



Research paper

Investigation about Water Quality at Madurai, Tamilnadu, India

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ARTICLE INFO

Keywords:

*Water analysis
standards of drinking water
bore well
quality of water*

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Received: 20 February, 2022

Accepted: 14 March, 2022

Available online: 25 June, 2022

ABSTRACT

Physic-chemical factors' check for water in 6 region at Madurai have been performed. Five samplings have been selected from bore well, and a Company pipe supply. The chemical grade has been compared by the drinking water grade criteria. Some factors such as pH, turbidity, chloride, electrical conductivity, sulfate, whole hardness, dissolved oxygen, whole dissolved solids, biochemical oxygen demand and alkalinity have been investigated. The investigation demonstrates that the bore well water excluding at site S_3 is unsuitable to drink. Company pipe supply water and bore well water sampling of S_3 could be utilized to drink objective water after pretreatment.

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Introduction

Madurai is one of the significant city in Tamil Nadu. It is located on the Tamil Nadu center and is nicely joined with rail, air and road. Every day, many of people see the Meenakshi temple, because it is one of the ancients and significant visitant centers. Vaigai is a river in Madurai that stays dried for most time of the year. Therefore, the major water resource is bore well water. While, the quality of water is so inadequate by salty flavor in many areas. For aim of drinking, people are relies on Company water supply. In most areas in the city, water is given via pipeline, and in different areas, water is provided by trick. The bore well water with salty flavor isn't suitable to drink and in some areas

the water is tasteless. The quality of water isn't apparently comprehended since of no prior investigation. Therefore, physic-chemical study has been performed on 5 bore well water and the Company water supply.

Methodology

Sampling

Bore well water samplings and Company water supplied with pipeline in Madurai have been organized in high quality plastic bottles with a capacity about a liter after irrigating them by distilled water and three with the water sampling before accumulation. The area and resource of water samplings are presented in Table 1.

Table. 1. Area and resource of water samplings in Madurai

Sampling code	Area	Resource
S_1	Old Kuyavar Palayam	Bore well
S_2	Krishnapuram Third Cross Street	Bore well
S_3	Pauthadi Second Street	Bore well
S_4	Old East Madurai Station Road	Bore well
S_5	St. Mary's Dairy	Bore well
S_6	Corporation Supply	Pipe supply

Analysis of Water

Samplings have been got to the lab and the factors such as pH, electrical conductivity and water samplings dissolved solids have been calculated instantly. Other physic-chemical factors have been investigated in 36 h. Standard techniques have been assumed for the water samplings analysis (APHA 1989).

Discussion and Results

The water grade data of physic-chemical factors of the investigation are presented in Table 2. These data have been compared to Bureau of Indian Standards (BIS 1998) drinking water standards.

Table. 2. The physic-chemical factors of water samplings at the chosen areas in Madurai, by the standard amounts for comparison.

Factors	P	E	S_1	S_2	S_3	S_4	S_5	S_6
pH	6.5	9.2	8.0	7.8	8.5	8.3	7.8	8.2
EC	-	1400	1600	1750	1200	1875	2800	290
Sulfate	200	400	120	95	112	115	230	25
Chloride	250	1000	48	175	68	192	368	19
Biochemical oxygen need	-	5	5.3	2.8	4.8	1.9	4.5	7.1
Whole dissolved solids	500	1000	1125	1128	610	1100	1650	180
Total hardness	300	600	480	540	250	515	750	83
Total alkalinity	200	600	400	475	340	550	545	100
Dissolved oxygen	-	-	12.8	9.5	10.5	6.8	13.5	8.9
Turbidity	5	25	0.2	0.1	0.2	0.3	0.1	0.1
Color	-	-	Colorless	Colorless	Colorless	Colorless	Colorless	Colorless
smell	-	-	Without smell					
favor	-	-	Without favor					

Flavor and Color

The flavor, color, and smell of water samplings have been presented in the current research at the sampling place. 6 samplings of water have been discovered to be colorless and without smell. The flavor of the samplings S_2 , S_4 , and S_5 were salty.

PH

The pH mounts of the water samplings differed from 7.8 -8.5. The suggested pH amount to drink goals is in the range of 6.5 -9.2 (BIS 1998). In the current investigation, all the water samplings investigated were above the acceptable limits while within the extreme limitations. Nevertheless, higher amounts of pH quicken the scale shape in water

heaters and decrease the chlorine germicidal potential.

Electrical conductivity

The amounts of electrical conductivity differed from 290-2800 $\mu\text{mhos/cm}$. The extreme limitation is defined as 1400 $\mu\text{mhos/cm}$. Just the samplings S_3 and S_6 have electrical conductivity under extreme limitations. The high amounts of electrical conductivity in these samplings obviously demonstrate that the water from these resources isn't suitable for human use. The electrical conductivity amounts might be according to the natural concentration of ionized substances current in the water and because of the high dissolved solids in the investigation region.

Sulfate

Sulfate is an essential hardness component. Extra sulfate ions have a laxative impact and generate negative impact on human health. They create flavor in water. The highest desired limitation of sulfate in drink water is 200 mg/L and the highest acceptable limitation is 400 mg/L. Water samplings sulfate level are in the desired limitation excluding the water sampling S_5 , where the amount is beyond the desired limitation while below extreme limitation. High amounts of sulfate might induce gastrointestinal conditions in humans.

Chloride

Furthermore, Chloride is one of the critical factors for knowing the water grade. Chloride resources contain fertilizers, salt, and human and animal wastes. The chlorides concentration is supposed to be an index of animal source organic contamination. The current analysis demonstrates which chloride amounts for whole samplings are with the desired limitation excluding the water sampling S_5 , where the amount is above the desired limitation whereas below the extreme limitation. The higher chloride range might cause higher blood pressure in people that utilize it to drink. Whereas, whole amounts are in the BIS extreme limitation.

Biochemical oxygen need

The highest desired limitation of biochemical oxygen need to drink water is 5 mg/L. In the current research, biochemical oxygen need amounts of water samplings differ between 1.9 and 7.1. The water samplings S_1 and S_6 have biochemical oxygen need amounts higher than the highest desired limitation of 5 mg/L. The high biochemical oxygen need amounts absolutely demonstrate contamination that might be assign to the percolation of wastewater loaded with biodegradable combinations. The company water supply has higher biochemical oxygen need.

The whole dissolved solids

The whole dissolved solids is a significant factor to drink water and water to be utilized for other objectives. It demonstrates the water saltiness. Water including higher than 500 mg/L of whole dissolved solids isn't supposed desired to drink water supplies (Sastry & Rahee 1988). Nevertheless, in inevitable circumstances 1500 mg/L is utilized. In the current research, the whole dissolved solids changed between 180 and 1650mg/L. water sampling S_6 has the admissible amount. Water sampling S_3 has The whole dissolved solids beyond desired limitation while under extreme limitation. whole the other samplings have so high whole dissolved solids amounts and are unsuitable to human utilization. The whole dissolved solids concentration beyond the

acceptable limitation induces gastrointestinal irritation. Therefore, water with high whole dissolved solids amount shouldn't be utilized to drink goals. If it has to be used due to scarcity, it could be utilized after inverse osmosis.

Whole hardness

levels of the whole hardness altered between 83 mg/L and 750mg/L. Water samplings S_3 and S_6 have whole hardness levels with the desired limitation. Water samplings S_1 , S_2 and S_4 have whole hardness beyond the desired limitation while under extreme limitation. Water sampling S_5 has Whole hardness level under the highest acceptable limitation.

Whole alkalinity

In the current analysis the whole alkalinity amounts varied between 100 and 550 mg/L. whole alkalinity amount for the sampling S_6 is in the acceptable limitation and for whole the other samplings, it is beyond the acceptable limitation whereas under extreme limitation.

Dissolved oxygen

Dissolved oxygen is a significantly essential factor. Lower dissolved oxygen provides bad odor to water according to anaerobic contamination of organic wastes (Sallae 1974). In the current investigation dissolved oxygen amount of water samplings changed between 6.8 and 13.5mg/L. The dissolved oxygen level in natural waters relies on physical, chemical and biological actions dominant in the water bodies. The dissolved oxygen values changes by water temperature and height (Chhatwal et al. 1989).

Turbidity

The turbidity amounts varied from 0.2 to 0.3 NTU. The BIS permissible limitation for turbidity is 25 NTU. Whole water samplings investigated for turbidity have been nicely in the acceptable limitation by reference to the BIS standards (1998).

Conclusion

Multiple bore well waters in Madurai, specifically S_1 , S_2 , S_4 and S_5 , are unsuitable for human use as these samplings have highly dissolved solids and electric conductivity, and salty flavor. The water sampling S_3 has the whole dissolved solids beyond acceptable limitation whereas under extreme limitation. Therefore, the water from this bore well could be utilized to drink goals after pretreatment such as heat or inverse osmosis. The company water supply by pipeline (water sampling S_6) could be utilized to drink. In the sampling biochemical oxygen need is high than the extreme limitation and pH is beyond acceptable limitation whereas under the extreme limitation.

Therefore, this water could be utilized for use after pretreatment.

Conflict of interest

The authors declare that they have no conflict of interest.

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