

STUDIES ON SOME ASPECTS OF POLLUTION DUE TO DISTILLERY EFFLUENTS AT KOKER, RANCHI. I- CHARACTERISATION OF THE EFFLUENTS

M. P. Sinha*, P. N. Pandey & P. N. Mehrotra

Ecological Research Laboratory, P. G. Department of Zoology, Ranchi University, Ranchi 834 008, India

*Presently : Department of Zoology, R. S. More College, Govindpur 828 109, India

Abstract

In order to assess the pollutional impact of the effluents of Ranchi Distillery on the receiving aquatic ecosystem, the effluents were analysed for their physico-chemical characteristics. The results revealed that effluent discharged by the distillery were highly acidic as well as alcoholic. Dissolved oxygen and free carbon dioxide contents were found nil or if present were in traces. Effluents were found to have high values of total solids and turbidity. The BOD and COD values were recorded of the order of 5263 mg/l and 11360 mg/l respectively.

Introduction

Unplanned urbanisation and industrialisation without ecological safe technology have resulted in a potential source of pollution. Effluents, an integrated part of industrial processes cause pollution and produce adverse impact on the receiving ecosystem depending on their physico-chemical characteristics. Further, for any remedial measure it is prerequisite to know the nature of pollutant in detail and assess the toxicity which underlines the need of characterisation of effluents.

Various workers have studied the different industrial effluents assessing the adverse effects on the receiving stream or river system (Ganapati & Alikunhi; 1950; Banergia et al, 1956; Basu, 1966; David & Ray, 1966; Ray & David 1966, Banerjee, 1969; John Vorkey, 1973; Verma & Dalela, 1975; Hakim, 1981; Patil et al, 1986; Sinha & Sinha, 1987) in India but there is no report, as is revealed by the review of literature, on distillery effluents from this region. With this background the present in-

vestigation was taken up. The communication deals with the physico-chemical characteristics of the effluent in relation to the IS specification of effluent disposal.

Material and Methods

The samples were collected for one year (March 1980 to Feb 1981) from the discharge point of the effluents and were analysed for physico-chemical characteristics following standard methods (A.P.H.A, 1965).

Results and Discussion

The results of physico-chemical analysis of the effluents have been presented in the Table I with its statistical analysis for Standard Deviation (SD), Co-efficient of variation (CV), Variance (V) and Co-efficient of Standard Deviation (CSD) to get an idea of range of variation in different parameters.

From Table I it is clear that the effluent samples are always dark brown with alcoholic pungent smell.

The pH values range from 3.5 to 5.6 while

Table 1 : Physico-chemical characteristics of distillery effluents at Koker, Ranchi with statistical analysis.

Parameters	Minimum & Maximum Range	M	SD	CSD	CV	V
Colour	Dark Brown					
Odour	Aromatic Pungent					
Temperature (°C)	23.8-31.3	28.23	± 3.216	0.113	11.390	10.3482
Turbidity (NTU)	390.6-458.6	427.76	± 26.114	0.061	6.104	681.978
Conductivity (m mhos)	0.0563-0.0769	0.063	± 0.009	0.145	14.567	8.638
pH	3.5-5.6	4.9	± 0.827	0.168	16.878	0.684
Total Solids	16350.0-22430.0	20366.66	± 2386.366	0.117	11.717	5694746.7
Total Alkalinity	90.2-117.6	105.81	± 12.005	0.113	11.3445	144.133
Dissolved Oxygen	Nil-traces	—	—	—	—	—
Free CO ₂	Nil-traces	—	—	—	—	—
Chloride	108.9-173.6	142.38	± 32.636	0.229	22.921	1065.1441
Sulphate	9.3-18.6	14.81	± 4.092	0.276	27.621	16.749
BOD	2563.0-5263.0	4025.16	± 1072.647	0.266	26.6448	1150572.6
COD	9459.0-11360.0	10551.0	± 805.238	0.076	7.631	648408.8

All values which have not been indicated are in mg/l.

M = Mean; SD = Standard Deviation; CSD = Co-efficient of Standard Deviation; CV = Coefficient of Variation; and V = Variance.

the effluent standard for discharge of the same in inland surface water specify from 5.5 to 9.0. The high acidic nature together with other pollutants make the effluents more toxic. The temperature range of the effluent comes under the limit of Indian Standard of waste disposal but all other parameters are considerably higher than the prescribed limit (IS-290;1974). The high values of total solids are far beyond the permissible limits while BOD value is more than 175 times higher and COD value is more than 45 times higher than specification.

The low pH, high temperature and higher values of total solids, BOD as well as COD make the effluent so toxic that as a result of which the effluents do not support any life from in them. Verma & Shukla (1969) also found a similar result while working on sugar

factory effluents. The absence of dissolved oxygen content and free carbon dioxide in the effluent further support the view which is in conformity with the finding of Ghosh & Basu (1968).

From environmental safety viewpoint, on the basis of the present study, it is advisable that the effluents are dangerous for receiving ecosystem if discharged untreated.

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