Study of Biodegradation of Methyl Thymol Blue and Methyl Red When Treated with Bacteria Free Sludge Dyes, By Sewage Sludge

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ABSTRACT

As we know that there are many groups of bacteria and other microorganisms are present in sewage sludge. Sewage sludge contains water, organic matter, nutrients (nitrogen, phosphorus), microorganisms, and potentially heavy metals or persistent contaminants. Sewage sludge is the nutrient-rich, semi-solid residual byproduct generated during the treatment of municipal wastewater. Composed of organic matter, microorganisms, and inorganic materials, it is treated to reduce pathogens and moisture, turning it into "biosolids" for agricultural fertilizer, land reclamation, or energy recovery (methane production). The biodegradability of selected acid dyes like Methyl thymol blue and methyl red when treated with bacteria free sludge Dyes, by the sewage sludge has been investigated here. Methyl thymol blue has been found to be most sensitive for biodegradation, followed by methyl red when treated with bacteria free sludge Dyes. The possibility of the removal of acid dyes from contaminated effluents by using sewage sludge has been discussed in this Study. The effluent from the textile industry is a complex mixture of recalcitrant molecules that can harm the environment and human health.

Keywords:- Biodegradable, Sludge and effluents.

INTRODUCTION

The average composition of domestic sewage as re-ported by earlierworkers (Jallan et al., 1988) is as follows: pH-6.81. Loss on ignition 4.4%. Silica-68.6%. FeO, 4.2% AlO.2.9%. CaO 7.2%. MgO 2.3%. Na 0.4%. K-0.1%, Cl-0.5%, Soluble sulphate 1.3%. Sulphide 0.028%. Total sulphur 0.095%. Total nitrogen-0.01%. Grease content 0.45%. The presence of a number of toxic metals (at ppm level) in the domestic sewage sludge has also been reported by the same workers (Jallan et al., 1989). The same authors have also reported the biodegradation of sulphates by the sewage sludge resulting in the formation of sulphide ions (Jallan, 1990). This biodegradation has been attributed to the presence of a group of sulphate re-ducing bacteria, which uses sulphate in a manner in which aerobic organisms use oxygen (Mayer, 1977: Alluway, 1970). In the work reported here, the effect of sewage sludge, of similar origin, has been studied on selected dyes (Methyl thymol blue and methyl red when treated with bacteria free sludge Dyes).

MATERIAL AND METHOD

A sample (500g) of domestic sewage sludge was collected from the sewer line of a housing colony at Raipur (Chhattisgarh, India). Weighed quantities (2.55.0 mg) of Methyl thymol blue and methyl red when treated with bacteria free sludge Dyes were taken separately in labelled glass vessels, and each dissolved in 100 ml of distilled water. A weighed quantity (5g) of sewage sludge was added to each vessel. The absorbance values of the dyes solutions were measured, at wavelength of maximum absorbance. The pH value of each dye solution was also recorded.

Aliquots (5 ml each) of clear supernatant liquids wore drawn from each glass vessel after intervals of one day, and the absorbance of each was measured at their respective wavelengths of maximum absorbance, after filtration and adjustment of pH to initial values. The measurements were continued till nearly constant values of absorbance were obtained. The decrease in absorbance values has been taken as the loss of dyes molecules. To confirm the bioactive mechanism operating in the removal process, a parallel run using the most sensitive dye (Methyl thymol blue and methyl

red when treated with bacteria free sludge Dyes) and oven heated (250 °C) sample of sewage sludge was also carried out. The results obtained have been shown in figure 1.

RESULT AND DISCUSSION

The result obtained (Figure 1) show that degradation of dyed molecules, in varying degrees, has taken place in each case. The extent of degradation has, however, been found to be different for different dyes. Within the same duration (9 day). Methyl thymol blue has undergone 100% degradation, followed by methyl red when treated with bacteria free sludge Dyes (80%). The most sensitive dye (Methyl thymol blue) when treated with bacteria free sludge (oven-heated) showed a removal of only 10%, indicating either a residual presence of bacteria in the heated sludge or the role of some other processes such as surface adsorption While the fragmentation pattern of the dyes is not discernible from the investigations here, the Methyl thymol blue has shown highest sensitivity for the biodegradation process. The findings have relevance in the treatment of acid dyes contaminated wastewaters using the sewage sludge.

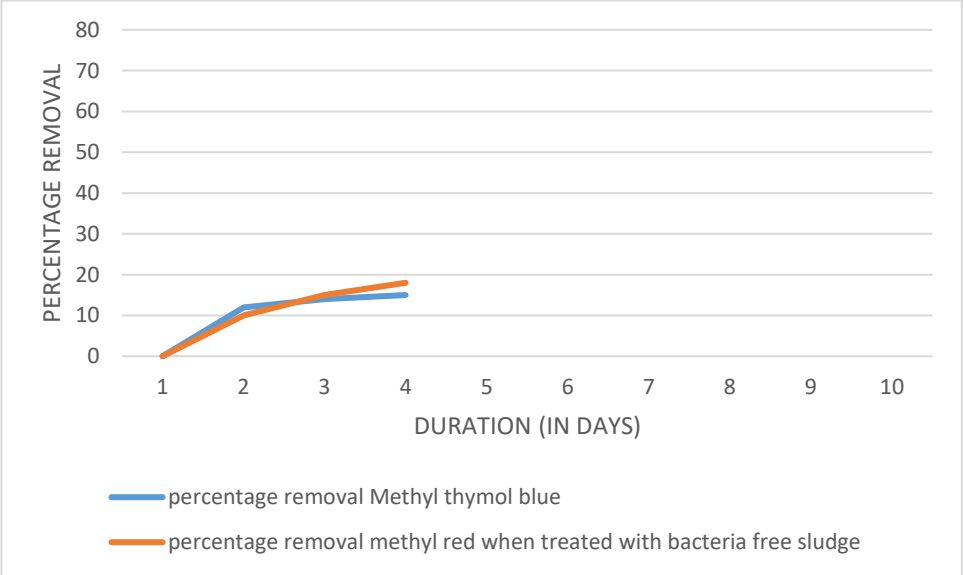


Figure 1: Removal of Dyes by sewage sludge

OBSERVATION TABLE-1

S.No.	**(duration in (days)**	**percentage removal**	
		Methyl thymol blue	**methyl red when treated with bacteria free sludge**
1	1	**0**	**0**
2	2	**12**	**10**
3	3	**14**	**15**
4	4	**15**	**18**

CONCLUSION

The study of the biodegradation of dyes by sewage sludge have shown that the microorganism is capable of causing the biodegradation of the dyes are available in the sewage sludge. The finding suggest that the waste water of dye-plants or textile mills can be released into the sewerages at pre-determined rates as a save method of their desposal.

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