

ANALYSE THE QUALITY OF WATER AT MANNAMPANDAL, MAYILADUTHURAI TALUK

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ABSTRACT: “Water quality” is the term used to express the suitability of water to sustain various use or purpose. It has been characterized by physical, chemical and bacteriological. Physical characters include color, taste, odour, turbidity, temperature and electrical conductivity. Chemical character include pH, total solids, dissolved oxygen, hardness, chloride content and other elements etc and bacteriological include plate count test, E- coli test. Mannampandal, a village which is located in the Mayiladuthurai taluk. In this village more than 6000 peoples can use the water for drinking, toilets and for various purpose like cooking, washing etc. so village ground water is analyzed for utilization. In our project, by collecting the water from different places in the mannampandal village and checking whether the water is fit for drinking or not as per drinking water specification IS 10500:2012.

KEY WORDS: water quality, characters of water, E-Coli, Plate count etc.

1. INTRODUCTION

Water is a chemical compound and it may occur in a liquid form or in a solid form, gaseous form. All these three forms of water are extremely useful to man, providing the comforts, in addition to fulfilling his basic necessities in life. Water is the elixir of life. It has been estimated that two-third of human body is constituted of water. It is not only essential for the survival of human being, but also have animal, plants and other living organisms. There are various sources of water available on earth such as surface sources and sub surface sources. Most of the earth’s water sources get their water supplies from precipitation, which may have fall in various forms such as rain, snow. Dew etc. precipitation is from hydrological cycle. The requirement of water in all lives, from micro organisms to human beings, is increased day by day but it is a serious problems now – a days. According to WHO organization, about 80% of all diseases in human beings are caused mainly by water.

So water quality standard are needed to determine whether the ground water of a certain quality is suitable for its intended use. So water quality index is an important technique for demarcating ground water quality and its suitability of drinking purpose.

2. PARAMETERS TO BE ANALYSE

These include three parameters like **A. Physical**
B. Chemical **C. Bacteriological**

Table 1.0 Parameters of Water

PHYSICAL	CHEMICAL	BACTERIOLOGICAL
1.Colour	1.pH	1. MPN(E-coli)
2.Odour	2.Total Hardness	a. presumptive test
3.Taste	3.Total Dissolved Solids	b. confirmed test
4. Turbidity	4.Sodium	c. completed test
5.electrical conductivity	5.Potassium	2.Plate Count Test
	6.Calcium	
	7.Sulphate	
	8.Nitrate	
	9. Total Alkalinity	
	10. Chloride	
	11. Dissolved Oxygen	

2.1. PHYSICAL PARAMETER

2.1.1 COLOUR

The colour in water is usually due to the presence of minerals and dissolved organic impurities. It can be measured by tintometer. The unit of colour is the color produced by one milligram of platinum cobalt in a litre of distilled water. It should be preferably less than 10.

2.1.2. ODOUR

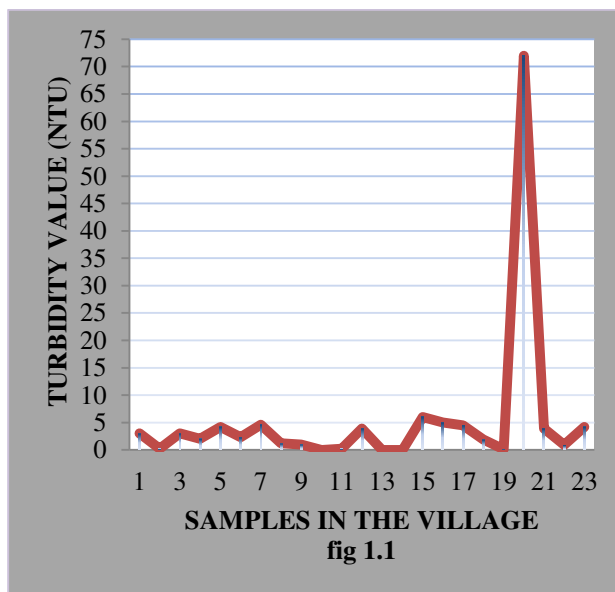
The odour depends on the sensitivity of the observer. The odour may be fishy, earthy, spicy, musty, and disagreeable and so on. It depends on variation of temperature. The testing of odour is done for cold at 20degree Celsius and hot at 80 degree Celsius. It is identified by inhaling through two tubes of an osmoscope.

2.1.3. TASTE

The taste also depends on the sensitivity of the observer. Taste may be sweet, bitter, salty, brackish, irritating etc.

2.1.4. TURBIDITY

Turbidity is caused by the presence of finely divided, suspended and colloidal matters like clay, loam and sand or microscopic organisms. It is measures of its resistance to the passage of light through it. It is expressed in NTU. It can be measured in nephelometric turbidity meter.



The permissible level of turbidity as per IS 10500-2012 is **1-5NTU**.

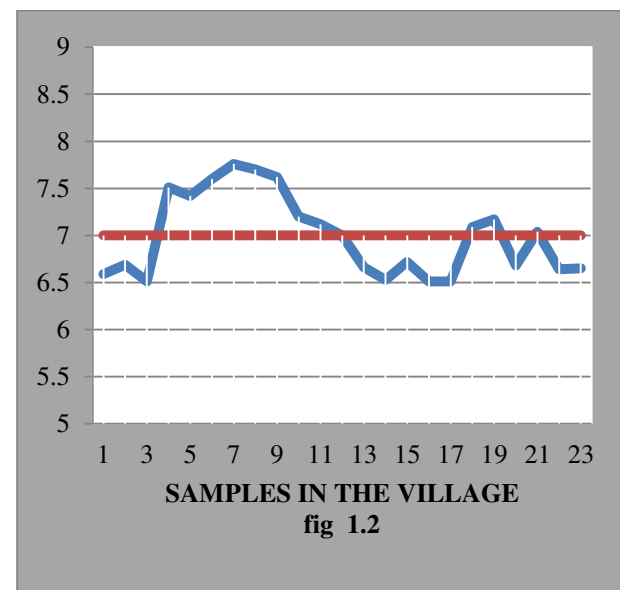
2.1.5. ELECTRICAL CONDUCTIVITY

Conductivity is the capacity of water to carry an electrical current and varies both with number and types of ions the solution contains. It is measured by conductivity meter. For drinking water, the conductivity value may be **0-2ms/cm**.

2.2 CHEMICAL PARAMETER

2.2. 1. PH

It is otherwise known as hydrogen ion concentration. It is the concentration of hydrogen ions in water and is a measure of the strength of acidity or alkalinity. It can be measured by colorimetric method or electrometric method. For drinking, pH value may **6.5 to 8.5** as per IS 10500-2012.



2.2.2. TOTAL HARDNESS

It is the property of water which prevents the lathering of soap. It is due to the presence of sulphates, nitrates and chlorides of calcium and magnesium. It also due to the presence of carbonates and bicarbonates. It can be measured by volumetric titration of EDTA solution against water sample. For drinking, the acceptable limits may be **200mg/lit to 600mg/lit**. The color changes from **pink to blue**.

2.2. 3. TOTAL DISSOLVED SOLIDS

Total dissolved solids in water consist of inorganic salts and dissolved materials. This can be find out to determine the filterable solids in water. The permissible value may be **500mg/lit to 2000mg/lit.**

2.2.4. POTASSIUM

It is macro nutrient element for plant growth. It can occur naturally in minerals and from soils. It can be measured by Flame photometer. In drinking water, the permissible level may be **30ppm to 100ppm.**

2.2. 5.SODIUM

It is a nutrient element for our growth. It can be measured by Flame photometer. In drinking water, the permissible level may be **30ppm-60ppm.**

2.2.6. CALCIUM

It is an essential for bone growth. It can be measured by Flame photometer. In drinking water, the permissible level may be **75ppm-200ppm.**

2.2.7. SULPHATE

Water contains sulphate ions and most of these ions are also soluble in water. The method to measure the quantity of sulphate is UV spectrophotometer. As per IS 10500-2012, the limit may be **200mg/lit to 400mg/lit.**

2.2.8. NITRATE

The presence of nitrate in water indicates that the organic matter is fully oxidized. Its presence is tested by UV spectrophotometer. As per IS 10500-2012, the permissible may be **45mg/lit.** If exceeds the limit, it leads to blue baby syndrome.

2.2. 9. TOTAL ALKALINITY

It is the measure of hydroxide, carbonate etc and measured by volumetric titration with phenolphthalein and methyl orange as indicators. For drinking, the limit may be **200mg/lit to 600mg/lit.** The colour may change **white to pink** (in the addition of phenolphthalein) then pink disappears. In addition of methyl orange to same sample it becomes **red.**

2.2. 10. CHLORIDE

They are generally present in the form of sodium chloride and it may be due to the presence of mineral

in soil. Their concentration may be **250ppm to 1000ppm** as per IS 10500-2012. Colour may change from **yellow to milk white then brick red.**

2.2.11. DISSOLVED OXYGEN

The oxygen in dissolved state is obtained by absorption from the atmosphere. It keeps water fresh and sparking. For potable water, DO may be 5 to 10. More quantity of oxygen it causes pipe corrosion

Table 1.2 .Causes and Effects of Excess Limit of Parameters in Water:

PARAMETER	CAUSES	EFFECTS
Turbidity	Bitter taste	Gastro intestinal tract
Total dissolved solids	Corrosive ability	-----
Total hardness	Mineral formation	Skin rash, hair loss
Total alkalinity	Osteoporosis, Rheumatoid arthritis	Liver disorder
calcium	Hypercalcemia	Gastro intestinal infection
sodium	Hypernatremia	Endocrine disorder
potassium	Hyperkalemia	Kidney failure
nitrate	Blue baby syndrome	Heart effects
sulphate	Severe diarrhoea	Intestine effects
Chloride	Hyperchloremia	Hormonal imbalance

2.3. BACTERIOLOGICAL PARAMETERS

It is most important from health point of view. The harmful bacteria are responsible for the outbreak of water borne diseases. The various reasons for bacteriological examination of water are

1. To detect and assess the degree of excremental pollution in the source of water supply.
2. To establishing the bacteriological purity of final water.
3. To measure the extent of safety of water.
4. To locate the organisms responsible for developing and spreading water borne diseases.
5. To identify the organisms responsible for developing certain effects on water with respect to colour, taste, odour etc.

The main form of effect in drinking water is the coliform bacteria. These are the indicator of drinking water quality and it has different level of risk. Total coliform is a group of different kinds of bacteria exist commonly in the environment and are harmless. It can be detected by laboratory (MPN test). Then the fecal coliform is a sub group of total coliform bacteria. It can be exist in the intestines and in the feces of animals and peoples.

2.3.1. MPN (e-coli test)

There are 3 steps involved,

2.3.1.1. PRESUMPTIVE TEST

In this test, definite portions of diluted sample is inoculated with lactose broth as culture medium and it is placed in standard fermentation tubes. They are incubated for 24 to 48 hours at 35 degree C. After this period, if gas is seen inside the Durhams tube, it indicates the **presence of bacterias and the test is said to be positive**. Otherwise, the test is treated as negative and the water is fit for drinking.

2.3.1.2. CONFIRMED TEST

This test is carried out to confirm the presence of E- coli. Brilliant green lactose bile is used as a medium. If gas is present inside the tube, it confirms the positive results and the presence of E- coli.

2.3.1.3 COMPLETED TEST

In this test, a small portion of BGLB showing positive confirmed test is inoculated into lactose broth fermentation tubes and agar tubes. This test is

actually showing positive results of the confirmed test are real members of coliform group. For drinking, E-coli should preferably less than 3 and should not exceed 10.

2.3.2 PLATE COUNT TEST

In this test, bacteria are cultivated on specially prepared culture medium of agar containing nutrients for bacteria for different sample of water with sterilized water. The diluted sample is incubated at 37°C for 24 hours called hot count or 48 hours at 20°C called cold count. The bacteria grow and form clusters or colonies. The bacteria thus formed are counted and results are compared for 1cc. For potable water, the total count should not exceed 100 per cc.

The most probable number index may be in 100ml. If the E-coli is present in the water, the bacteria are classified as

1. Klebsiella spp
2. Alcaligenes faecalis
3. Pseudomonas spp
4. Areomonas spp
5. Proteus spp
6. vibrio spp

3. CONCLUSION

Monitoring the water quality of ground water is done by collecting representative water samples and analysis of physico-chemical & Bacteriological characteristics of water samples at different places in the village.

The result of water quality assessment showed that most of the water quality parameters are all **fit for drinking**.

Turbid content is higher than the permissible value in water sample 20 having (72 NTU). This can be removed by settling and decanting in the closed container from 2 hrs to 24 hrs and we can use it for drinking.

Bacteria plays a major role in water to cause diseases. The bacterial test reveals that the samples didn't contain any sort of bacteria hence our samples all are **fit for drinking**. Our results showed that all the samples are **potable**.

TABLE 1.4 TESTED VALUES OF PARAMETERS

Sample/ parameter	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Turbidity	3.0	0.2	3.0	2.0	4.2	2.3	4.6	1.2	1.0	0.0	0.2	3.9	0.0	0.0	6.0	5.6	4.5	1.9	0.1	72	3.9	0.9	4.2
EC	0.25	0.23	0.21	0.20	0.20	0.19	0.20	0.18	0.18	0.17	0.15	0.15	0.15	0.14	0.13	0.14	0.12	0.11	0.11	0.25	0.10	0.10	0.10
pH	6.59	6.69	6.51	7.51	7.42	7.6	7.76	7.7	7.62	7.2	7.12	7.00	6.66	6.53	6.72	6.51	6.51	7.09	7.17	6.68	7.04	6.64	6.50
Hardness	240	380	320	320	460	480	280	340	320	220	300	320	440	100	280	340	280	300	300	300	340	280	320
DO	6.0	7.70	6.40	6.20	6.60	6.10	6.10	7.20	5.30	6.50	7.10	6.20	6.90	6.12	6.80	7.00	8.30	8.50	4.90	8.10	7.60	5.00	6.4
TDS	40	160	60	240	20	60	420	20	60	20	20	60	60	20	20	40	20	20	60	60	20	40	20
Sodium	10	30	12	14	10	05	11	03	06	10	05	09	14	14	09	10	09	08	05	08	08	18	23
Calcium	65	55	89	36	54	30	78	56	52	92	72	89	65	68	96	52	85	63	78	63	98	84	45
Potassium	71	30	67	56	23	48	59	40	39	56	63	58	66	67	57	58	58	67	57	53	54	81	89
Chloride	480	560	600	560	600	520	600	560	560	480	520	560	240	600	560	560	480	600	520	560	520	600	480
Alkalinity	200	280	120	320	160	400	400	240	160	160	280	160	240	560	600	160	200	280	400	180	400	240	160
Sulphate	13	05	26	12	06	25	13	09	25	16	15	06	14	42	24	46	62	36	18	12	56	24	23
Nitrate	13	05	26	12	06	25	13	09	32	18	09	08	26	35	32	36	48	21	15	24	22	06	14
E-Coli Bacteria	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

All the above tested values are compared with **IS: 10500-2012**

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The permissible values are taken as per “**INDIAN STANDARDS 10500-2012**”