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Study of chemical Properties of ground water in Pravara area in Ahmednagar Dist., India

Kharde A.K.
Department of Chemistry, Arts, Science and Commerce College, Kolhar, Tal: Rahata, Ahmednagar, MS, INDIA

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Abstract

Water from wells is the mostly the source of drinking water for Pravara area. Some villages use bore well water for drinking. Pravara River which runs from most part of Pravara area contaminates the well water. Also bore well water for most part of region is found to be salty. This water is unhealthy for living part of environment. For this study we have collected 10 samples from the region and analyzed some essential parameter like pH, electrical conductivity, TDS, Alkalinity, Dissolved oxygen, Biochemical oxygen demand, Total Hardness, Calcium, Magnesium, chloride, sodium, potassium, carbonate.

Keywords: Chemical parameter, contamination, Groundwater.

Introduction

Groundwater is generally used as source of drinking water. The increasing demand of this source of water is due to increase in population, high standard of living and industrialization. At the same time above factor results in to pollution of the source day by day. Other factors contributing to pollution of source are excess use of fertilizers and pesticides[1]. The quality of contaminated sources cannot be regained even by stopping further addition of pollutants. Hence regular monitoring of groundwater is essential. For current study we have selected ten villages on the bank of Pravara River which are affected by river water. The villages like Dadh, Hanmantgaon, Pathare, Kolhar, Songaon, Rampur, Galnimb, Fattyabad, Chincholi, and Davangaon.

Table-1

Sample 1	Dadh	Sample 6	Rampur
Sample 2	Hanmantgaon	Sample 7	Galnimb
Sample 3	Pathare	Sample 8	Fattyabad
Sample 4	Kolhar	Sample 9	Chincholi
Sample 5	Songaon	Sample 10	Davangaon

Material and Methods

All the underground water samples were taken from 10 bore wells in selected station of Pravara area in month of March 2013. Samples were collected in polythene bottles. These samples were analyzed by using standard methods APHA [2,3].

pH was measured with the help of pH meter at 30^0C. The pH meter is previously standardized with the help of pH buffers of 4.0 to 7.0 pH units. Conductivity is measured with the help of conductivity meter. Total dissolved solid and alkalinity were determined by using soil water analysis kit. Dissolved oxygen and Biochemical oxygen demand were analyzed by using titrametric method. Calcium, Magnesium, chloride, carbonate analysis is done by using volumetric titration method. Sodium and potassium were analyzed by Flame photometry[3,4].

Results and Discussion

pH: The pH value of ground water sample ranges between 6.8 to 9.1.The standard pH value for drinking water is in between 6.5 to 8.5 pH units [5].The pH value of groundwater sample no.7, 8 and 9 show higher than prescribed limit and indicate that water is slightly alkaline.

Electrical conductivity: Electrical conductivity is useful tool to evaluate the purity of water. Electrical conductivity of ground water is varying from 810 mS/cm to 2556 mS/cm; prescribed limit of Electrical conductivity in drinking water is 2250mS/cm[4]. The sample no. 5 and sample no. 9 have EC value greater than permissible limit.

Total dissolved solid: Total dissolved solid means small amount of inorganic and organic matter that are dissolved in water. When the water sample is heated to dryness weight of residue left is TDS [6]. TDS value of these water samples are in between 379 mg/lit to 1319 mg/ lit. The standard value for TDS is up to 500 mg/lit [7] and maximum permissible quantity is 2000 mg/lit.

Alkalinity: Total alkalinity of groundwater sample ranges from 105 mg/lit to 223 mg/lit. The high value of alkalinity is due to various salts like phosphate, borate, hydroxide, calcium, sodium, bicarbonate and high temperature in summer[8].

Table-2
Physico-chemical parameters of ground water in Pravaranagar region

Sr. No.	Parameters	Sample-1	Sample-2	Sample-3	Sample-4	Sample-5	Sample-6	Sample-7	Sample-8	Sample-9	Sample-10
1.	pH	7.02	8.21	8.23	6.80	8.35	7.80	8.56	8.70	9.10	7.97
2.	EC mS/cm	927	1025	1470	1218	2387	1667	1138	810	2556	894
3.	TDS mg/lit	785	379	827	478	1319	647	491	1179	1218	567
4.	Alkalinity mg/lit	117	203	207	105	211	188	156	219	223	197
5.	DO ppm	2.92	4.71	3.65	3.28	6.24	4.85	4.91	6.86	7.36	5.34
6.	BOD ppm	3.14	3.74	4.16	2.96	4.26	3.66	3.55	4.65	4.97	3.99
7.	Calcium mg/lit	176	192	155	198	187	201	238	205	224	219
8.	Magnesium mg/lit	86	105	125	83	78	82	90	85	102	79
9.	TH mg/lit	262	297	280	281	265	283	328	290	326	298
10.	Sodium mg/lit	28	39	35	29	41	38	31	43	46	41
11.	Potassium mg/lit	7	8	10	7	9	8	10	11	12	13
12.	Carbonate mg/lit	3.1	4.3	4.5	2.7	4.1	3.7	4.9	4.7	5.2	3.5
13.	Chloride mg/lit	140.5	241.8	174.1	194.3	235.0	99.5	217.9	287.3	187.5	310.1

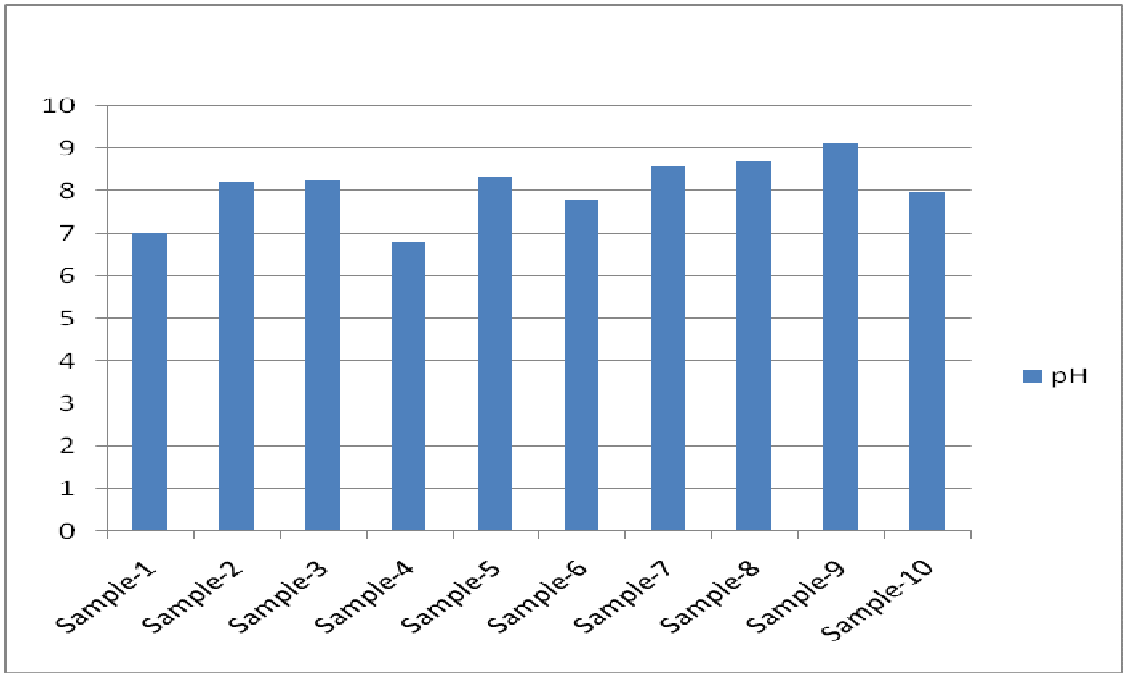

Figure-1
Figure-1 pH value of ground water samples

Dissolved oxygen: The D.O content of ground water varies from 2.92 ppm to 7.36 ppm.

Biochemical oxygen demand: The B.O.D of groundwater is ranges from 2.96 ppm to 4.97 ppm. The water having BOD less than 4 ppm are considered to be clean water, where as water having BOD greater than 10 ppm are considered to be polluted water[9].

Calcium: Calcium concentration in groundwater sample ranges from 155 mg/lit to 238 mg/lit. The observed range of values is within the limit approved by ICMR except sample no.6, 7, 8, 9, 10.

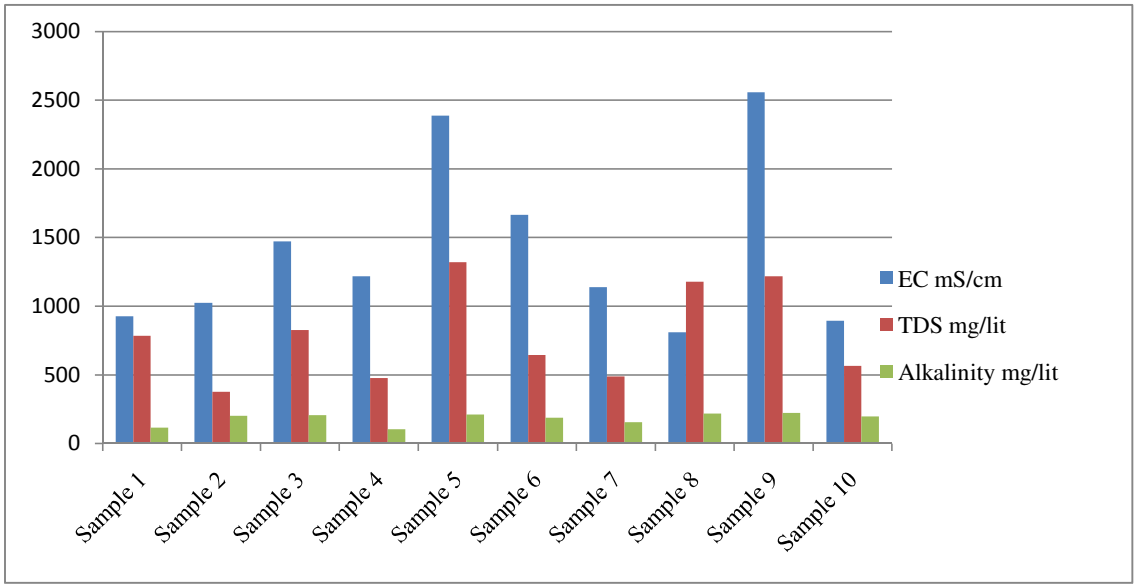

Figure-2
EC,TDS and alkalinity value of ground water samples

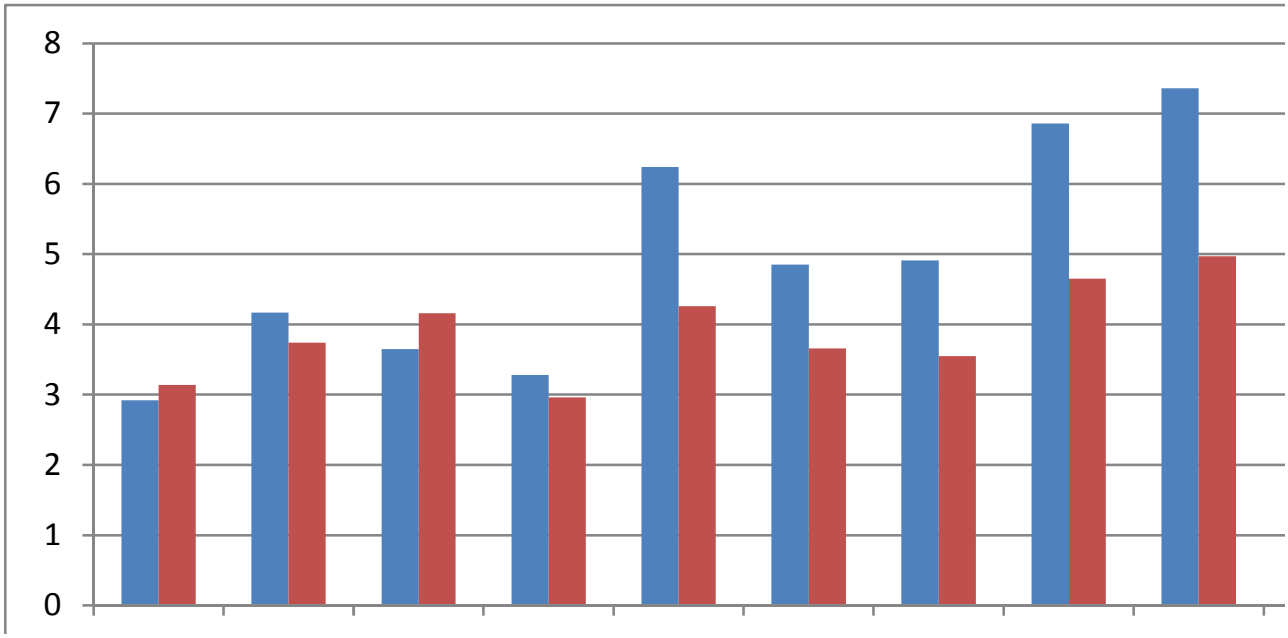

Figure-3
DO and BOD value of ground water samples

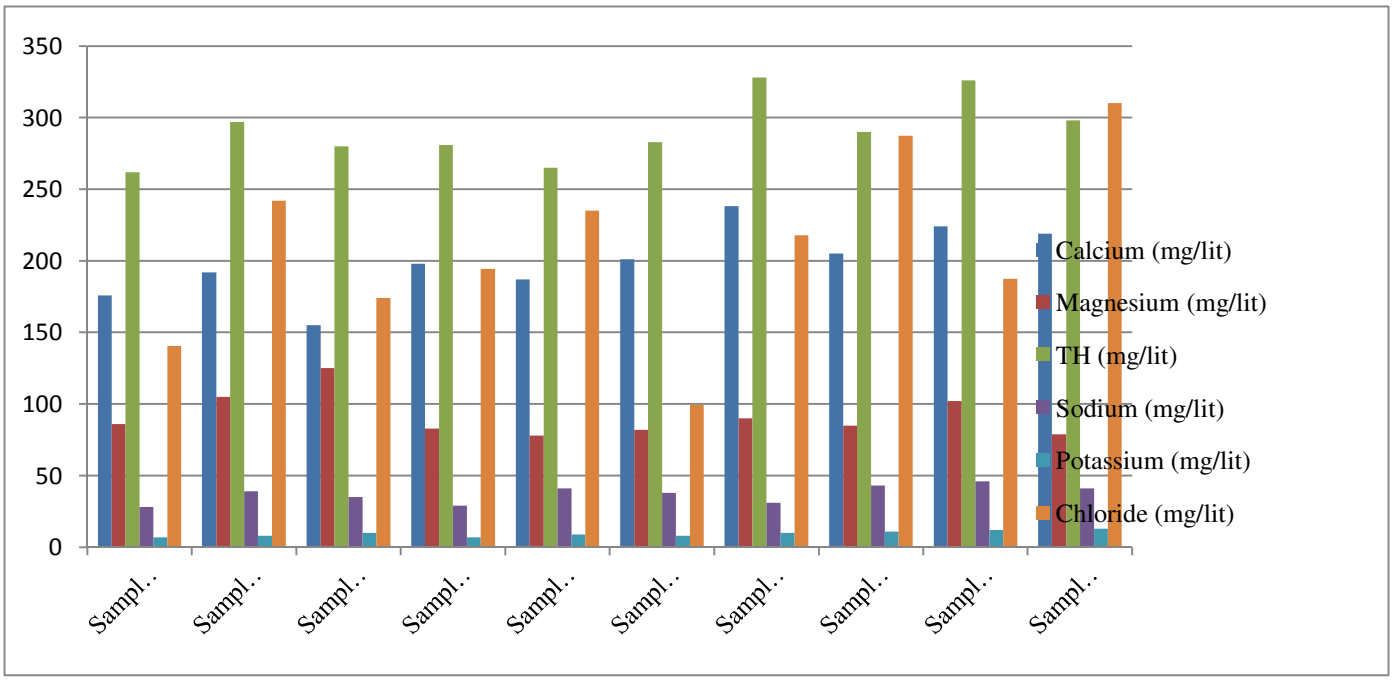

Figure-4
Calcium, Magnesium values of ground water samples

Magnesium: Magnesium concentration varies from 78 mg/lit to 125 mg/lit and these values are within permissible limit approved by ICMR.

Total Hardness: Total Hardness in water is due to calcium and magnesium and all other cations except alkali metals. Total Hardness is varying from 262 mg/lit to 328 mg/lit. The observed range of values are within the limit approved by ICMR[3,10] except sample no. 7 and sample no. 9 .These two water samples are considered as hard water.

Sodium and Potassium: Large amount of sodium and potassium present in water, it combined with chloride to give salty test to water. If these are present in moderate quantity this water is useful for most purposes. Sodium concentration of groundwater samples is varying from 28 mg/lit to 46 mg/lit. Potassium concentration of groundwater sample is varying from 7 mg/lit to 13 mg/lit.

Carbonate: Carbonate concentration of groundwater samples are varying from 2.7 mg/lit to 5.2 mg/lit.

Chloride: Chloride concentration of groundwater sample is varying from 99.5 mg/lit to 310.1 mg/lit. The chloride concentration in groundwater above 100 mg/lit gives salty taste to water. Chloride when combine with calcium and magnesium may increase the corrosive activity of water. It is recommended that chloride content should not exceed 250 mg/lit.

Conclusion

The analysis of groundwater sample of Pravara area shows that pH of sample no.7, 8 and 9 are above the prescribed limit. The sample no.5 and 9 have electrical conductivity greater than prescribed limit. Total Hardness of sample no. 7 and 9 has exceeded the prescribed limit .Calcium concentration in groundwater sample no. 6,7,8,9,10 are above the prescribed limit. These sample required treatments to minimize the contaminations. The value of all other parameters of groundwater samples are well within the prescribed limit.

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