

Estimation of Few Chemical Constraints of Industrial Effluents by Spectroscopy

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Abstract: Purified water is an integral constituent for the subsistence of healthy life of human beings plants & animals. As part of the growing industrialization, there are various chemical industries located at Ambernath Maharashtra Industrial Development Corporation (MIDC) zone. The various chemical effluents from different chemical industries are discharged into the Waldhuni and Ulhas rivers. This results in the rise of the water pollution of these rivers. The present studies involve observations which were carried out post lockdown due to the Covid pandemic. The results obtained were very alarming with reference to the standards set by the Environmental Pollution Act, the Central Pollution Control Board (CPCB) the Maharashtra Pollution Control Board (MPCB) The instrumental spectroscopic techniques were carried out to estimate quantitatively certain chemical species. The instrumental methods are preferred over conventional volumetric and gravimetric estimation with respect to accuracy, sensitivity reproducibility (Precision) and speed of analysis. The results obtained from the different instrumental analysis for the Waldhuni and Ulhas rivers were compared and thus provided a platform of Comparison with reference to various chemical parameters.

Keywords: Industrialization, Rivers, AAS, Spectrophotometric, Fluorescence Spectroscopy, CPCB, MPCB, EPA

I. INTRODUCTION

The qualitative and the quantitative analysis of the effluents from the chemical industries into the river bodies has always been a keen area of research. The water from the water bodies is being used for variety of purposes which can be severely affected with the pollutants present in water. Hence it is imperative to continuously monitor the quality of water so as to sustain the application of water in diversified fields.

The present study takes into account the evaluation of quality of water with respect to few parameters of essentially two rivers namely Waldhuni and Ulhas which are located around the MIDC, Ambernath. The study of quality of water samples were performed post lockdown due to the Corona pandemic. Due to the pandemic, as per the Government resolutions several industrial plants were closed down which resulted in a considerable decrease in the discharge of the effluents into these river bodies. The aim of the present study was to analyze the impact of the lockdown on the quality of water of these rivers. The comparative study of the quality of water of these rivers were being carried out through various reported instrumental techniques which is advantageous with respect to accuracy, precision and speed of analysis.

II. METHODOLOGY

The present study is limited to the evaluation of certain chemical species on the basis of spectroscopic techniques. Calcium was estimated by AAS. Ca was treated with HCl forming CaCl_2 and the estimation was carried out at 4227A with air pressure of 28psi in a reducing flame. Acetylene was used as fuel. Copper was estimated by AAS. Cu was treated with HNO_3 forming $\text{Cu}(\text{NO}_3)_2$ and the estimation was carried out at 3247A with air pressure of 28 – 30 psi in an oxidising flame. Lead was estimated spectrophotometrically. Pb reacts with dibromohydroxyphenyl porphyrin, 1:2 yellow complex and absorbance was measured at 479 nm. Cadmium was estimated spectrophotometrically. Cd forms a complex with 5,7-dibromo 8 hydroxyquinoline and absorbance was measured at 396 nm. Mercury was estimated

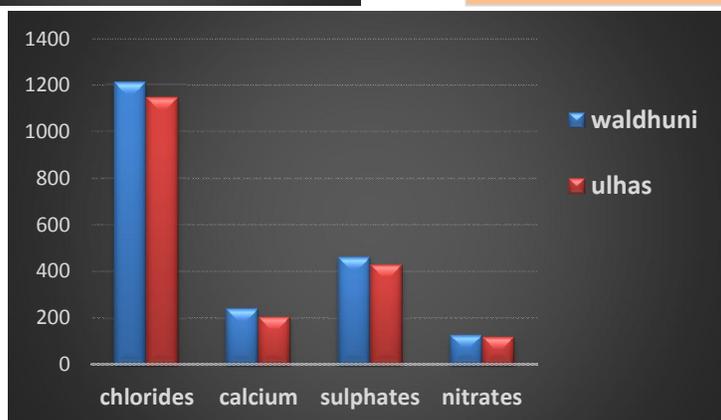
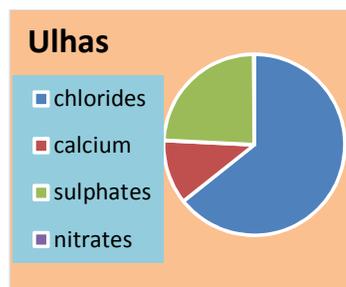
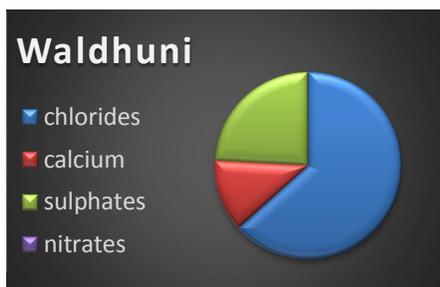
spectrophotometrically.

Various Physico-Chemical parameters were evaluated as per the standards set by Bureau of Indian Standards (BIS) pH was determined by means of electrometry using pH meter. TDS was determined by means of Gravimetric analysis. Hardness was determined by means of complexometric titration with EDTA. Biochemical Oxygen Demand (BOD) was determined by bio assay procedure. Chemical Oxygen Demand (COD) was determined by volumetric analysis using Ferrous Ammonium sulphate and Ferroun indicator. Total alkalinity was determined potentiometric and indicator methods.

III. RESULTS

The results obtained for the water samples from the Waldhuni river and Ulhas river are tabulated as below

Species	Units	Values (Waldhuni)	Values (Ulhas)	Permissible limits
Calcium	Ppm	240	205	200
Copper	Ppm	1.9	1.7	1.5
Lead	Ppm	0.09	0.06	0.05
Cadmium	Ppm	0.02	0.015	0.01
Mercury	Ppm	0.0014	traces	0.001
Aluminium	Ppm	0.36	0.28	0.2
Chloride ions	Ppm	1210	1145	1000
Sulphate ions	Ppm	460	430	400
Nitrate ions	Pppm	128	120	100
Nitrate Nitrogen	Ppm	14	11	10



IV. CONCLUSION

As per the results obtained it seems that water sample of Waldhuni river is more polluted than ulhas river. Many procedures as directed by the Environmental Protection Agency (EPA) and Maharashtra Pollution Control Board (MPCB) must be strictly adhered. On the basis of the findings, it is proved that quality of water of Waldhuni river with respect to the various parameters are beyond the permissible levels as compared to the Ulhas River. These studies can also be related to the qualitative and the quantitative pollutants present in the effluents which being discharged into the river bodies. However, it was also observed that the water quality of a particular river before and post lockdown was improved. This type of comparative studies can be the basis of the future scope of this research to ascertain the influence of the industrial effluents on the quality of water of particular river body.

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REFERENCES

- [1]. Adefemi S. O. and E. E. Awokunmi, (2010), Determination of Physico-chemical parameters and heavy metals in water samples from Itaogbolu area of Ondo-State, Nigeria, African
- [2]. Journal of Environmental Science and Technology, 4(3), pp 145-148. 2. Adeyeye EI, (1994),
- [3]. ASTM International, (2003), Annual Book of ASTM Standards, World Health Organization (W.H.O.) (1998) Guideline for drinking water quality.