



**Ecosafe Envirotech**

**Water testing laboratory & Environmental services**

1<sup>st</sup> floor, AVM Building, Kanakalaya Bank, Westhill, Kozhikode-673005

8129470770, 8547745170 ecosafe17@gmail.com

Approved by kerala state pollution control board

# Analytical study on purification efficiency of Enzyme (ENVOREIN™) in Drinking water

Project carried

By

**Ecosafe Envirotech**

*(Approved by kerala state pollution control board)*

This study conducted & report prepared

by

Mr. JASEEL O C

MSc Environmental eng (Cochin University), BSc Chemistry





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## Introduction

Quality and safety of drinking water is a raising public health issue in urban as well as even in rural areas. In most of the cities in India more than 70% of drinking water sources are contaminated with coliform bacteria and E-Coli. Unorganized waste management, unscientific sewage disposal, poor socio economic status and cultural aspects are causing the reason for contamination fresh water resources.

Presence of coliform and E-Coli bacteria is one of the major indicator parameter of unsafe drinking water, like that presence excess iron, ammonia, hardness etc. also determines the potability of water. International quality standard has the strict guidelines on water quality with maximum permissible limit of each parameter. There is hundreds of parameter in the international guideline, yet analyzing all those parameters are not practical and also not needed to do like , instead almost seventeen parameters which are most important are analyzing in a regular water quality test to assess the quality.



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## About Ecosafe Envirotech.

We are a bunch of highly experienced professionals in the field of water analysis, water treatment technology, and designing of pollution control devices. Our employees are well qualified with academic degrees like MSc environmental engineering, MSc chemistry etc. Our scope covers the analysis of all type of water samples. Our main motto is customer satisfaction and we provide quality results with high accuracy following all the quality criteria as stated in ISO 17025:2017 manual. Our experienced personals visit the sites for the collection of samples in most accurate way following APHA 1060 B guidelines. We provide the results with solutions within minimum days so that the customer can find a solution without any further delays. Our team does conduct awareness camps in various parts of Kerala to make people aware the necessity of dealing with safe and healthy water.

We do analyze all type of effluents, influents and sewage water sticking on to the norms and guidelines of Kerala State Pollution Control Board and provide them technical advices on how to enhance the quality of outlet water from ETP/STP which is being discharged to municipal sewerages and environment.

We are also accredited for analyzing particulate matter and various gases which are hazardous to the environment from quarries and different industries.





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## About Envonix Hydrotech. LLP

Established in 2008 Envonix Hydrotech is a kerala-based company, which provides state-of-the-art yet environment-friendly water, waste water treatment/filtering solutions as well as water purification product options across the country and overseas under its flagship brand, Maqpure.

Led by a dynamic team of innovative professionals including water treatment specialists and engineers/ plumbing designers, Envonix has a fully-fledged manufacturing facility and a brilliant sales and marketing team. Superb team work, an excellent range of products and solutions coupled with a focus of vision to be “better than the best,” led to Envonix Hydrotech establishing itself as a brand to reckon with, in a short span of time.

The Maqpure range of energy-saving turnkey projects both large and small, ensure effluents and sewage are safe for discharge into their surrounding natural environment. We integrate science and technology seamlessly to cleanse large volumes of water at high flow rates, which guarantees pure and safe portable water.

Also, our extensive range of household/commercial water purifiers deliver fresh, pure and healthy drinking water efficiently, round-the-clock. ENVOREIN and ENVOREIN PLUS are two of our standalone best-selling brands of 100% ecofriendly and non-toxic solutions for a clean and odorless environment as well as an easy-to-use solution for oxygenating and purifying contaminated water, respectively.





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## Basic parameters and standard limits

No	parameters	unit	Desirable limit (IS:10500)
<b>Physical parameters</b>			
1	Color	Hazen	5
2	Odor		No odor
3	Taste		Agreeable
4	Turbidity	NTU	5
5	Electrical conductivity	μS/cm	
<b>Chemical parameters</b>			
6	pH		6.5 – 8.5
7	Total dissolved solids	mg/L	500
8	Total hardness	mg/L	300
9	Calcium	mg/L	75
10	Magnesium	mg/L	30
11	Alkalinity	mg/L	200
12	Chloride	mg/L	250
13	Sulphate	mg/L	200
14	Ammonia	mg/L	0.5
15	Iron	mg/L	0.3
<b>Bacteriology</b>			
16	Total coliform	CFU	Absent
17	E -Coli	CFU	absent





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## Conventional treatment methods of Drinking water

Filtration through sand media and activated carbon is the well-practiced method of treatment for fresh water to remove excess fine particles, dirt, and foul smell etc. sand media is the different sizes of naturally available gravels from some sort of rocks. Activated carbon is specially treated charcoal in industrial facility; it has strong absorbing capacity towards most of the organic and volatile components and inorganic dyes.

For disinfection of pathogenic microorganisms, chlorination and ultra violet treatment are more popular methods. UV treatment or ozonizing is more convenient in comparison with chlorination; because excess chlorine is harmful and cause pungent smell of chlorine.

Reverse osmosis is the most advanced treatment of purification of highly contaminated water and saline water. But this technology is not suitable for low TDS soft water, because it cause complete draining of minerals nearly equal to distilled or demineralized water; it is not good for health.





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## Aim of study

- To find out the treatment efficiency of enzyme (ENVOREIN<sup>TM</sup>) in drinking water
- To know the minimum quantity of enzyme required that gives maximum result of purification
- Estimate the time retention time water with enzyme for maximum treatment performance

## Scope of the work

- Improvement of fresh water treatment in an easiest way
- Purification of drinking water without using any chemicals
- Maintain the quality of drinking water in more convenient safe and ecofriendly materials.

## Study method

Analyse a sample of contaminated fresh water with presence of coliform and excess iron content. At the same time a portion of sample from same source is taken and added small quantity of enzyme (10 mg/l) then kept aside for 24 hours. After 24 hours sample taken for analysis and the both result is get compared each other to observe the difference.

## Brief description of the Enzyme

It is a commercial product with a trade name as 'ENVOREIN'. It is cellulose based derivative of a particular plant species with catalyst. The appearance is white powder.





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## Interpretation of analysis report







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(No. PCB/LAB/C29/2019)

## WATER ANALYSIS REPORT

Name & Address of client/Sampling location	Mr. Abdul Rahman, Managing partner , Envonix Hydrotech LLP, Madeena tower, Calicut airport junction. Kerala	Sample I D	F200526-01
		Report No	ES20/F049
Sample description/Source	Open well (before treatment with Enzyme)	Sampling by	Laboratory
Date of collection	27-May-2020	Test completed on	30-May-2020

### Physical & Chemical analysis

Sl. NO	Parameters	Unit	Test method APHA	Result	Desirable limit as per IS: 10500
1	pH	-	4500H <sup>+</sup> B	6.80	6.5 – 8.5
2	Turbidity	NTU	2130B	0.5	5
3	Electrical conductivity	µS/cm	2510B	395	-
4	Total dissolved solids	mg/L	2540 C	256	500
5	Total Hardness as CaCO <sub>3</sub>	mg/L	2340 C	152	300
6	Calcium Hardness as CaCO <sub>3</sub>	mg/L	3500 Ca B	134	-
7	Magnesium Hardness as CaCO <sub>3</sub>	mg/L	3500 Mg B	18	-
8	Calcium ( Ca )	mg/L	3500 Ca B	53.7	75
9	Magnesium ( Mg )	mg/L	3500 Mg B	4.4	30
10	Alkalinity as CaCO <sub>3</sub>	mg/L	2320 B	104	200
11	Chloride ( Cl )	mg/L	4500 Cl B	28	250
12	Sulphate ( SO <sub>4</sub> )	mg/L	4500 SO <sub>4</sub> E	14.9	200
13	Ammonia ( as N )	mg/L	4500 NH <sub>3</sub> F	0.04	0.5
14	Iron ( Fe )	mg/L	3500 Fe B	0.19	0.3

### Bacteriological analysis

15	Total Coliforms	CFU/100ml	9222 B	200	Absent
16	Fecal Coliform	CFU/100ml	9222 D	10	Absent

\*BDL: -Below detectable limit,

Remarks: - Presence of coliform bacteria.

Analyzed & reported by

Jaseel , Chief Analyst





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**Report no: - ES20-F049**

**Sample description: - untreated contaminated fresh water**

Water contaminated with coliform and E-Coli bacteria, moderately hard water.

Total hardness :- 152 mg/L

Iron :- 0.2 mg/L

pH :- 6.8

Ammonia :- 0.04 mg/L

Total coliform :- 200 CFU per 100 ml

Fecal coliform :- 10 CFU per 100 ml



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## WATER ANALYSIS REPORT

Name & Address of client/Sampling location	Mr. Abdul Rahman, Managing partner , Envonix Hydrotech LLP, Madeena tower, Calicut airport junction. Kerala	Sample I D	F200526-02
		Report No	ES20/F050
Sample description/Source	Open well - after 24 hour treatment with enzyme (ENVOREIN™) – 10mg/L	Sampling by	Laboratory
Date of collection	27-May-2020	Test completed on	30-May-2020

### Physical & Chemical analysis

Sl. NO	Parameters	Unit	Test method APHA	Result	Desirable limit as per IS: 10500
1	pH	-	4500H <sup>+</sup> B	7.00	6.5 – 8.5
2	Turbidity	NTU	2130B	0.0	5
3	Electrical conductivity	µS/cm	2510B	400	-
4	Total dissolved solids	mg/L	2540 C	260	500
5	Total Hardness as CaCO <sub>3</sub>	mg/L	2340 C	148	300
6	Calcium Hardness as CaCO <sub>3</sub>	mg/L	3500 Ca B	130	-
7	Magnesium Hardness as CaCO <sub>3</sub>	mg/L	3500 Mg B	18	-
8	Calcium ( Ca )	mg/L	3500 Ca B	52.1	75
9	Magnesium ( Mg )	mg/L	3500 Mg B	4.4	30
10	Alkalinity as CaCO <sub>3</sub>	mg/L	2320 B	104	200
11	Chloride ( Cl )	mg/L	4500 Cl B	28	250
12	Sulphate ( SO <sub>4</sub> )	mg/L	4500 SO <sub>4</sub> E	55.1	200
13	Ammonia ( as N )	mg/L	4500 NH <sub>3</sub> F	BDL	0.5
14	Iron ( Fe )	mg/L	3500 Fe B	0.06	0.3

### Bacteriological analysis

15	Total Coliforms	CFU/100ml	9222 B	NIL	Absent
16	Fecal Coliform	CFU/100ml	9222 D	NIL	Absent

\*BDL: -Below detectable limit,

Remarks: - All parameters are under safe level.

Analyzed & reported by

Jaseel , Chief Analyst





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**Report no: - ES20-F050**

**Sample description:** - Contaminated fresh water treated with enzyme (10mg/L), analyzed after 24 hour.

Sample is free from total coliform and E-Coli bacteria

Total hardness :- 148 mg/L

Iron :- 0.06 mg/L ( iron reduces from 0.2 to 0.06 ,i.e. 70% reduction)

pH :- 7.00 (pH raises from 6.8 to 7.0)

Ammonia :- BDL (Below detection limit)

Total coliform :- Absent

Fecal coliform :- Absent





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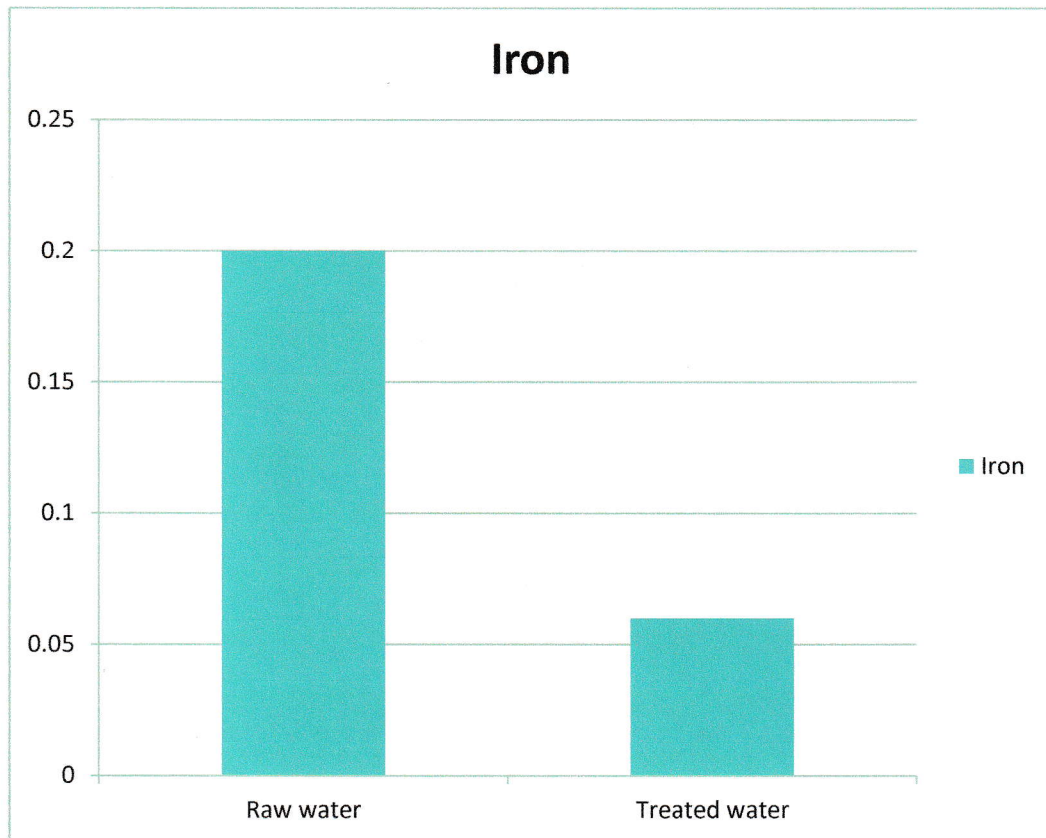
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## Diagram showing the reduction of iron



70 % reduction of Iron





## Summary of the analysis and conclusion

1. The enzyme (ENVOREIN™) is effective in purification of drinking water.
2. 10mg/L Enzyme is sufficient to treat the moderately contaminated water.
3. Enzyme is capable for effectively vanishes the presence of coliform bacteria and E-Coli.
4. Reduces 70% of iron after 24 hours of enzyme treatment
5. Raises the pH value slightly and continue in a stable value of 7.0.
6. Indicate a reduction /disappearance of Ammonia.

