

SEASONAL VARIATION IN PHYSICO-CHEMICAL CHARACTERISTICS OF EFFLUENT OF M/S NARANG DISTILLERY AT NAWABGANJ, GONDA, INDIA

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SUMMARY

Seasonal variations in physico-chemical properties such as transparency, temperature, colour, odour, BOD, COD, total dissolved solid, turbidity, total suspended solid, alkalinity, hardness dissolved oxygen, CO₂ and pH were studied by analyzing distillery effluent of Narang Distillery, Nawabganj, Gonda (U.P.) during the year 2005-2006. The study aimed the assessment of pollution potential of the effluent accumulated in Parvati Lake of Nawabganj, Gonda (U.P.). Many of the parameters studied have been found beyond the permissible limit hence water of the reservoir was found unfit for the use of animals and aquatic lives.

Key words : Seasonal variations, Physico-chemical characteristics, Distillery effluent.

Man has been exploiting the nature for their requirements ever since his existence on the earth and thus altering the natural balance of environment. Conservation and preservation of environmental quality are the demand of the day but rapid growth of population and various human activities have been quite damaging in the past few decades. Distillery effluents have been found quite unsuitable, creating a serious problem of pollution, insanitation and low productivity of crops in the localities where they are discharged. This spoils the quality of water and makes the water bodies unfit for the survival of aquatic organisms and reduces their productive potential. An alcohol distillery based on sugar cane molasses, produces a huge amount of waste water every day which is rich in organic materials, less toxic and easily amenable for the use of micro-organism. M/s Narang distillery is located in rural area and releases 1250 quantal effluents per day. That is ultimately carried to Parvati Lake after passing through several water channels. The extent of losses in growth and yield of various plant species depends upon the pollution potential of the effluents. Seasonal variations have significant impact on many physico-chemical properties of the effluents which determine the pollution potential of the effluent. The present work focuses on the pollution potential of the distillery effluent influenced by the seasonal variations.

MATERIALS AND METHODS

Samples were collected at different time intervals every month from the discharge point of the main channel of the M/s Narang distillery, Nawabganj, Gonda (U.P.).

Different physico-chemical properties of seasonal (summer, monsoon and winter) variations in values were determined during the year 2005-2006. The samples were brought to the laboratory and analyzed for various parameters using standard methods (Apha *et al.*, 1995). Temperature and pH were noted with the help of water analyser kit. Total alkalinity and dissolved oxygen were determined titrimetrically following the method of Adomi (1985).

MATERIALS AND METHODS

Seasonal variations in physico-chemical characteristics of distillery effluent is summarized in the Table 1.

The highest temperature (37.47°C) of distillery effluent was recorded in June, 2005 and lowest (28.26°C) in November, 2005. The maximum transparency (4.21) of the effluent was found in January, 2006 and the lowest (1.25) in June, 2005. The pungent organic smell and dark brown colour of the effluent remained unchanged throughout the year (from 2005-2006). Dissolved oxygen was absolutely absent in the effluent during the course of investigation which indicated the presence of high level of organic pollution pH of the effluent was acidic in nature that ranged between 4.0 to 4.8 and was lowest in August, 2005 and highest in March, 2005. The highest turbidity or the distillery effluent (296.00) was recorded in October, 2005 and the lowest (112.33) in January, 2005. Free CO₂ determined in the effluent was found highest in January, 2006 and lowest in July, 2005. The values were 3.85 mg/l and 1.95 mg/l respectively. Total alkalinity of the effluent was highest (365.33) in June, 2005 and the lowest (200.00) in January, 2006 and the amount of total dissolved solid was maximum (1910.10 mg/l) in May, 2005 and minimum

Table 1: Seasonal variation in physico-chemical characteristics of distillery effluent during March, 2005 to Feb., 2006

PARAMETERS	MANSOON												WINTER			BIS/ CPCB Std.
	March	April	May	June	Mean	July	Aug.	Sep.	Oct.	Mean	Nov.	Dec.	Jan.	Feb.	Mean	
Temperature	28.30	30.40	33.30	37.47	30.86	32.27	35.40	33.84	33.03	33.63	28.26	29.00	29.03	25.36	20.66	40°C
Transparency (in cm)	2.72	2.01	2.04	1.25	2.00	3.08	2.94	1.83	1.90	2.43	3.05	3.07	4.21	3.94	3.56	-
Odbur	P.A.	P.A.	P.A.	P.A.	-	P.A.	P.A.	P.A.	F.A.	-	P.A.	P.A.	P.A.	P.A.	-	-
Colour	D.B.	D.B.	D.B.	D.B.	-	D.B.	D.B.	D.B.	D.B.	-	D.B.	D.B.	D.B.	D.B.	-	-
Turbidity	217.33	22.07	129.30	130.67	174.49	291.34	194.67	200.00	296.00	245.50	110.00	112.34	112.33	120.67	113.83	-
pH	4.80	4.20	4.37	4.90	4.56	4.17	4.00	4.57	4.43	4.29	4.45	4.71	4.47	4.20	4.45	5.5-9.0
Free CO ₂	2.85	2.12	3.13	2.10	2.55	1.95	2.00	2.85	2.15	2.23	2.85	2.75	3.85	3.00	3.11	-
Total alkalinity	355.00	348.34	311.67	365.33	345.08	202.00	202.00	212.00	229.67	211.41	238.30	201.60	200.00	351.67	247.89	200.00
Total dissolved solids	1425.75	1050.67	1510.10	1373.50	1440.00	1470.00	230.89	1199.10	879.99	1194.99	1014.12	998.85	1270.00	1185.85	1117.20	2100.00
Total suspended solids	573.34	673.34	225.00	570.57	510.56	301.34	512.33	590.67	593.67	499.50	300.40	297.34	482.50	590.00	417.56	100.00
Total Hardness	591.34	494.67	600.00	596.00	570.50	510.00	512.34	512.34	520.67	513.83	617.33	620.67	629.30	630.37	624.49	100-500
Dissolved O ₂	Nil	Nil	Nil	Nil	-	Nil	Nil	Nil	Nil	-	Nil	Nil	Nil	Nil	-	-
B.O.D (20°C, 5 Days)	30131.67	29703.67	29786.33	28794.33	29604.00	30371.34	29366.00	27250.20	28375.00	28840.63	21461.60	28563.00	28181.67	28465.34	28667.90	500.00
C.O.D	48402.00	50023.67	49103.67	49145.00	49168.58	50512.67	48481.33	50492.00	50502.67	49997.16	48865.00	60620.00	59360.00	55365.00	58551.75	250.00

All the values expressed as mg/l (except pH, temperature, transparency, odour and colour), P.A. = Pungent aromatic, D.B. = Dark brown.

(879.99 mg/l) in October, 2005. The amount of total suspended solid in effluent, was found highest (673.34 mg/l) in April, 2005 and the lowest (300.40 mg/l) in the month of November, 2005. However, in other months it ranged between aforesaid values. The maximum (30371.34 mg/l) and minimum (21461.60 mg/l) BOD values were recorded in the July, 2005 and November, 2005 and maximum (65365.00 mg/l) and minimum (48402.00 mg/l) COD values were determined in February, 2006, and March, 2005, respectively.

Seasonal variation in temperature of the effluent has been observed and co-related with similar behavior of atmospheric temperature (Zingade, 1987). In the present study, highest temperature (37.47°C) was recorded in June, 2005 and lowest (28.26°C) in November, 2005 with a difference of 9.21°C between the two seasons (the summer and the winter). pH of the effluent was acidic in nature which ranged between 4.0 to 4.8 being well within the permissible limit as suggested by WHO (1984).

Verma and Shukla (1969) found high values of solids, BOD and COD in distillery effluents and reported these effluents as toxic and unsuitable for existence of life in such water. Hingorani *et al.* (1979) reported putrissible organic matter in distillery effluent which caused severe depletion of dissolved oxygen in fresh water. Singh (1982) reported distillery effluent highly organic in nature and because of its high BOD, dissolved oxygen is removed quickly from the waste water.

In the present study, influences of seasonal variations were found on alkalinity, total dissolved solids, total suspended solids, BOD and COD. The highest values of these were recorded in the summer seasons (April to June) and the lowest in the Winter season (November to January), but free CO was found maximum in January (winter Season) and minimum in July (summer season). However, the colour and smell of the effluent remained unchanged in all the three seasons. The dissolved oxygen was completely absent through out the year, this shows presence of high organic content in the effluent which is similar to the observations made by Singh (1982).

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