sorption kinetics was studied by taking three different size ranges viz. 0.2mm, 0.4 mm and 0.60 mm. The effect of agitation speed on removal of atrazine was studied for three different agitation speeds of 150 rpm, 200 rpm and 250 rpm.

The removal rate was found to be increasing with anincrease in the initial atrazine concentration and with decreasing biosorbent size. The reaction followed Lagergren's pseudo 2nd order reaction kinetics. The biosorption of atrazine ontobiosorbent followed Langmuir isotherm model. It was found that the biosorption process of atrazine was controlled by intra-particle diffusion, which was confirmed by various kinetic studies and interruption test.

Keywords: *atrazine, batch biosorption studies, biosorption.*

1. Introduction

Atrazine is a very popular, most frequently soil-applied, pre emergent and selective herbicide (USEPA, 2006). It is used for selectively controlling weeds in wide variety of crops, forestry cultivation; selective control of pond-weeds including submerged aquatic plants; and also in wood preservation, home gardening and tsetse fly control (Meister, 1998). As non selective herbicide, it is used for weed control along highways, on railroads, storage yards and industrial sites (Ribaudo and Bouzaher, 1994).

1.1. Environmental Contamination due to Atrazine and Need for Research

Atrazine is applied in field by different modes viz. spray, dust, smoke. Once applied, some atrazine may enter the air, some may enter surrounding areas including streams, lakes, or other waterways through washed-off from the soil by rainfall and some atrazine may enter the groundwater through its leaching from the upper soil surface to deeper soil layers. Atrazine gets accumulated in the plants by absorption via their roots and