

## OxiMax Users



... and many more



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Australia • India • Singapore



Partnering with Defence Research  
& Development Organization, Government of India  
for Iron & Arsenic Removal Systems



Effective, Economical & Simple Technologies for the Masses

## DEFLUORIDATION

### Why Fluoride Removal?

Excessive Fluoride in Water is a menace. The permissible limit in drinking water is 1.5 ppm in India where as it is much lower as per World Health Organization Standards. Excess Fluoride in Water can cause several diseases such as:

- ◆ Dental Fluorosis
- ◆ Skeletal Fluorosis - Arthritic pain, spine rigidity, malshaping of bones, etc. When you ingest Fluoride, only about 50% comes out and the remainder is stored in the bones, which accumulated over a period, causes severe physical problems.
- ◆ Cancer
- ◆ Genetic Damages
- ◆ Fluoride is more toxic than lead and slightly less toxic than Arsenic.

### What is Bio-F ?

- ◆ Bio-F is a biological adsorbent using natural shell as raw material
- ◆ Porous in nature
- ◆ Bio-F is insoluble in water
- ◆ Bio-F has high temperature tolerance
- ◆ Bio-F has the capability to remove Fluoride
- ◆ Can remove Fluoride in excess of 90%
- ◆ Bio-F is highly cost-effective
- ◆ Can be used without electricity
- ◆ Suitable for domestic and community purpose
- ◆ Regeneration produces no hazardous material
- ◆ No Fluoride in waste water
- ◆ Low contact time (3-5 minutes).



School Children enjoying fluoride free water from OxiMax Bio-F hand pump based unit

### Bio-F Regeneration Methods

#### Convenient. Safe. Simple.

#### Regeneration Method 1 -

START. Keep the media dissolved in alum solution for 2-3 hours. Then drain the alum solution out and rinse with fresh water. STOP.

#### Regeneration Method 2 -

START. The new regeneration process developed by us, requires you to just insert hot water at > 70 degree C or pass steam through the media and then rinse with fresh water. STOP.

“Bio-F is 2.5 times more efficient than Activated Alumina”

All India Institute of Public Hygiene & Health, Kolkata

### Bio-F Compared to Activated Alumina

Sr. No.	Activity	Activated Alumina	OxiMax Bio-F
1.	Defluoridation capacity	1 mg/g	3-4 mg/g
2.	Regeneration Process	Regeneration by exposing to 4% caustic soda (hazardous chemical) difficult to carry out regeneration onsite. Must be carried to regeneration centre.	Regeneration using alum or hot water/ steam >70°C. Can be easily carried out at site.
3.	Wastewater	Wastewater contaminated with Fluoride thus going back to ground at the same location.	No Fluoride in wastewater.
4.	Neutralization	Neutralization required with sulphuric acid after regeneration again hazardous chemical use.	No neutralization necessary.
5.	Number of Regenerations Possible	3-4, after which media needs replacement.	15-20 times

## Why Bio-F?

- ◆ Safe- No Chemical required!
- ◆ High & steady adsorption
- ◆ High fluoride removal efficiency
- ◆ Stable regeneration capability
- ◆ Cost effective
- ◆ Tested & certified by various leading labs across the country
- ◆ Safe, Simple regeneration.



## Fluoride Removal Test Result by Food and Drug Laboratory

Sr. No.	Type of Samples	Fluoride Contents in Samples before Treatment	Contact Time (Min) with Media	Fluoride Contents in Samples after Passing through Demo Unit
1.	Raw Water	0.48 PPM	10 Min	0.033 PPM
2.	1 PPM Fluoride in Raw Water	1.40 PPM	10 Min	0.047 PPM
3.	2 PPM Fluoride in Raw Water	2.48 PPM	10 Min	0.042 PPM
4.	3 PPM Fluoride in Raw Water	3.50 PPM	10 Min	0.044 PPM
5.	5 PPM Fluoride in Raw Water	5.37 PPM	10 Min	0.041 PPM
6.	7 PPM Fluoride in Raw Water	7.46 PPM	10 Min	0.038 PPM



OxiMax Bio-F Fluoride removal system - 40,000 liters/day



## OXIMAX DRDO IRON & ARSENIC REMOVAL SYSTEMS

### Who is DRDO ?

- ◆ Defence Research & Development Organization or DRDO is India's premier research organization, working under the Ministry of Defence, Government of India. DRDO has developed technologies for removal of iron and arsenic from drinking water, for the benefit of society.

### Who is HES Water Engineers (India)?

- ◆ HES Water Engineers is a leading manufacturer and provider of water quality solutions and for years has lived up to its commitment of providing safe drinking water to the masses under the brand name OxiMax. To achieve this target, HES Water Engineers is always eager to explore and invent technologies that can improve the quality of drinking water and benefit society at large.

### DRDO OxiMax Together

- ◆ DRDO has honoured HES Water Engineers by transfer of technology for removal of iron and arsenic from drinking water so that the benefit of these technologies can reach the rural masses of India who suffer most due to poor drinking water quality.
- ◆ These systems are manufactured by HES Water Engineers for installation in India and other countries.

HES Water Engineers has an extensive network and team of professionals.

### Why remove IRON?

- ◆ "Iron Water readily stains plumbing fixtures, porcelain and cooking utensils. When used in the laundry, it soon stains washables with reddish-brown discolorations. "Iron Water" also leaves its telltale marks on walls and floors if

used in doing home cleaning chores. "Iron Water", if not treated, can lead to serious complications in many industrial applications. In fact, there is hardly any wet process work that can be carried on successfully with water that contains iron.

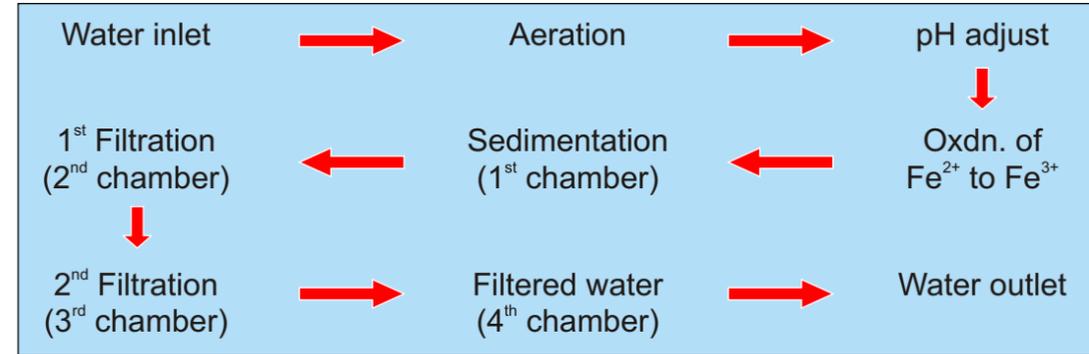
- ◆ Iron imparts a disagreeable metallic taste to water. Even when water contains small amounts of iron, a disagreeable, somewhat astringent quality is apparent. Naturally when iron is present in detectable amounts, it can ruin the flavour of tea, coffee and alcoholic beverages. Further iron in the beverages gives them an unappetizing, inky black appearance.
- ◆ In its insoluble forms, iron can form deposits in pressure tanks, pipelines, water heaters, commodes and in any other equipment where water is used.
- ◆ Desirable limit is 0.3 ppm. Permissible limit is 1.0 ppm.
- ◆ Dissolves concentrations of iron in excess of 60 mg/l are known to exist. Usually, however, no more than 5 mg/l of iron are present in supplied water. Unfortunately, iron in water becomes a real source of trouble to the homemaker and industry.



3000 liters/hour Iron/Arsenic removal unit

## Iron Removal

### How it works



### Performance Evaluation

Performance Evaluation		
Parameter	Feed Water	Filtered Water
pH	5.8 - 6.2	6.8 - 7.5
Turbidity (NTU)	>100	1 - 2
Total Solids (ppm)	470 - 534	402 - 418
Total Hardness (ppm) (as CaCO <sub>3</sub> )	36 - 47	66 - 154
DO (ppm)	0.55 - 2.94	5.92 - 6.86
Iron (ppm)	39 - 40	0.05 - 0.2

### Advantages of DRDO OxiMax Iron Removal Unit

- ♦ Adequate Aeration
- ♦ Major portion of iron settles in sedimentation chamber
- ♦ Filter bed cracking prevented and clogging delayed
- ♦ Double filtration ensures better iron removal
- ♦ Efficient backwashing system
- ♦ Easy operation and maintenance in rural condition
- ♦ Can remove iron up to 40 ppm
- ♦ No regeneration required.



300 liters/hour Iron/Arsenic removal unit

## Arsenic Removal

### Technological Innovation by DRDO

- ♦ Defence Research & Development Organization (DRDO) works under Ministry of Defence. DRDO dedicatedly working towards enhancing self-reliance in Defence Systems and undertakes design & development leading to production of world class weapon system and equipment in accordance with the expressed needs and the qualitative requirements laid down by the three services.
- ♦ DRDO while striving to meet the cutting edge weapons technology provides ample spin off benefits to the society at large thereby contributing to the nation building.
- ♦ The development of Arsenic Removal Technology is a step in this direction by DRDO. Defence Research Laboratory, has developed a very simple and effective technology for removal of deadly Arsenic from drinking water.
- ♦ While designing the unit, DRDO has kept in mind the need of society, the user profile and cost factor.

### A Simple Solution to a Complex Problem

- ♦ Arsenic is a complex problem, but India's premier R&D organization, DRDO, has developed a simple solution for removing arsenic from drinking water. The system developed by DRDO is economical, simple to operate and requires virtually no maintenance.
- ♦ OxiMax-DRDO Arsenic Removal System delivers consistent, guaranteed performance. In this simple pump-and-treat adsorption system, the contaminated water passes through a robust 3-stage filtration. The coatings for the media are developed by DRDO. As the water passes through the media, the arsenic is adsorbed and removed to a level below the drinking water standard of <50 ppb.
- ♦ The media is designed with high capacity for arsenic, providing long operating cycle and low operating costs. The exhausted media is non-hazardous and can be sent for landfill.
- ♦ The media will last for several years requiring no change.
- ♦ System requires no regeneration and simple backwash takes care of proper functioning of the unit.

### Advantages

- ♦ Removes arsenic effectively
- ♦ Easily achieves the limit of up to 50 ppb as per requirement of IS:10500-91
- ♦ Robust media with high capacity for arsenic removal
- ♦ No regeneration required
- ♦ Low capital cost
- ♦ Negligible operating cost
- ♦ Readily available, indigenously developed media
- ♦ Unattended operation
- ♦ Easy disposal of spent media (after several years of use). No hazardous waste generated
- ♦ Low maintenance-no moving parts
- ♦ Can run with or without electricity
- ♦ Technology by DRDO-India's premier research organization, run by Ministry of Defence, Government of India.