DECOLOURISATION AND DEODOURISATION OF DILUTED SPENT WASH USING CHEMICAL AND BIOLOGICAL AGENTS

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ABSTRACT

In India there are 290 distilleries producing 2.75 billion liters of alcohol generating 45 billion liters of waste water annually. The distiller disposing waste water in to the natural streams, on to the land (or agricultural land), pollutes the mother earth. Also it is essential to sustain the mother earth for the future of our next generation. The technology for treatment of such a waste water is of prime concern. Hence, the present study was focussed on decolourisation and deodourisation of spent wash using oxidising, coagulating agents and biological material. The treatment has shown complete odour removal. No colour removal has been noticed with powdered *strychnus potatorum* treatment. The result of chemical treatment revealed the highest colour removal than biological agents. Complete colour removal has been noticed when the 5% diluted spent wash treated with 1.5 g and 2 g of calcium hypo chlorite (bleaching powder).

INTRODUCTION

Water is a vitally important commodity to all organisms. It is the medium which gave birth to the first primitive living molecules and without which life can never exist. Many anthropogenic activities especially industrialization play a main role to pollute the aquatic ecosystem to a maximum. One such industry, distillery consumes large amount of water and consequently generate huge quantities of spent wash.

The spent wash is characterised by the intense colour, objectionable odour.
higher TDS, TSS, TS, HOD, COD, nitrate, chloride etc. (Nanjundaswamy et al. 1998). Ramchandra and Singh 1999 have been reported that colour and odour poses a serious threat to the environment as the coloured waste affects the aquatic organism, light penetration and reduces the aesthetic value.

The colour is reddish brown to dark brown, due to the presence of melanoidins and polyphenolic compounds (Kasturibai and Ganga 1996). The unpleasant odour caused by distillery spent wash has been blamed due to the presence of odour causing compounds such as hydrogen sulfide ammonia, mercaptans, amines, aldehydes, ketones, indole and skatole that has been reported by (Youngwoo et al. 1994). Hence the treatment of spent wash is utmost essential.

MATERIALS AND METHODS

Physico-chemical characterisation of distillery spent wash

The spent wash was collected from a distillery located at i rich), TamilNadu. The physico-chemical characteristics such as pH, EC, TS, TDS, TSS, COD were determined (APHA 1989). The intensity of the colour was measured at 420 nm (max).

Dilution of the distillery spent wash

Spentwash was diluted with distilled water to obtain the 5% dilution. This dilutions was prepared by diluting 5ml of spentwash to 100mL with distilled water.

Effect of oxidising agents and coagulating agents on colour and odour removal of 5% diluted spent wash

About 100 mL of diluted spentwash was taken in 12 different conical flasks. Accurately 0.5g, 1g, 1.5g, 2g of calcium hypochlorite was added to the first four flask. Stirring was done immediately and left for 2 hrs.

Accurately 0.5g, 1g, 2g of calcium oxide was added to the another four flasks, mixed and left for 2 hrs.

About 0.5 mL, 1 mL, 1.5 mL, 2 mL of Hydrogen peroxide was added to the remaining conical flasks stirred and left for 2 hrs.

After 2 hrs they were filtered and colour was determined using spectrophotometer at 420 nm.

Table 1

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameters</th>
<th>Values (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Colour</td>
<td>Dark Brown</td>
</tr>
<tr>
<td>2.</td>
<td>Odour</td>
<td>Objectionable</td>
</tr>
<tr>
<td>3.</td>
<td>pH</td>
<td>4.5</td>
</tr>
<tr>
<td>4.</td>
<td>TS</td>
<td>70000</td>
</tr>
<tr>
<td>5.</td>
<td>TDS</td>
<td>65000</td>
</tr>
<tr>
<td>6.</td>
<td>TSS</td>
<td>5000</td>
</tr>
<tr>
<td>7.</td>
<td>COD</td>
<td>92000</td>
</tr>
</tbody>
</table>

Except colour, odour and pH all are expressed in mg/L.

Effect of biological agents on colour and odour removal

About 100mL of spent wash was taken in 4 conical flask. Accurately 0.5g, 1g, 1.5, 2g of powdered *Strychnus potatorum* was added and mixed. Left for 2 hrs and filtered. The filtrate was subjected to colour analysis.

RESULTS AND DISCUSSION

Physico chemical characterisation of spentwash

The characteristics of the distillery spentwash have been presented in Table 1. The colour and odour of the spentwash is dark brown and unpleasant alcholic odour respectively, colour of the spent wash may be due to presence of cyanidin pigments. Melanoidins are formed due to decomposition products such as hydroxymethyl furfural (Saxena and Rai, 2000).

Youngwoo at al. 1994) have reported that objectionable odour was produced by the anaerobe decomposition of compounds containing nitrogen and sulphide, mercaptans, amines, aldehydes, ketones, indole, and skatole. The pH of the spent wash was acidic which may be due to fermentation process and the total solids, total dissolved solids were so high, which may be the reason for the higher BOD and COD. Hence the DO was nil.

Effect of oxidising agents and coagulating agents on colour and odour Removal of 5% diluted spent wash

Complete colour removal has been noticed when the spent wash was treated with 1.5g and 2g of calcium hypochlorite. It was achieved by the oxidizing power of calcium hypochlorite. The oxidizing agent may have oxidized the
pigments imparting the colour.

Diluted spent wash treated with calcium oxide has shown complete deodourisation and slight reduction of colour. The colour removal has decreased with decrease in amount of calcium oxide. It may be due to the hydroxy radicals which are generated capable of degrading the contaminants through oxidation (Inthorn et al. 2001). 5% diluted spent wash treated with 0.5 ml of H₂O₂ has resulted in no colour removal. It may be due to insufficient dosage of H₂O₂. Complete removal of odour has been achieved but only 10% of colour removal have been noticed.

Effect of biological agents on colour and odour removal from the 5% diluted spent wash

No colour removal was noticed and complete odour removal was noticed when 5% diluted spent wash was treated with powdered *Stryclinus potatorum*. The coagulating property of the powdered *strychnus potatorum* (poly electrolyte) has been already reported by Rangwala et al. 1997.

CONCLUSION

Calcium hypo chlorite, hydrogen peroxide, Calcium oxide and powdered *Stryclinus potatorum* were used lor the decolonisation and deodourisation. Chemical treatment has shown the highest reduction of colour when compared to biological treatment. But complete deodourisation has taken place by all the treatments. Hence, chemical treatments are better than biological treatment for the removal of colour and odour from the diluted spent wash which has been diluted with distilled water.

REFERENCES


