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STUDY OF PHYSICO-CHEMICAL PROPERTIES OF EFFLUENTS FROM SOAP INDUSTRY IN AMRAVATI

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ABSTRACT

Physicochemical Parameters of the effluents from soap industry of Amravati region had been analyzed. In this investigation Physico-Chemical Parameters such as colour, odour temperature, pH, electrical conductance, total dissolved solids, hardness of calcium and magnesium, chloride, COD, BOD, SAR, fluoride, Iron and alkalinity & sulphate had been analyzed of the effluent collected from the soap industry of Amravati region. Sodium and potassium elements were analyzed flame photo -metrically.

Key words: Soap Industry effluents, Physicochemical parameter.

INTRODUCTION

Almost 70% of the water in India has become polluted due to the discharge of domestic sewage and industrial effluents into natural water sources such as rivers, streams as well as lakes[1]. The above paper discuss the water quality of effluents from the soap industry of Amravati region. The water coming from this source has significant impact on the quality and sustainability of the rivers. Industrial effluents, direct discharges, as well as precipitation may introduce a wide variety of pollutants into the rivers ranging from agrochemicals, heavy metals, microbial as well as persistent organic pollutants According to WHO estimate about 80% of water pollution in developing country, like India is carried by domestic waste.

The improper management of water systems may cause serious problems in availability and quality of water.[2] In our country 70% of water is seriously polluted and 75% of illness and 80% of the child mortality is attributed to water pollution[3]. The industrial pollutants associated with organic matter, inorganic dissolved solids and other unwanted chemicals cause serious ground water problems[4]. The consequences of urbanization and industrialization lead to spoil the water. There is an extensive literature which stresses detoriation of water quality[5-8]. The faster rate of detoriation is now a global problem[9]. Effluent generated by the industries is one of the source of pollution contaminated air, soil and water effluent & from the industries are associated with heavy disease burden[10] and this could be part of the reasons for the current shorter life expectancy in the country[11] when compared to the developed nations. Some heavy metals contaminated in

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these effluents from the industries have been found to be carcinogenic[12]. While other chemicals equally present are poisonous depending on the dose and exposure duration[13].

Amravati is an important and historical city of India. The present work is an attempt to examine the soap industrial effluents of Amravati region.

EXPERIMENTAL

In this study water samples have been collected in polythene bottles with necessary precaution at points at which effluents discharge into drains for laboratory analysis. Determination of parameter like colour, odour, temperature. alkalinity, SAR, Calcium and magnesium hardness, Chloride Dissolved oxygen were carried out in the laboratory pH and electrical conductance were carried out using pH meter and conductometer respectively. Sodium (Na) and potassium (K) were determined by using flame photometer. Sulphate ion concentration (so_4^{2-}) was determined by using U.V. Visible spectrophotometer. Iron (fe) was determined by atomic absorption spectroscopy. Total dissolved solids were detected by gravimetric method and fluoride was detected by fluoride electrode. Chemical oxygen demand (COD) was determined by the dichromate digestion method while biological oxygen demand (BOD) was determined by the dilution method. The chemicals used were used of AR grade. Double distilled water is used for the preparation of solutions and reagents.

RESULTS AND DISCUSSION

Temperature, colour and odour

In the present study, temperature ranges from 28^{o}C - 30^{o}C. The effluent collected was found to be brownish in colour and having unpleasant odour.

Electrical conductance (Ec)

More the dissolved solid more is the electrical conductance. Ec of the water is the sum of ionic conductance of all the ionic constituents. The most expedient to evaluate the salinity of water is to measure its electrical conductance. The high EC valves are harmful for plant growth. Water with high EC affects the soil structure, permeability and irrigation. These adverse effects known as salinity hazard which affects plant growth and crop yield considerably. EC of studied effluent was found to be 2.21 µm Mhos.

pH

Extremely high or low pH has adverse impact on the quality of the mater and may kill the aquatic organisms. pH is an important index of acidity. Alkalinity and resulting values of acidic–basic interactions of number of minerals and organic components. pH below 6.5 below causing corrosion in pipes resulting in the release of toxic metals. The pH detected in effluent was 10.78 which is not in the prescribed range by WHO (7-8.5)

Calcium and magnesium hardness

The hardness of water is not the chemical parameter but indicate the quality in terms of ca^{2+} and mg^{2+} and expressed as $Caco_3$. The ca hardness is 112 mg/L and Mg-hardness is 38.4 mg/L. This hardness is well within the permissible limits of WHO standard.

Biological oxygen demand (BOD)

BOD was not found in studied samples.

Chemical oxygen demand (COD)

The COD in the effluents from soap Industry was 8.2 mg/L. The high levels of COD in the effluents indicate high toxic condition and presence of biological resistant organic substances COD exceed the WHO acceptable limit.

Total dissolved solids

TDS is mainly composed of carbonate, bicarbonate, chloride, phosphate and nitrates of calcium, magnesium, potassium and manganese, organic matter salts and other particles. TDS of effluents if found to be 1235 mg/L. High TDS values may be associated with excessive scaling in pipes which may cause corrosion. The acceptable limit of TDS is 500 ppm.

Dissolved oxygen

Dissolved oxygen is of significant importance to the respiratory activities of the aquatic organisms and effluents with very low do may have a negative impact on the sustainability of the rivers in the basin. DO of studied effluent is 8.3 ppm which is just within the permissible limit of the WHO.

Sulphate ion concentration (SO^{2-}_4)

Sulphates cause water hardening and therefore high levels are not recommended. All industries should be encouraged to ensure that it is kept under control. Sulphate usually occurs in natural water. The presence of Na_2SO_4 and $mgso_4$ in the drinking water is beyond prescribed limit of water. The SO_4 ion conc.^{n} in the studied water was found to be 240 mg/L. It just exceeds the WHO permissible limit.

Iron (Fe)

Iron is an essential element in human nutrition long time consumption of drinking water with high conc.^{n} of Iron can lead to liver disease. Iron also promotes the growth of Iron bacteria.

Chlorides

Chloride is one of the major inorganic anion in water. High chloride content may harm metallic pipes and structures as well as growing plants. Chloride content in the studied effluent was found to be 795.2 ppm which is exceeding the WHO acceptable limit i.e. 200 ppm.

Fluoride

Traces of fluorides are present in many waters. Higher conc^n are often associated within underground sources. Large amounts of fluoride are associated with dental and skeletal fluorosis (1.5 mg/e) and inadequate amount with dental caries (< 1 mg/L) In the given sample fluoride is 20.4 ppm. This is more dangerous.

Sodium adsorption ration

It is the measure of the relative preponderance of dissolved sodium in water compared to the amount of dissolved calcium and magnesium. It is an important parameter for determining the suitability of groundwater for irrigation because it is a measure of sodium hazard to crop. It is in the range of 9.96. The value of SAR when exceeds than 10 is harmful.

Sodium

The Presence of Sodium could be attributed to the sodium salts and soaps used too much sodium has been identified as a risk factor for high blood pressure 20 mg/L suggested as safe. Sodium concentration was determined to be 20.82 mg/L by flame photometrically.

Potassium

The concentration of K is quite lower than Na. It remains mostly common in solution without undergoing any precipitation. Potassium concentration was found to be 2.67 ppm.

Alkalinity

High alkalinity is a measure of wastewater strength. It shows the capacity of wastewaters to neutralize acids, and is undesirable. The alkalinity of water may be caused due to OH^-, bicarbonate ions. Alkalinity is the estimate of ability of water to resist change in pH upon addition of acid. Total alkalinity as CaCO3 found to be 2879.2 ppm.

CONCLUSION

In conclusion it can be stated that the different studied physic-chemical parameter In which COD, pH, TDS, sulphate ion Conc^n fluoride & chloride Conc^n exceeds than the WHO permissible limit the water needs to be treated before using it for domestic application.

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