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Performance of sewage treatment plant with special reference to Badwai (STP) Bhopal, (INDIA)

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ABSTRACT

Water resources on earth are diminishing rapidly and human activities continue to affect detrimentally the quality and quantity of existing fresh water resource. In the most common usages, waste water refers to the municipal waste water that contains a broad spectrum of contaminants resulting from the mixing of wastewaters from different sources. Present paper deals with the Hardness removal from municipal wastewater at sewage treatment plant (STP) Bhopal. Six samples were collected from inlet and outlet of Sewage Treatment Plant (STP) and analyzed for Total hardness, calcium hardness and magnesium hardness. Comparison between the hardness at inlet and outlet of STP shows that hardness reduces after the treatment. The treated wastewater can be used for irrigation purposes.

Keywords: Wastewater, STP, Total hardness, Calcium hardness and Magnesium hardness.

INTRODUCTION

Hard water in interferes with almost every cleaning task from laundering and dishwashing to bathing and personal grooming. Clothes laundered in hard water may look dingy and feel harsh and scratchy. Dishes and glasses may be spotted when dry. Hard water may cause a film on glass shower doors, shower walls, bathtubs, sinks, faucets, etc. hair washed in hard water may feel sticky and look dull. Dealing with hard water problems in the home can be a nuisance. The amount of hardness minerals in water affects the amount of soap and detergent necessary for cleaning. Soup used in hard water combined with the minerals to form s sticky soap curd. Wastewater is any water that has been adversely affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture and can encompass a wide range of potential contaminants and concentrations. In the most common usage, it refers to the municipal wastewater that contains a broad spectrum of contaminants resulting from the mixing of wastewaters from different sources [1]. Sometimes,

industrial wastewaters are treated partially before their discharge into sewers, or else are treated separately through suitable treatment processes so that the treated effluent is safe [2]. Industrial wastewater disposal needs proper considerations from the points of view of manufacturer, public and the sanitary engineer alike. From the public point of view, industrial wastes cause pollution to stream making it unfit for domestic, recreational and commercial purposes, deteriorate sewers and treatment, and increase cost of treatment.

EXPERIMENTAL SECTION

The present sewage treatment plant (Badwai) is situated at a geographical location of coordinates 23^{o} 15' 44'' N, 77^{o} 28' 23'' E. Badwai sewage treatment plant receives the wastewater generated in CTO, Hemu Colony, Beta village, Koh-e-fiza etc areas. Badwai sewage treatment plant is designed to treat 16.67 MLD sewage. The Badwai STP is based on waste stabilization technique using anaerobic and facultative ponds.

Wastewater samples were collected from influent and effluent of sewage treatment plant (STP) from January to December 2010. Samples were analyzed to determine the efficiency of the treatment plants in removing those parameters from the influents to effluent of STP. Samples were collected in glass containers, precleaned by washing with non-ionic detergents, rinsed in tap water, in 1:1 hydrochloric acid and finally with deionised water before usage. Before sampling, the bottles were rinsed three times with sample water and then filled and Total hardness, calcium hardness and magnesium hardness were analysis in the analytical laboratory according to the methods prescribed in the APHA [3].

RESULTS AND DISCUSSION

The waste water quality analysis of different locations, namely, influent and effluent of sewage treatment plant Bhopal twelve months from January to December 2009 has been carried out physicochemical parameters like, total hardness, calcium hardness and magnesium hardness were analyzed and results are given in Table – 1.

Table-1 Physicochemical parameters of Influent and Effluent of sewage treatment plant (STP).

Parameters/ Months		Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Total Hardness	Influent of STP	312	352	322	382	342	358	424	438	364	334	376	306
	Effluent of STP	162	202	188	224	198	206	268	262	208	200	222	160
Calcium Hardness	Influent of STP	210	228	218	236	216	228	256	262	224	220	232	212
	Effluent of STP	102	128	116	134	116	128	152	158	122	112	130	98
Magnesium Hardness	Influent of STP	102	124	104	146	126	130	168	176	104	114	144	94
	Effluent of STP	60	74	72	90	68	78	116	104	86	88	92	62

Total Hardness

In investigation period Total hardness varied from 306 mg/l to 438 mg/l in the influent and 160 mg/l to 268 mg/l in the effluent water. The minimum value was observed in month of December while maximum value was observed in the month of August in the influent water of sewage treatment plant. The minimum value was observed in month of December while maximum value was observed in the month of July in the final treated effluent water of sewage treatment (Fig-1).The value of hardness coincided with findings of Sharma [4,5]. The harness of water is mainly governed by the contents of Ca and Mg which largely combined with bicarbonates an carbonates (temporary hardness) and with sulphates, Chloride and others anions of minerals (permanent

hardness) [6] also reported that high values of hardness are probably due to the regular addition of large quantities of sewage and detergents in the water body from the nearby residential localities.

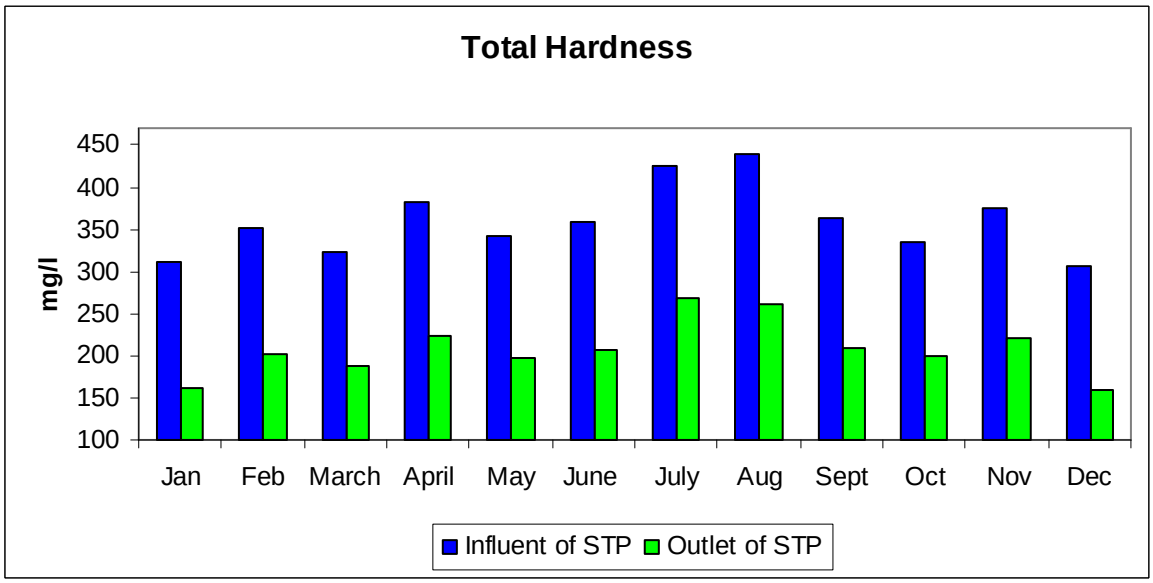

Figure-1 Variation of Total Hardness in influent and effluent of sewage treatment plant (STP).

Calcium Hardness

In the present study period Calcium hardness varied from 210 mg/l to 262 mg/l in the influent and 98 mg/l to 158 mg/l in the effluent water. The minimum value was observed in month of January while maximum value was observed in the month of August in the influent water of sewage treatment plant. The minimum value was observed in month of December while maximum value was observed in the month of August in the final treated effluent water of sewage treatment (Fig-2). Calcium is essential for the organism as it regulates various physicochemical functions. It is required as micronutrient for algae also, through it is known to be essential nutrient for the metabolisms of plants. [7] Categorized water bodies as "Calcium rich" having Calcium values >25 mg/l. The present studies corroborate the finding of [7].

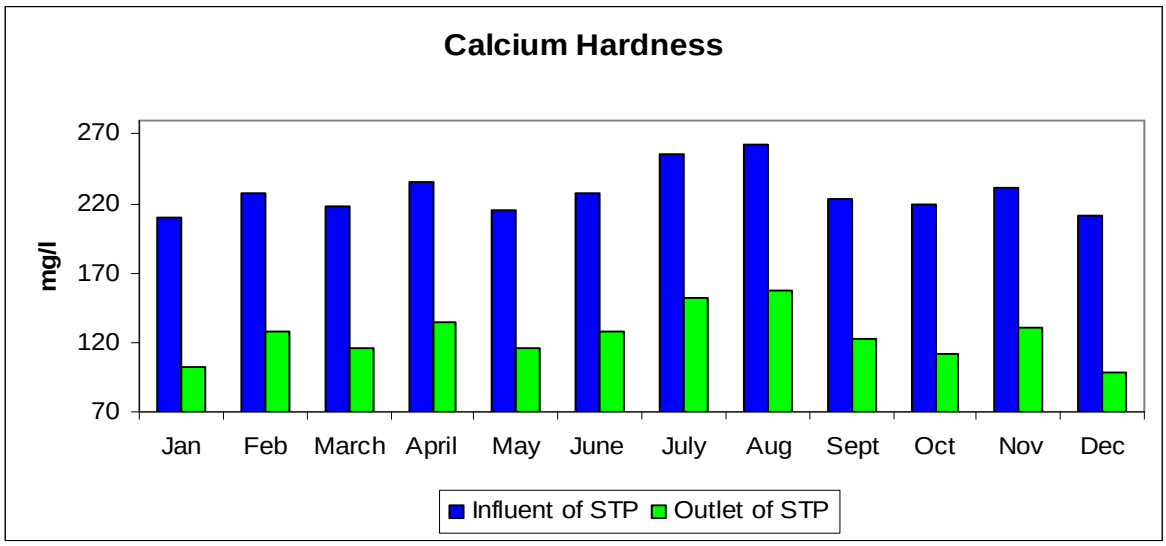

Figure-2 Variation of Total Hardness in influent and effluent of sewage treatment plant (STP).

Magnesium Hardness

In the present study period Magnesium hardness varied from 94 mg/l to 176 mg/l in the influent and 62 mg/l to 104 mg/l in the effluent water. The minimum value was observed in month of December while maximum value was observed in the month of August in the influent water of sewage treatment plant. The minimum value was observed in month of December while maximum value was observed in the month of August in the final treated effluent water of sewage treatment (Fig-3). [8] recorded direct relationship between organic matter and Magnesium.

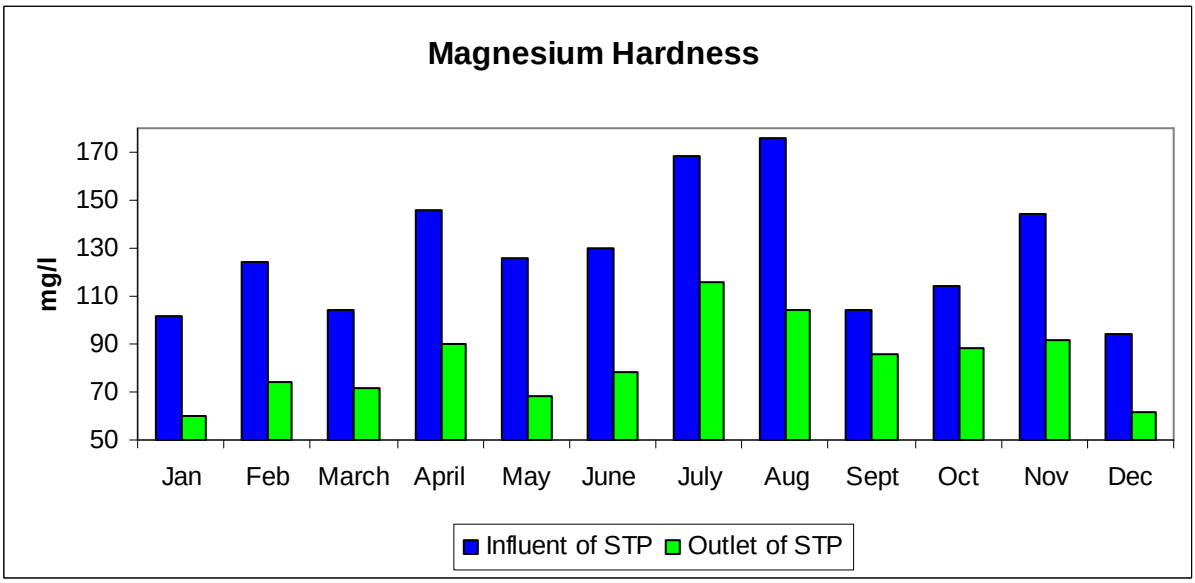

Figure-3 Variation of Total Hardness in influent and effluent of sewage treatment plant (STP).

CONCLUSION

The present study reveals that the assessment of water quality deterioration is due to various location of sewage treatment plant (STP) Bhopal. Wastewater quality of the Bhopal city was evaluated which was capable to remove Total hardness, Magnesium hardness and Calcium hardness. From the studies it was prove that high concentration in the inlet of sewage treatment plant and Better water quality was found after treatment in effluent water. Instead of discharging the sewage onto the nearby body of water, it is proposed to let it pass through sewage treatment plant that would remove most of pollutant. So the sewage treatment is essential for maintaining the water quality. And final treated wastewater can be used for irrigation purposes.

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