

Part II : Detailed Description

RED-OXY[®] AND KATALOX-LIGHT[®]

High Speed Bullet Train

High speed bullet train **RED^x** + **OXY^x** and Katalox-Light[®] are both with Formula $\text{FeO}_4^{-2} + \text{MnO}_4^{-2}$ are considered to have the same formula named tetrahedral structured ions. Tetrahedral FeO_4^{-2} produced with the system **RED^x** having the highest **Oxidation** and **Reduction** potential in acid solution and Katalox-Light[®] an alkaline media is explained in detailed description. **RED-OXY[®]** with its ferrate ions is the strongest oxidant and is capable of removing inorganic and organic impurities just in few seconds of reaction. The ferrate will generate iron ions and oxygen molecules. The oxidation-reduction reaction is the strongest reaction with a particular significance in the entire water treatment industry because of no by-products. After the oxidation of all organics including inorganics, the final left over is the ferric ion. Now to take the maximum efficiency of the valuable ferric iron the solution of **ADSORB^x** is dosed to create the floc and catch the inorganic precipitates of cations and adsorb anions and all suspended particles including colloids. There is no other method to reach the solution point with safety, convenient, versatility with lots of cost saving using any other train. In this respect **RED^x**, **OXY^x** and **ADSORB^x** are in an environmentally friendly bullet train.



RED-OXY[®] system prototype

Watch-Water[®] Germany has designed the **RED^x** system to generate ferrate on very reasonable costs, in addition to low costs, the **RED^x** is the only system for treating drinking water, agricultural irrigation, industrial applications, municipal water treatment including disinfection and filtration in one process easier and less expensive than no other technology can provide in the existing water treatment company. **RED-OXY[®]** mobile labs by Watch-Water[®] are provided to test any water on the spot which is absolutely identical to **RED^x** systems. To order **RED-OXY[®] LAB** please provide us your company details by following [this link](#).

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Very important: Watch-Water[®] here with guarantee that there are no toxic products involved in **RED-OXY**[®] mobile lab. All compounds are "environment friendly". All other **Oxidants** like **Chlorine** or **Ozone** are hazardous to workers, since they are highly toxic, no such compounds are used in **RED-OXY**[®] treatment.

RED^x in the process is reduced to Fe (III) with adsorb FeOOH water leaving the Katalox-Light[®] and Catalytic Carbon[®] free of iron and zero non-toxic by-products, including any organisms such as cells, bacteria, viruses. In this reaction all organics are oxidized to biological inactivation product.

Water at outlet of Katalox-Light[®] has the highest cleaning effect of any sewage to remove coli form bacteria, ammonia and nitrogen.

*We know water and we
can re-use any water.*

*For explanation: if X is shown in **RED-OXY**[®] it is selected for systems like **RED**^x, **OXY**^x and **ADSORB**^x.*

*Example: System for **RED-OXY**[®] : **RED**^x Dosing.*

Part II. Detailed Description of **RED-OXY**[®]

Introduction

Revolution in all waters including waste water treatment by **RED-OXY**[®]. Treatment of any kind of water with **RED-OXY**[®] has showed the best results for the removal of turbidity, color, odor, BOD, COD and inactivation of bacteria. In all waters **RED-OXY**[®] produced high quality of final water, predominantly due to its simultaneously action as an adsorbent, oxidant and

disinfectant. Working as an adsorbent, **RED-OXY**[®] produces **BEST QUALITY WATER** of final water compared to all the adsorbent based on Iron or Aluminum. The advantage of using **RED-OXY**[®] is never to change adsorbent thus producing minimum waste and this makes **RED-OXY**[®] a very promising adsorbent in all waters including wastewater.

Goal

Watch-Water[®]'s goal and interest to develop new technologies for the filtration adsorption and disinfection including the removal of organic materials from potable water supplies and also removal of organics from aqueous process streams prior to recycle (water reuse) or discharge into deep wells or natural surface waters.

Most of the research in Watch-Water[®] is dedicated to discontinuing the use of

- Chlorine
- Chlorine Dioxide
- Ozone and all products causing huge amount of disinfection by products.

RED-OXY[®] has shown great results as multi-functional water and waste water treatment

product for

- Adsorption
- Oxidation
- Disinfection

RED-OXY[®] has proved to remove toxic organic molecules such as nitrosamine, organic sulfur compounds including sulfates and phenol, as well as inorganic ions such as arsenic, copper, chromium, cadmium, cyanides, fluorides including destroying all viruses and bacteria.

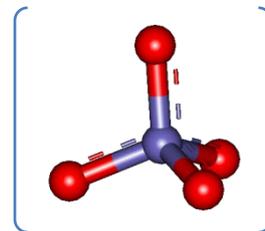
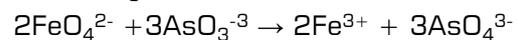
RED-OXY[®] holds its greatest reward for residential, commercial, industrial, municipal including fracking applications. Nothing is better than **RED-OXY**[®], the only source for **ULTIMATE WATER SOLUTION**.

Arsenic

The ability of **RED^x** or the **RED^x / OXY^x** combination provides the most efficient method for remediation of **arsenic** from any water under mildly acidic conditions. Both As (III) and As (V) forms of arsenic are amenable to treatment since **RED^x** rapidly oxidizes the former (+3) to +5 oxidation state. This is the only process which will decrease the amount of **All Adsorbents** since **RED-OXY[®]** makes the fresh adsorbent because of using a soluble form of iron (**RED^x**) to treat all waters. Most importantly, **RED-OXY[®]** method provides the most economic and inexpensive approach to meet every drinking water regulation where acceptable levels of arsenic may reach as low as 0.0 µg/L (Zero parts per billion). Another huge benefit of **RED-OXY[®]** treatment is that a reaction between arsenite and **RED-OXY[®]** is extremely rapid (within milliseconds) for all forms of arsenic.

Oxidation Kinetics

In order to provide our customers of how well **RED-OXY[®]** will work with "real life". To treat water with 50 ppb Arsenate at pH from 7 to 8 only 0.5 mg of **RED-OXY[®]** dosage is needed. As explained often, arsenic is usually present as As (V) in surface waters and as As (III) in most of ground-waters, which must be oxidized to the +5 state to ensure removal. Since **RED-OXY[®]** is the best oxidation method, the reaction kinetics between (AsO₃⁻³) is shown as follows:



*High purity Ferrate [Fe(VI)]
is the heart of **RED-OXY[®]** treatment*

RED-OXY[®] in small drinking water systems

Innovative Technology

Millions of small drinking water systems are equipped with Reverse Osmosis and the disadvantage of these systems, none of them is working, cannot be repaired because of limited financial and human resources, and some time due to their remote location. **Watch-Water[®]** has only one objective to install **RED-OXY[®]** systems to solve more than 90% of water quality and treatment problems faced by small communities and villages.

RED-OXY[®] has proved to be more effective and less detrimental than any existing conventional

- Adsorbent media
 - Chlorination
 - Ozonation or
 - Chlorine dioxide oxidation
- These technologies are more costly, more hazardous or require specialized expertise to operate.

Watch-Water[®] will highlight the ways it can be used to improve water quality, lower cost and provide a more sustainable treatment alternative to any other existing technologies. **Watch-Water[®]** is already offering full-scale units for on-site production of the strongest adsorbent at cost of only 0.05 cents to treat one cubic meter (264.2 gallons) of water. **RED-OXY[®]** does not react with bromide like **ozone**; so the carcinogenic bromate is not produced in the treatment of bromide-containing water.

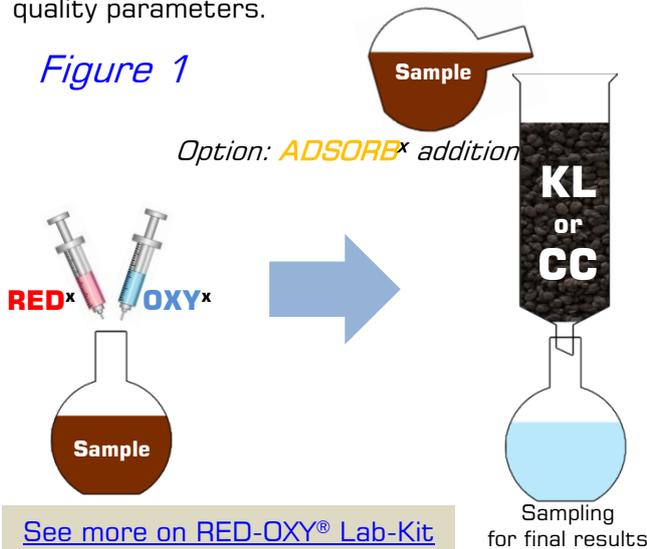


*The dream of sustainable
water re-use is now a reality!*

Breakthrough experiment

The **RED-OXY® LAB** breakthrough columns test can be conducted as a set of comparative tests, usually consisting of 2 to 4 columns in each run. But in the mobile Lab-Kit, a single column (95 mm diameter, 140 mm height) containing Katalox-Light® granules and a single column of the same size filled with Catalytic Carbon® is employed as a standard test on site. There are two sampling jars to fill the columns on the inlet and collecting sampling at the outlets ends of the column. Both Katalox-Light® and Catalytic Carbon® are supported by glass filter (140 micron) at both ends. To begin a set of breakthrough results as to (Figure 1), a sample jar (step 1) should be filled with {Contaminated Water "[see list of contaminants](#)"}. And now inject the prepared - **RED^x** stock solution with your left hand filling the pipette with 1ml of solution. And on the other hand (Right) inject the solution of **OXY^x** into the sample. In an **Automatic RED-OXY® System** concentration of **RED^x** and **OXY^x** are set at 0.5 mg/L of **RED^x** and 0.5 mg/L of **OXY^x**. To obtain results from the comparative columns both samples can be send to investigate water quality parameters.

Figure 1



Please Note:

After an experiment, clogged columns have to be replaced with new media's or to wash the media's with little $KMnO_4$ solution (max 1%). After washing the media it can be used as often as possible. The stock solution of **OXY^x** can be used for maximum one month of preparation.

Conclusion

Water samples treated with **RED-OXY®** has demonstrated that it is the most efficient technology to remove bacteria, pesticides, viruses, pharmaceuticals, metals and anions. The mechanisms of some metals uptake differ considerably depending on the metal species and their dissolved conditions. **RED-OXY®** is a process of a very rapid reduction and disinfection of solids, liquids and gases but some metals need adsorption and co-precipitation processes. Adding **ADSORB^x** into the process will create **adsorber - a super adsorber**, compared with any adsorber in the world, **RED-OXY® adsorber** will achieve twice more loads and just by adding a 1ml of the **Liquid ADSORB^x** and that can be obtained at very low-cost. 1 ml of **ADSORB^x** can load 50mg of metals.

Advantages of **ADSORB^x**

The adsorption of Toxic or dissolved metals takes place within 3 to 6 minutes. This unique adsorbent has very high surface of Iron Oxy hydroxide. The best breakthrough for adsorption process will be achieved at inlet of the column at pH 6.5. The higher outlet pH's of sampling as compared with initial pH coincide with an extensive accumulation of iron hydroxides role of adsorption/ co-precipitation process.

Watch-Water® at removal of dissolved metals from stormwater runoff by zero-valent iron.

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