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Physico-Chemical Analysis of Drinking Water of Sanand District Villages

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ABSTRACT: Physico-chemical analysis such as temperature, pH, dissolved Oxygen, TDS, Chloride, Total Alkalinity, Calcium and Magnesium hardness, Sulphate, Phosphate, Nitrate and fluoride of borewells, wells and lacks drinking water has been carried of fifteen villages of Sanand District of Gujarat area during January 2015 in order to assess water quality index.

Keywords: Physico-Chemical analysis,Sanand, Complexometric, Chloride.

INTRODUCTION

Physico-chemical analysis of drinking water of Sanand district of Gujarat state has been investigated intensively[1-3]. Bore well water is generally used for drinking and other domestic purposes in this area. The use of fertilizers and pesticides, manure, lime, septic tank, refuse dump, etc. are the main sources of bore wells water pollution [4]. In the absence of fresh water supply people residing in this area use bore wells water for their domestic and drinking consumption. In order to assess water quality index, we have reported the physico-chemical analysis of bore wells drinking water. Fluoride is found in all natural water at some concentration. In ground water however low and high concentration of fluoride can occur depending upon the nature of the rocks and the occurrence of the fluoride – bearing minerals. Fluorosis has been described as an endemic of tropical climate[5].The main sources of fluoride intake is water[6].In low concentration of fluoride prevent dental caries. However it has been observed that when fluoride intake through water, food and air increases to a specific level (1.0-1.5 mg / l.) the beneficial effect is lost and in fact harmful effect being to show with increasing concentration (above 1.5 mg / l.). Excess intake of fluoride beyond permissible limit bring out dental and skeleton fluorosis along with some neurological disorder. Higher concentration of fluoride alsocauses respiratory failure, fall of blood pressure and genera paralysis. Continuous investigation nonfatal dose of fluoride causes permanent inhibition of growth. Fluoride ions inhibit a variety of enzymes often by forming complexes with magnesium ion and other metal ions[7].

According to Water and River Commission Western Australia ground water occupies the pores and crevices in sand, sand stone and other rocks[8]. The crucial role which ground water plays as decentralized sources of drinking water for millions of rural and urban families cannot be overstated[9]. Rao *et al.* reported that about 80 percentage of the diseases in the world are created because of poor quality of drinking water[10]. The quality of the ground water cannot be restored by stopping the pollution if it is contaminated once. Water quality index is very important tool for the information on water quality[7-10]. Some important ratings are given below:

Nonfatal dose of fluoride causes permanent inhibition of growth. Fluoride ions inhibit a variety of enzymes often by forming complexes with magnesium ion and other metal ions[7].

Table 1

Parameter	*Desirable Limit*	*Permissible Limit*	*Moderately safe*	*Unsafe*
Fluoride(ppm)	1.0	1.5	1.5-2.0	>2.0
RSC(Meq./L)	1.0	<1.25	-	>2.50
SAR	5.0	<10	10-18	>26
ECm moh/cm	0.0-0.5	0.0-0.75	0.25-0.75	>2.25

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Table 2
Result of analysis of samples collected in January- 2015

No	Village	Temp C^0	H P	TDS	D.O. mg/L	Chloride mg/L	Total Alkalinity	Ca^{+2} Hardness mg/L	Mg^{+2} Hardness mg/L	SO_4^{-2} mg/ml mg/L	Po_4^{-3} mg/L	NO_3^{-1} mg/ L
1	Fangdi	30.2	7.3	255	7.6	27.22	328	35.13	68.45	345.36	8.4	150
2	Bhavanpur	30.5	7.5	300	8.1	56.40	160	26.3	7.88	46.23	8.2	130
3	Navapura	30.1	7.3	415	6.7	63.15	514	27.5	45.32	269.54	4.5	100
4	Vinchhiya	31.0	7.5	315	6.3	45.12	327	33.14	88.32	278.30	42.5	442
5	Chharodi	29.9	6.9	361	7.5	65.23	256	45.2	20.2	85.31	33.4	206
6	Hirapur	29.4	7.2	500	8.1	304.30	487	54.3	156.18	301.25	7.6	404
7	Changodar	30.7	8.0	1420	7.8	316.44	345	35.15	13.25	364.27	24.5	156
8	Goraj	31.1	7.1	530	4.4	167.15	652	55.23	29.36	287.65	52.9	283
9	Matoda	27.0	7.5	1413	7.5	163.15	584	63.14	123.65	263.29	22.8	172
10	Vasodra	30.5	7.3	362	7.9	286.25	458	8.45	66.25	341.23	3.6	164
11	Zamp	33.0	6.8	1355	8.2	174.14	549	36.16	132.23	256.32	55.0	334
12	Sanand	29.9	7.4	412	6.8	555.32	748	88.70	81.36	348.36	49.3	450
13	Khoda	31.2	8.0	1450	6.9	45.66	748	55.21	155.42	368.52	38.2	201
14	Rampura	30.5	7.3	800	7.2	57.82	461	43.21	20.56	356.21	55.0	209
15	Manipur	31.4	7.6	750	7.5	569.52	376	56.41	30.54	236.5	26.3	383

RESULT & DISCUSSION

Chlorides : In the present study chloride ranged from 27.22 to 569.52 mg/Lwhile thetolerance range for chloride is 200 – 1000 mg/L.

Total Alkalinity : The total alkalinity content in the samples is in between 160 to 748 mg/L.

Calcium Hardness : The calcium hardness ranged from 8.45 to 88.70 mg/L. The tolerancerange for Ca hardness is 75 – 200 mg/L.

Magnesium Hardness : The Magnesium hardness ranged from 7.88 to 155.42 mg/L. Thetolerance range for Mg hardness is 50 – 100 mg/L.

Sulphate: The Sulphate ranged from 46.23 to 368.52 mg/L. The tolerance range for SO_4^{-2}is200 – 400 mg/L.

Phosphate : Phosphate ranged from 3.6 to 52.9 mg/L. The evaluated values of phosphate in thepresent study are higher than the prescribed values. The higher values of the phosphate are mainly due to the use of fertilizers and pesticides by the people residing in this area. If phosphate is consumed in excess, phosphine gas is produced in gastro-intestinal tract on reaction with gastric juice.

Nitrate : The Nitrate ranged from 100 to 442 mg/L. The tolerance range for Nitrate is 20 – 45mg/ L.

Nitrate nitrogen is one of the major constituents of organism along with carbon and hydrogen as amino acids proteins and organic compounds in the bore wells water. If the nitrate reduces to nitrite, then it causes methaemoglobinaemia in infants and also diarrhea.

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