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Impact of Effluents of Agro-based Industries on Groundwater Quality of Nizamabad District

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Abstract: Ground water quality is important as it is main factor determining its suitability for drinking, domestic, agricultural and industrial purposes. The suitability of ground water for several purposes has been studied in the present paper by analyzing pPhysical and chemical parameters of ground water such as EC, pH, TDS, TH, Cl, DO, BOD, COD. Each parameter is compared with the standard desirable limit prescribed by WHO.

Key Words:- Ground water Quality, Agro based industries, PHysico chemical Parameters.

Introduction:-

Fresh water has become a scarce commodity due to over exploitation and pollution of water. Increasing population and necessities have lead to the deterioration of surface and sub surface water, Groundwater is the major source of drinking water in both urban and rural areas. Industrialization and urbanization have major impact on groundwater environment. Both surface and subsurface water sources are getting polluted due to developmental activities. Water Pollution is related with urbanization though rural pollution is also predominant due to modernization in agricultural practice. Ground water crisis is not the result of natural factors. It has been caused by human actions. The agro based industries are major cause for the pollution of surface and ground water. Continuous disposal of industrial effluents on land, which has limited capacity to assimilate the pollution load, has led to ground water pollution. The contamination of ground water by heavy metals and pesticides has assumed much significance during recent years due to their toxicity and accumulative behavior, Industrial disposal of chemicals by surface and sub surface run off, direct release into natural water bodies can be subjected to reaction with percolating rain water and reach the ground water level. The effluents from the industries greatly distress the geochemistry of soil. The discharged chemicals interact with ground water and alter PH and other water quality parameters. Polluted ground water is the cause for the spread of epidemics and chronic diseases in human.

Today we need industries for economic and commercial development which leads ultimately for social development also, but it should not be at the cost of environment. Therefore sustainable development is necessary. Ground water quality surrounding the industrial areas has deteriorated and the application of polluted ground water for potability has resulted in increased salt content of soils. Polluted ground water is the cause for the spread of epidemics and chronic disease

in human. The social relevance of the problem has encouraged us in carrying out this work. The quality of ground water has been assessed by comparing each parameter with the standard desirable limit of that parameter in drinking water as prescribed by WHO.

Experimental Section

Study Area

The PHysicochemical Parameters of ground water of 5 stations of neighboring areas of Agro based industries of Nizamabad district were considered in the present investigation. The ground water was collected from the bore wells located in the specified areas during the months of March, 2015 to May, 2015. The sampling location and source are shown in table – 1

Sl. No	Sampling Location (Neighbouring areas of)	Source
1	Sugar Industry – S1	Handpump
2	Dairy Industry – S2	Handpump
3	Starch Mill – S3	Handpump
4	Rice Mill – S4	Handpump
5	Paper Mill – S5	Handpump

Collection of Water Samples

The water samples were collected and stored in 1 litre capacity clean plastic bottles. The bottles were rinsed by the water to be sampled before sampling. The wells were duly pumped before collecting their sample so that the stagnant water if any is completely removed from storage with in the well assembly. The bottles were tightly sealed after collection and labeled in the field. The temperature of the samples were measured in the field on the spot at the time of sample collection. The pPhysical chemical parameters were analysed by standard procedures given by the Trivedi et. al. 1984.

Analysis of water samples

The pPhysical chemical parameters of ground water quality analysed were as shown in Table – 2.

Results and Discussion

The results of the physicochemical analysis of the ground water samples S1 to S5 collected from 5 stations of neighbouring areas of agro based industries of Nizamabad district are shown in Table – 3.

Temperature

The temperature was found to be in the range between

27-30°C during study. The higher value of water temperature observed in the present study could be attributed to the early summer months prevailed during the period of investigation. During Summer, water temperature is higher because of decrease in water table, clear atmosphere and great solar radiation.

Sl. No.	Parameter	Unit	Test method
1	PH	-	PH meter
2	EC	ms/cm	Conductivity meter
3	TDS	mg/L	Evaporation method
4	Total Alkalinity	mg/L	Titration method
5	Chlorides	mg/L	Argent metric Titration
6	Total hardness	mg/L	EDTA Titration
7	BOD	mg/L	5 days incubation at 20°C and titration of initial and Final DO
8	COD	mg/L	Open Reflux method

Table.2. physicochemical parameters of ground water quality

S. No	Parameter	S1	S2	S3	S4	S5	WHO
1	PH	7.7	8.0	7.6	7.3	7.4	7-8.5
2	EC						
3	TDS	1100	1000	200	700	800	500
4	Total Alkalinity	800	525	450	700	700	120
5	Chlorides	300	115	71	200	360	250
6	Total Hardness	410	160	330	170	180	200
7	Dissolved Oxygen	2	1.3	1.8	1.2	1.6	4-6
8	BOD	3.7	2.6	3.0	3.1	2.8	5
9	COD	180	134	123	178	194	250

Table .3. Comparison of Physico Chemical Parameters of ground water, Nizamabad Dist with Standard values (WHO)

pH:- PH indicates the acidity and alkalinity of water samples. The pollution load in most of the chemical industries are in large quantity in the form of acid and alkali in manufacturing unit. When pH is low or high, it can affect the germination of crop plants and decrease the productivity of crops. In the present investigation. The pH values fluctuate between 7.3 – 8.0 and shows slightly alkalinity. The pH of water is influenced by buffering capacity of water.

Total Dissolved Solids (TDS):-

The total solid concentration in waste effluent represents the colloidal form and dissolved species. In summer most vegetation is decaying, so rise in the amount of dissolved solids was neutral as the products of decaying matter which were settled in the water. TDS values observed in S1, S2, S4, S5 were above the standard desirable limit. TDS value of S3 was within the desirable limit. High TDS in ground water may be due

to ground water pollution when waste waters from industrial area are discharged into pits, ponds, lagoons enabling the waste migrate down to the water table.

Total Alkalinity (T.A):-

Alkalinity due to the presence of carbonate and bicarbonate ions. Increased alkalinity might be due to more CO₂ release in the water stream. In the present investigation the values of alkalinity are beyond the desirable limit.

Chlorides:-

The presence of chloride in the natural water can be attributed to dissolution of salt deposits discharged of effluents from chemical industries. The values of chlorides observed in S2, S3, S4 are within the permissible limits. The presence of chlorides in higher amounts in S1 and S5 may be due to pollution from industrial waste.

Total Hardness:-

The total hardness is due to concentration of calcium and Magnesium ions expressed in terms of calcium carbonates. The total hardness in S1 is due to excessive use of lime in sugar processing. The observed total hardness values were well within the limits.

Dissolved Oxygen:-

Dissolved Oxygen in water body is very good indicator of water quality. The organic pollutants present in the effluents create an oxygen demand. The study reveals that the observed Do values are lower than permissible limit which indicates that there is lot of pollution.

Biochemical Oxygen demand (BOD):-

The Biochemical Oxygen demand is a measure of organic biodegradable material in water. The values obtained in the present study were above the desirable limits.

Chemical Oxygen Demand (COD):-

The observed COD values in all 5 stations are above the desirable limits.

Conclusion

The present study reveals that the effluents released from different Agro based industries have a significant negative impact on the water quality. It is concluded that ground water of neighboring areas of agro based industries of Nizamabad district need treatments to minimize the contamination. There is a need to increase awareness among the people to maintain the ground water at their highest quality and purity levels.

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