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Residual Chlorine Concentrations in Underground Water Samples Collected From Tube Wells of Nipani Town

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Abstract:

Human impact on nature has risen dramatically as the scope and intensity of human activities has increased. Although there has been progress recently in tackling air and water pollution problems in some countries many negative trends, such as loss of tropical forests and contaminated water are more acute. Hence, In our study, the ground water samples were taken from twelve tube wells from Nipani town and analyzed every month throughout the year. The results revealed that the ground water from the localities near the industries and sewage disposal sites contained residual chlorine (25-28 mg/l). The seasonal analysis indicated that the levels of residual chlorine were generally least in summer and more in winter season and low during rainy season. The higher level of residual chlorine at winter season deteriorate quality of groundwater in the vicinity of Nipani town, making it unfit for drinking purpose, which can be serious problem in future. During present investigation groundwater pollution was evaluated with the measurement of levels of residual chlorine contents.

Keywords: Underground water, Pollutants, Residual Chlorine, tubewell, sewage.

1.0 Introduction:

Cities and engines of economic development and failure to manage the impact of rapid urbanization, Threatens human health, environmental quality and urban productivity. Immediate and most critical environmental problems facing most cities in India are lack of safe drinking water. In the present study, the levels of residual chlorine were studied in the vicinity of Halsiddhnath Sugar Factory located at Nipani. The underground water samples were taken form twelve underground tube wells in the glass bottles following standard procedure. Samples were taken from twelve underground tube wells, which are located at 1. Nirmal Mal 2.Bhim nagar 3. Shivaji nagar 4. Ramling temple 5. Ganeshwadi 6.Walve plot 7. Kamgar chowk 8.Andolan nagar 9. Patankar galli 10. Bagwan galli 11.Jamdar plot 12. Janata housing colony. The samples were collected every month through the year and analyzed in the laboratory for the levels of residual chlorine.

The present study was carried out from Nipani urban area on the "Surface and Underground Water Quality Assessment in the Vicinity of Sugar Factory." The aim and objective of the present study was to assess the impact of urbanization and developmental activities of rapidly growing Nipani on Human health, The quality of surface and underground water and to locate the various sources and types of pollutants responsible for changes in surface and underground water quality.

2.0 Methodology for Determination of Residual Chlorine:

Chlorine is primarily added for destroying the harmful microorganisms. However, excess chlorine is harmful to many aquatic organisms. Presence of excess of chlorine in water interferes with its colour and taste at times initiating to throat. Chlorine is a strong oxidizing agent and liberates iodine from potassium iodide solution. The liberated iodine is equivalent to the amount of chlorine and can be titrated against sodium thiosulphate using starch as an indicator.

An aliquot of 100 ml water sample was taken in a conical flask. The pH of the solution was maintained between 3 to 4 with addition of 5ml acetic acid. Approximately 1.0 gm of KI crystals were added in the solution and mixed thoroughly with a stirring rod for about 15 minutes. The solution was kept away from direct sunlight, a few drops of starch were added to it. The solution was then titrated immediately against sodium

thiosulphate solution till colour changes from colourless to blue.

Residual Chlorine (mg/l) = AxNX1000X35.5/ 100

Where
A = ml of titrant
N= Normality of sodium thiosulphate solution (0.025N)

3.0 Results:

The analysis of residual chlorine is usually done in the treated drinking water to verify its level, which inhibits the growth of pathogenic organisms. In this case, however, attempts were made to know the level of residual chlorine in surface waters to assess natural and manmade contributions. Most of the samples except at site 5 and 12 showed total absence of chlorine indicating that there is no natural mechanism for inhibiting the growth of pathogens in surface water that is pond water. The minimal of 0.47 mg/l and maximal of 131.69 mg/l residual chlorine was observed. Profile of seasonal averages reflected least 5.04, 4.35 and 3.40 mg/l in summer, more 4.03, 4.00 and 3.63 in winter season and low 3.47, 3.35 and 3.11 during rainy season. The average concentration of residual chlorine is higher than the desirable limit, because of high load of discharge of industrial effluent in the present study. Higher residual chlorine level observed during winter season as compared to summer season and followed in rainy season at various sampling stations due to waste material brought in during rainy season which gets deposited along the banks during summer, coupled with low microbial activity (Table 1 and 2)

Table 1: Residual Chlorine (mg/lit) in pond water samples during the monitoring period (January 1999 to December 1999)

Stations	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	3.20	3.40	3.35	7.25	0.00	15.24	16.50	12.45	10.38	7.25	6.65	10.50
2	4.45	4.42	6.30	3.25	0.00	0.00	4.40	4.25	4.55	6.50	6.25	6.45
3	1.70	33.02	4.80	8.40	17.50	37.50	5.38	4.90	0.00	4.75	12.37	6.45
4	20.04	40.32	29.80	8.64	43.50	36.75	8.80	4.50	39.40	36.07	19.06	40.25
5	16.78	12.24	15.40	5.60	18.21	20.21	5.35	17.87	16.25	17.87	17.55	18.25
6	4.69	9.52	4.69	5.55	4.87	0.00	1.68	16.72	17.45	16.70	6.20	6.52
7	0.62	1.70	0.00	0.00	4.12	4.15	0.00	5.12	7.25	5.12	0.69	5.18
8	1.38	3.34	10.50	0.00	3.33	.25	0.00	6.67	5.43	6.67	4.32	5.40
9	1.67	4.45	7.28	7.24	0.00	8.72	8.20	5.30	0.00	5.30	5.34	6.40
10	1.30	3.32	4.40	4.18	4.12	4.25	4.27	5.78	6.63	5.78	1.68	1.74
11	0.66	.95	3.35	5.52	0.00	4.51	4.35	2.30	1.78	2.30	.85	5.20
12	1.40	4.80	3.70	3.26	2.62	4.70	8.32	3.40	6.41	3.40	4.70	3.30

Table 2: Chemical Oxygen Demand (mg/lit) in pond water samples during the monitoring period (January 1999 to December 1999)

Stations	Average	S.D
1	8.01	5.13
2	4.46	2.29
3	11.76	12.25
4	27.25	14.32
5	13.63	5.61
6	6.74	5.38
7	2.41	2.60
8	4.13	2.98
9	5.10	3.02
10	3.61	1.72
11	3.44	1.84
12	4.49	2.00

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