Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Archives of Applied Science Research, 2011, 3 (2):606-609

(http://scholarsresearchlibrary.com/archive.html)

ISSN 0975-508X
CODEN (USA) AASRC9

Study of hydrochemical parameters of ground water around ethanol plant, Bellur(V.) TQ. Dharmabad, DIST. Nanded, Maharashtra

Sayyed Hussain[a], Syed Yousuf Hussain[b]

[a]*Sir Sayyed College Aurangabad M.S.*
[b]*Kohinoor Arts, Science & Commerce College, Khultabad, Dist. Aurnagabad, M.S.*

ABSTRACT

The present investigation deals with the study of physicochemical parameters of ground water of an ethanol plant, Pioneer Distillaries Limited Bellur (V) Tk. Dharmabad Dist. Nanded, Maharashtra. The investigation was carried out collecting ten samples of the ground water from different locations of the plant and physico-chemical parameters like temperature, pH, total dissolved solids, dissolved oxygen, biological oxygen demand, chemical oxygen demand, total hardness, chlorides, calcium, magnesium, sulphate, nitrate.

Key words: Ground warter pollution, Hydrochemical parameters, Ethanol plant, Pioneer Distillaries Limited, Industrial wastes.

INTRODUCTION

The ground water quality is much more affected with industrial wastes. Any liquid effluents, when discharged will eventually find its way into the hydrological cycles and thereby can have adverse effects on ecosystems and eventually as the quality of water. It is likely that the liquid waste from ethanol plant does not undergo any treatment prior to it being discharged into environment. There is a need for the primary treatment of effluents before discharge into the environment. The biggest waste product of ethanol production is waste water.

For each gallon of corn ethanol produced, 160 gallons of waste water is produced. This water is discharged into enormous retention ponds for evaporation. Also, limited plots of land contribute to the problem of disposing such large quantities of waste water. Plant utilize chmicals such as algaesides and rust inhibitors, which are found in wastewater. Wsaste water also contains biological oxygen demand (BOD) of 18,000 to 37,000 ppm.

MATERIALS AND METHODS

The present investigation was carried out in and around an ethanol plant, Pioneer Distillaries Limited Bellur (V) Tk. Dharmabad Dist. Nanded, Maharashtra for one month in 2010. Ground water samples (S_1 to S_{10}) were collected from ten different locations of the plant which include four corners and surrounding area for the study of physico-chemical parameters. Temperature was measured using a standard centigrade thermometer. Total dissolved solids (TDS) were measured in the laboratory by using the standard procedure of Trivedi and Goel (1984). The pH was measured by using portable digital pH meter at the spots. Dissolved oxygen was estimated employing the Winkler's titration method (APHA, 1976). Similarly BOD, COD, chlorides, calcium, magnesium, sulphate, etc were measured by the standard methods given by APHA (1989).

RESULTS AND DISCUSSION

The hydrochemical parameters are tabulated along with the range and permissible limits in Table – 1.

The values of Table-1 revealed that hydrochemical parameters like temperature, pH,TDS, DO, BOD, COD, total hardness, chlorides, calcium, magnesium, sulphate, and nitrate. Temperature was basically important for the chemical and biological reactions of organisms in water. The temperature of the samples lies between 26.0 to 28.0^0C. The increase in temperature decreases the potability of water because at elevated temperature carbon dioxide and other volatile gases which impart test are expelled. The water temperature was observed by Pawar and Pulle(2005).

The collected water samples had pH within the permissible limits ranging from 6.8 to7.6 and average value is 7.15. The pH was slightly alkaline the value being greater than 7 at most of the stations. The reduced rate of photosynthetic activities reduces the assimilation of carbon dioxide and bicarbonates which is ultimately responsible for the increase of pH.

The total dissolved solids of collected water samples came under moderately hard which ranged from 520 to 750mg/L and average value was 587mg/L which was slightly higher than the permissible limit which is due to the excessive solids present in the ground water. The presence of excessive solids in water indicates pollution which can lead to a laxative effect. The presence of excessive solids in water may be due to agricultural activities and geological parameters. Gupta et. al.(2001) were recorded TDS from Udaipur lake ranged from 202 to 724mg/L. The high level of TDS in drinking water causes laxative effects. Khobargade Kshama(2003), observed the values of TDS were in the range of 9100 to 2500mg/L.

The dissolved oxygen level of the collected samples ranged from 2.6 to 4.2mg/L and average value was 3.25mg/L which is lower than the permissible limit indicating that it is not suitable for drinking purpose. The dissolved oxygen is one of the most important factors in any aquatic ecosystem. The main source of dissolved oxygen is from dissolution from atmosphere and the photosynthesis. DO in water samples depend on water temperature, partial pressure of the gas in contact with water, the concentration of the dissolved salts,biological activites and geology of river basin. Further, concentration of DO is inversely proportional to temperature at a given time

(Lohar and Patel, 1998; Deshmukh and Ambore, 2006). Several workers observed DO. Pejaver et. al.(2001), Sakhare and Joshi(2002) have reported DO range between 2.3 to 10.8mg/L in Palas Nilengaon reservoir in Osmanabad district.

The range for BOD was 6.4 to 8.6mg/L and average value was 7.52mg/L which is within the permissible limit. BOD has been used as a measure of the amount of organic material in an aquatic solution which support the growth of micro organisms. Saxena and Srivastava(2002) were observed the high BOD values from the samples exposed to municipal water near sewage dem, Tamlurkar and Ambore(2006) were recorded values varied from 0.72 to 3.02mg/L.

The COD range was 16.0 to 24.0mg/L and the average value was 18.61mg/L which is lower than the permissible limit. The another chemical parameter total hardness had range 310 to 436mg/L with average value 373mg/L. The total hardness is the total soluble magnesium and calcium salts present in the water as its $CaCO_3$ equivalent. Total hardness also includes the sulphate, chlorides, bicarbonates of calcium and magnesium. Hardness leads to heart diseases and kidney stone formation. The total hardness was in the range from 83.8 to 178mg/L at Harsal dam Wagh(1998). Mishra and Tripathi (2001) reported high values of 295mg/L in Ganga river.

The calcium ranged from 108 to 140mg/L with average value 123.4mg/L. It is higher than the permissible limit indicating higher amount of salts of calcium. Similarly magnesium ranged from112 to 142mg/L. It is close the permissible limit. The range for chloride was 128 to 208mg/L and its average value was 170.6mg/L. High chloride content in water bodies harms metallic pipes and structure as well as agricultural crops.

The range for sulphate was 140 to 172mg/L with average value 158.6mg/L. Sulphate concentrations around 1000mg/L has laxative effect and couses gastrointestinal irritation. The nitrate value of the sample collected were ranged from 18 to 34mg/L with average value 26.2mg/L which is below the permissible limit. High nitrate concentration in water bodies leads to organic pollution causing blue baby syndrome.

REFERENCES

[1] APHA(**2008**) Standard methods for the examination of water and wastewater (20th ed.) American Public Health Association, Washington, DC.
[2] Deshmukh, J.V. and Ambore, N.E. (**2006**) *J. Aqua. Bio.* Vol.21 (2) , 93-96.
[3] Environmental Protection Agency (EPA, **1986**) U.S. Quality Criteria for water, EPA #440/5-86-001.
[4] Kodarkar M.S. (**1992**) *Indian Association of Aquatic Biologist(IAAB)* Hyderabad Publication, 2-pp, 50.
[5] Pawar S.K. and Pulle J.S. (**2005**) *India J. Aqua. Bio.* Vol. 13(1&2), 57-59.
[6] Rao and Venkateshwarulu (**2000**) *IJEP* 24(i); 53-56.
[7] Trivedi R. K. and Goel P. K. *Environmental Publication*, Karad, **1986**.
[8] Kasthuri R. et. al. *Indian J. Environ. Protect.* ,**2003** 25 (3), 245-248.
[9] Tiwari D. R. *Indian J. Environ. Health,* **2001**, 43, (1), 176.
[10] Bhatia S. C. Environmental Chemistry, CBS Publications, New Delhi, **2000**.
[11] Gupta and Suruchi, *Asian J. Chem.*, **2001** 13 (3), 16-17

[12] Jain & Jain, A text book of Engineering Chemistry, Dhanpat Rai & Sons, New Delhi.