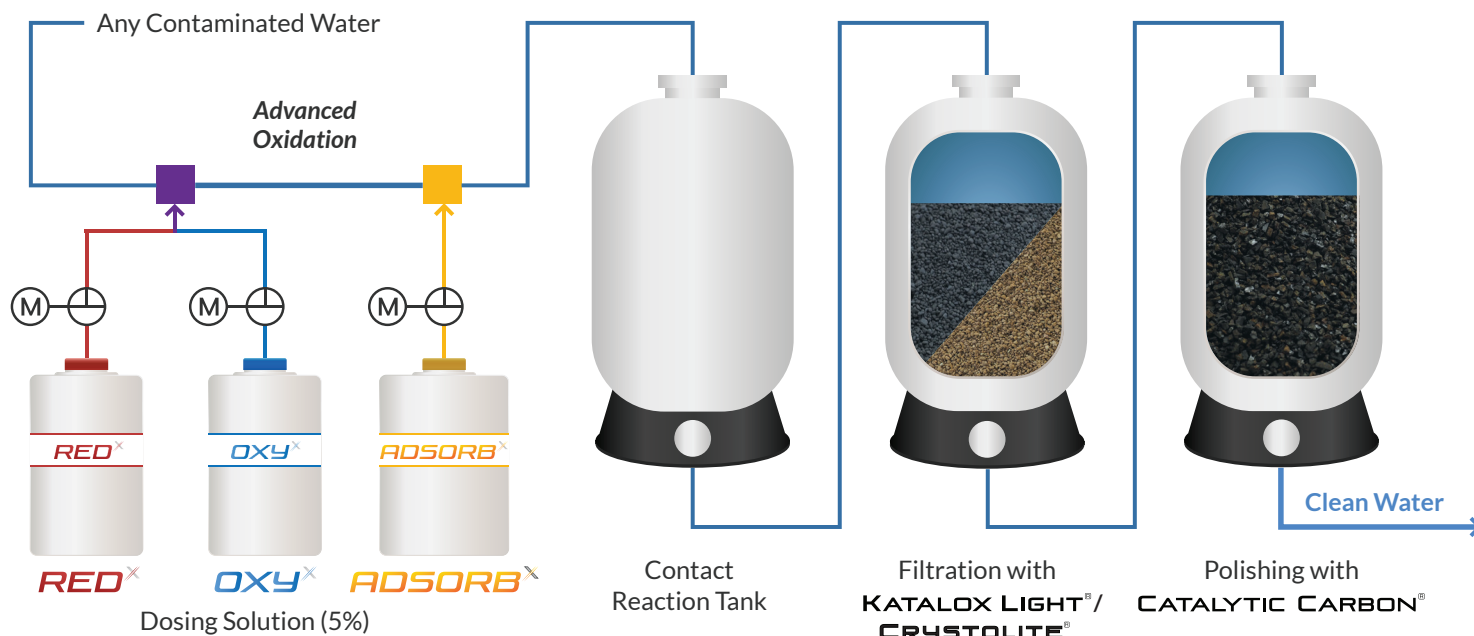


RED-OXY[®] TREATMENT

OXIDATION - ADSORPTION - FILTRATION

ADVANCED OXIDATION PROCESS

OXIDATION - ADSORPTION - FILTRATION



Applications

- Drinking water
- Process water Re-use
- Irrigation
- Mining
- Wastewater treatment
- Oil & Gas industries
- Fracking
- Soil Treatment
- Paper and pulp industries



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REDOXY
TREATMENT

**FILTERSORB
FILTRATION
ADSORPTION
INSTANT PRODUCTS
OXY TREATMENT
SYSTEMS**



Introduction to REDOXY[®]

Revolution in all waters including waste water treatment by REDOXY[®]. Treatment of any kind of water with REDOXY[®] has showed the best results for the removal of turbidity, color, odor, BOD, COD and inactivation of bacteria. In all waters REDOXY[®] produced high quality of final water, predominantly due to its simultaneously action as an adsorbent, oxidant and disinfectant. Working as an adsorbent, REDOXY[®] produces **BEST QUALITY WATER** of final water compared to all the adsorbent based on Iron or Aluminum. The advantage of using REDOXY[®] is never to change adsorbent thus producing minimum waste and this makes REDOXY[®] a very promising adsorbent in all waters including wastewater.

GOAL

Watch Water[®] 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 as all of them produce huge amount of disinfection by products.

REDOXY[®] has shown great results as multi-functional water and waste water treatment product for

- Adsorption
- Oxidation
- Disinfection

REDOXY[®] 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.

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

The fastest, safest and cheapest solution

High speed bullet train RED^x + OXY^x and KATALOX LIGHT[®] 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 acidic solution. REDOXY[®] 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 an environmentally friendly bullet train.

REVOLUTIONIZING WATER RE-USE WITH RADICAL CHEMISTRY



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What is REDOXY®?

DESCRIPTION

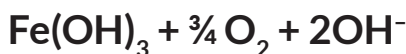
REDOXY® generated Ferrate with **Watch Water®** process is the most stable form of **Ferrate (VI)** because it is generated with Ferric Hexahydrate granules. The oxidant used in this process is a strong acid halogen which generates high voltage of oxidant without any DBPs. REDOX potential of the oxidant is as high as **Hydroxyl Radicals**. **Watch Water®** has no doubt that its proprietary process will be commercialize world-wide with its own branches or through very close partners.

Watch Water® understands chemistry. Generated Ferrate with its proprietary process of **ONLY TWO COMPONENTS** uses



REDOXY® spontaneously decomposes in the presence of all contaminants listed on page 8, in any kind of water into strong oxygen and the most powerful Adsorbent based on ferric hydroxide with the surface area of 3500 m²/gram.

The chemical formation reaction is



This reaction is the strongest for the Oxidation Adsorption of metals, non-metals and or organic contaminants in water and wastewater treatment. These include ammonia, cyanide, thiocyanate and very high concentration of hydrogen sulfide. All other contaminants are listed on page 8. As many of the reactions are pH based reactions it can be controlled in the process with **OXY^x** (the most powerful oxidant and disinfectant against viruses and Coli-form Bacteria). Inactivation of viruses and all kind of

bacteria occur faster as the pH drops, a phenomenon that has been attributed to mono-protonated form of HFeO_4^-

REDOXY® treatment can be done without investing on the equipments as in most of the systems worldwide the dosing equipment can be used from existing feed pumps which will bring substantial improvements in finished water quality, especially as regards to trace organic contaminants and DBPs. Most water treatment systems, regardless of their size, use a coagulant which in future is **RED^x** and a chemical disinfectant which in future is **OXY^x** and the sand filter in future are **KATALOX LIGHT®** systems. However only adding **I-SOFT** Corrosion Control chemicals may be necessary if after treatment corrosion-control is needed. **Watch Water®** has developed this technology in **INSTANT** form of **RED^x** and **OXY^x** to save transportation cost of chemicals.

Solutions for all contaminants problem just got much easier. How to approach some thousands of communities, municipalities to use this innovative treatment: **REDOXY®** Oxidation and Adsorption represents an improved Multiple Applications.



ALL CONDITIONS



ONE SOLUTION



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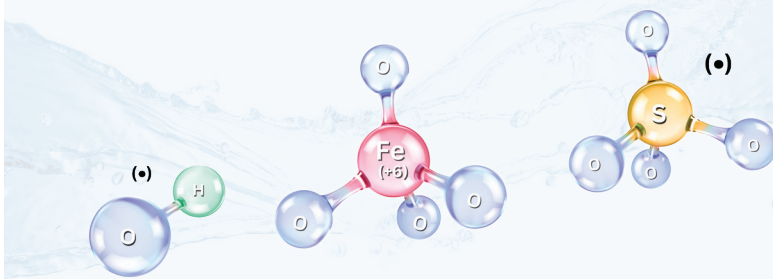


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REDOXY
TREATMENT

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NEXT LEVEL OXIDATION, WITH RADICAL CHEMISTRY



The RED^x Advantages

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.

REDOXY® mobile labs by Watch Water® are provided to test any water on the spot which is absolutely identical to RED^x systems. To order REDOXY® LAB please provide us your company details.

Watch Water® Germany is the only innovator to introduce the first On-Site RED^x generator and the Strongest Oxidant Solution [SOS] generator for disinfection and adsorption of almost every contaminants in water. RED^x technology combines salt of RED^x, OXY^x and ADSORB^x to generate the most cost effective high capacity Oxidant, Disinfectant and Adsorbent with Real Chemistry on site. Our extremely intelligent and expertly designed RED^x generators give all our customers the freedom to produce oxidants, disinfectants and adsorbents in the amount they need and when they need it.

RED^x will serve any kind of water in any kind of industries. RED^x generators are available in different sizes to fit every applications and to produce much superior results compared to any other oxidants and disinfectants including adsorbents, available all over the water treatment market. RED^x chemistries will clean over 7000 billion gallons of water everyday. Safer, economical and absolutely more effective RED^x is just a new revolution in the process of making water neat, clean and safe and without any hazardous byproducts.

WE KNOW THE WATER AND WE CAN RE-USE ANY WATER



PLEASE NOTE

Watch Water® herewith guarantee that there are no toxic products involved in REDOXY® Treatment. 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 REDOXY® 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. For further cleaning effect use of CATALYTIC CARBON® as the polishing filter is best recommended.



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REDOXY
TREATMENT

IMMENSE REDOX POTENTIAL

Ferrate (VI) \rightarrow 2.2 V

Hydroxyl Radicals - OH \cdot \rightarrow 2.7 V

Sulphate Radicals - S \cdot \rightarrow 3.1 V

**FILTERSORB
FILTRATION
ADSORPTION
INSTANT PRODUCTS
// OXY TREATMENT
SYSTEMS**

What is RED \times ?

The element of **RED \times** is iron which is one of the metals in periodic table that is named as "Transition Metal". This is the secret of **RED \times** that it exhibit multiple oxidation states. In fact, theoretically the valence up to +8 can be generated. But the most stable valence is +6 which is called Ferrate (FeO $_4^{2-}$).

Ferrate (VI) is a very powerful oxidizing compound that can be utilized in many applications. **Ferrate** has Oxidation Potential of 2.2 Volts under acidic conditions. As one of the most practical and powerful transition metal **Ferrate [Fe(VI)]** can be utilized to create Fenton's Reaction (activation of H $_2$ O $_2$ with **RED \times**) with its modification to **Hydroxyl Radicals (HRs)** with an extra oxidation potential of 1.8 - 2.7 Volts (depends on the pH and dosing of **OXY \times** values).

Since **RED \times** has now been changed to a catalyst all sulfates in composition of **OXY \times** generates **Sulfate Radicals (SRs)** with a redox potential of 2.5 - 3.1 Volts. Heterogeneous generation of **Sulfate Radicals** has now changed dissolved **RED \times** ions into the solid phase. Metallic hydroxide (FeOOH) particles (as adsorbent) can be easily removed by **KATALOX LIGHT \circledR** Filtration.

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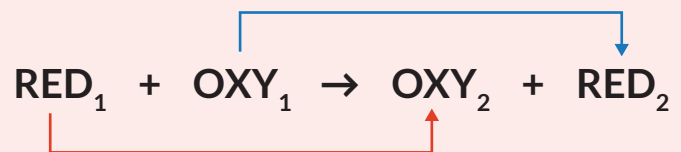
Explanation I

**RED is to reduce
Extremely Toxic organics and
Disinfection of water**

with

**Oxidation potential of over 8.5 V
Xtremely high sulfate and hydroxyl radicals
Yielding breakthrough in chemistry and process**

Explanation II



**RED $_1$ and RED $_2$ are both Reducers
OXY $_1$ and OXY $_2$ are both Oxidizers**

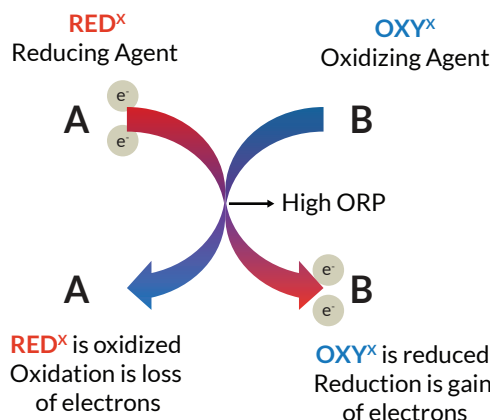
Each pairs RED $_1$ / OXY $_2$
OXY $_1$ / RED $_2$ are corresponding pairs

Oxidizers give electron (-) and Reduce
Reducers takes electron (+) and Oxidize
This process is called **REDOXY \circledR** Reaction

REDOXY CHEMISTRY

RADICAL CHEMISTRY

REDOXY technology, produces the most stable form of **Ferrate (VI)** using just two Components, i.e., Ferric hexahydrate Granules (**RED \times**) and a strong acid halogen (**OXY \times**). Apart of Ferrate, a lot of Hydroxyl (OH \cdot) and Sulphate (S \cdot) radicals are also generated, the combined **REDOX** potential of which has no match in the industry.



OXIDATION-REDUCTION

RED \times acts as a reducing agent and **OXY \times** acts as Oxidizing agent which leads to the transformation of ferrate ions into dissolvable metal hydroxide particles. These particles are adsorbed by **ADSORB \times** and can be easily removed by filtration.

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ADSORPTION
INSTANT PRODUCTS
OXY TREATMENT
SYSTEMS**



High Purity Ferrate

REDOXY® process of mixing Hydrated ferric solution and strong **OXY^x** solution is the easiest method to produce pure **ferrate** in the reaction tank. The purity of **ferrate** is more than 99 % in the mixed form. The **ferrate** reduced is an exclusive process of **Watch Water®** Germany

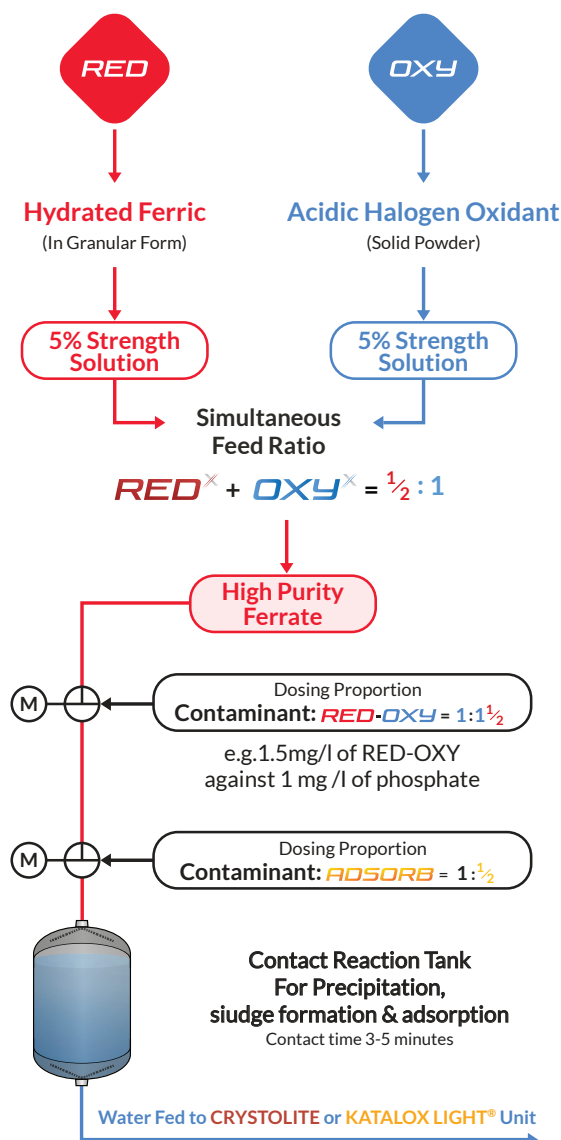
REDOXY® is the safest oxidant, inexpensive and “**environmental friendly**”, especially for potable water and waste water treatment applications. **REDOXY®** is an ideal treatment for industrial and municipal effluent containing hazardous organic and inorganic compounds as listed on page no. 8. Using **REDOXY®** there is no need to dose poisonous and corrosive fesses like chlorine, hypochlorite or ozone. These oxidants have deleterious side effects. Additionally, the handling of chlorine, hypochlorite, HOCl, chlorine dioxide or ozone are potential danger to workers due to their high toxicity. And a major disadvantage of chlorine and chlorine dioxide or any other chlorine-containing oxidant produce, chloramines, chlorinated aromatics, chlorinated amines or hydrocarbons. All of these oxidants are potential mutagens or carcinogens and are for sure more toxic than the parent contaminants.

REDOXY® a new oxidant is designed to move away from chlorine, as well as ozone. Both of the compositions in red and oxy are oxidation products and 100 % biodegradable. The **ferrate** molecule precipitates out of solution as $\text{Fe}(\text{OH})_3$ and now the adsorption process starts to collect cation as well as anions from the water. The iron containing sales can be easily filtered out by **KATALOG LIGHT®** leaving iron-free water containing innocuous by-products

Strong Oxidation Solution (SOS)

Strong Oxidation Solution (SOS) is the highest performing oxidant and disinfectant without producing any environmentally toxic byproducts. The revolution starts and its efficiency is derived from the second oxidant present in the **ADSORB^x** solution in the form of hydrogen peroxide which adjusts the **COD** and **BOD** to zero after dosing.

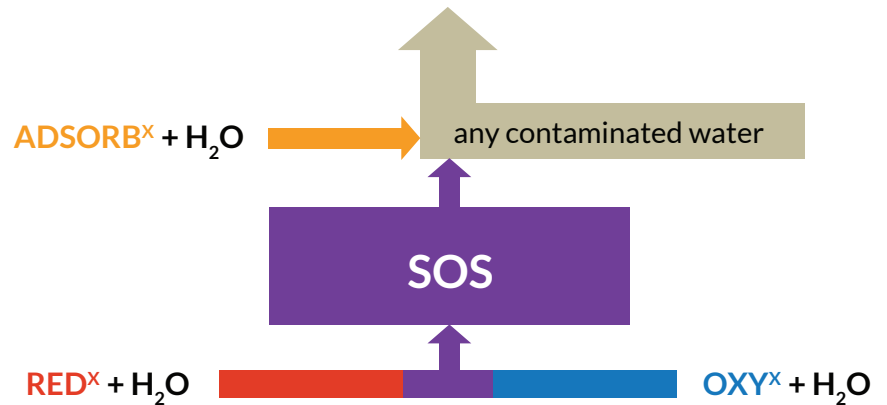
1. **RED^x** and **OXY^x** both food grade salts are injected into the pipe.
2. Strong reaction occurs inside the pipe producing Strong Oxidant Solution (SOS)
3. SOS is ready to use





Strong Oxidation Solution (SOS)

It's safe with **RED^X** - **OXY^X** - **ADSORB^X**.
Only **KATALOX LIGHT[®]** for filtration
and **CATALYTIC CARBON[®]** polishing
for better taste and odor and to catch
microorganisms to make the best water
by **Watch Water[®]**.



Adsorption "A Trap"

RED^X particles made from **ADSORB^X** have a hydrophobic core and a hydrophilic shell. Then Watch water came up with the idea to use these particles to remove toxic chemicals and pollutants including hormones from water and soil using UV light. Due to molecular scale forces, in a solution hydrophobic pollutant molecules are attracted more towards the hydrophobic **RED^X** particles and **ADSORB^X** on to their surface, where they effectively become "trapped". Without using **ADSORB^X** these would remain dissolved and dispersed evenly in water. But when come in contact with **ADSORB^X** which stabilizes the outer shell of the particles as a shed - and now "enriched" by pollutants - they form larger aggregate that can be removed through **KATALOX LIGHT[®]** filtration.

This unique invention of **Watch Water[®]** can be used to extract

- Phthalates
- Hormone-Disrupting chemicals used for softening plastics
- BPA – another endocrine disrupting synthetic compound widely used in plastics and plastic bottles and hundreds of different consumer goods from thermal printing paper samples
- Polycyclic hydrocarbons
- Carcinogenic compounds formed from incomplete combustion of fuels

... from contaminated soil.

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.

Even more exciting!

The oxidation, Disinfection, Adsorption and Filtration, this whole process is irreversible and the backwash waste is biodegradable – minimizing the risks of toxic secondary products to persist in – say "**A Body of Soil**".

Once they switch to this Macro-situation where there are big clumps "Nobody can bring them back".

For the pilot applications where you do not need an expensive system, just use **REDOXY[®] Mobile Lab** to purify water, wastewater or concentrate. It is a cheap testing kit which every water treatment company can afford.



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Contaminant List

(Subjected for update according to new data-collection)

Metal

Cations Removed

Aluminum	Al (III)
Arsenic	As (III)
Barium	Ba (II)
Cadmium	Cd (II), Cd (III)
Calcium	Ca (II)
Cerium	Ce (III)
Cobalt	Co (II)
Copper	Cu (II)
Lead	Pb (II)
Magnesium	Mg (II)
Manganese	Mn (II)
Mercury	Hg (II)
Potassium	K (I)
Silver	Ag (I), Ag (II)
Thalium	Tl (III)
Tin Sn	Sn (II)

Anions Removed

Arsenate	As (III)
Arsenite	As (V)
Ammonia	NH ₃
Chromate	CrO ₄ ²⁻
Fluoride	F ⁻
Molybdate	MoO ₄ ²⁻
Phosphate	PO ₄ ³⁻
Selenite	SeO ₃ ²⁻
Silicate	SiO ₂ ²⁻
Sulfate	SO ₄ ²⁻
Sulfite	SO ₃ ²⁻

Oxidation

(inorganic & organic Contaminants)

- 1 - Diaminopropane
- 1,2 - Ethanediol
- 1,2 - Propanediol
- 1,2,4 - Butanetriol
- 1,3 - Propanediol
- 2 - Mercaptobenzoic acid
- 2 - Mercaptoethanesulfonic acid
- 3 - Amino-1-propanol

- 3 - Mercaptopropionic acid
- Acetaldehyde
- Acetone
- Alpha-Hydroxy-toluene
- Ammonia
- Aniline
- Benzenesulfinate
- Chloral
- Cyanide
- Cysteine
- Cysine
- Diethylamine
- Diethylsulfide
- Dimethylamine
- Dimethylglycine
- Dimethylsulfoxide
- Ethyl alcohol
- Ethyl ether
- Ethylene glycol
- Ferrocyanide
- Fornic acid
- Formaldehyde
- Glycerol
- Glycine
- Glycoaldehyde
- Glycolic acid
- Glyoxal
- Glyoxylic acid
- Hydrazine
- Hydrogen sulfide
- Iminodiacetic acid
- Isopropyl alcohol
- Methionine
- Methyl alcohol
- Methylamine
- Methylhydrazine
- Neopentyl alcohol
- Nitriloacetic acid
- Nitrite
- Nitrosamines
- Methanol
- N-methyliminodiacetic acid
- Oxylic acid
- Phenol

- p-Aminobenzoic acid
- P-Hydroquinone
- p-Nitroaniline
- p-Toluidine
- Sarcosine
- Thioacetamide
- Thiodiethanol
- Thiosulfate
- Thiourea
- Thioxane
- Trimethylaldehyde

Disinfectant and Oxidants

- Aerobic spore-bearers
- B. Cereus
- Bryopsis sp.
- Caulerpa taxifolia
- Dasya baillouviana
- Enteromorpha intestinalis
- Escherichia coli (E. Coli)
- F-specific RNA-coliphage QB
- f2 Coliphage
- S. aureus
- S. bovis
- S. globigii
- S. facalis
- S. flexneri
- Sphaerotilus
- S. Typhimurium
- Styela plicata
- Sulfite-reducing clostridia
- Thermotolerant coliforms
- Total coliform

- 1,1,2,2 - tetrachloroethane
- 1,1,2 - trichloroethane
- 1,1 - dichloroethane
- 1,2 - dichlorobenzene
- 1,2 - dichloroethylene
- 1,2,3 - trichlorobenzene
- 2 - Chlorophenol
- 2 - Nitrophenol

- 2,4,6 - Trichlorophenol
- 2,4 - Dichlorophenol
- Acenaphene
- Anthracene
- Bromodichloromethane
- BOD / COD
- Chlorobenzene
- Dichloromethane
- Diethylphthalate
- Dimethylphthalate
- Ethylbenzene
- Hexachlorobenzene
- Nitrobenzene
- Napthalene
- Pentachlorophenol
- Phenanthrene
- Toluene
- Trichloroethylene

Endocrine Disrupting Chemicals (EDCs)

- Bisphenol A
- Estrone (E1)
- 17β-Estradiol (E2)
- 17α-Ethinylestradiol (EE2)
- 16α-Hydroxyestrone
- 4-Nonylphenol
- 4-tert-Octylphenol

Pharmaceuticals

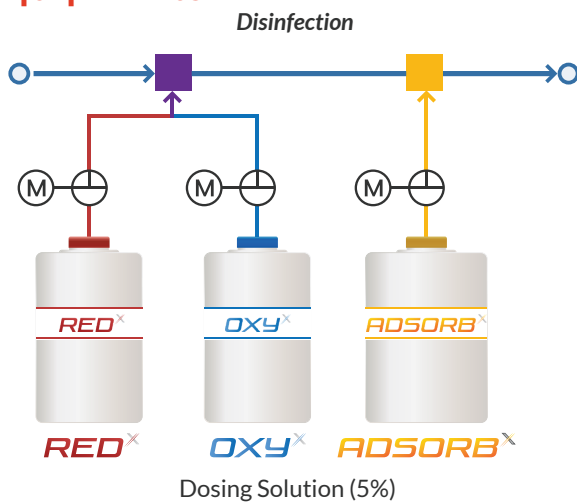
- Sulfamethoxazole
- Ibuprofen

Pesticides

- 2,4 - Dichlorophenoxyacetic acid
- 2,4,5 - Trichlorophenoxyacetic acid
- Dursban
- EDB (Ethylene di-bromide)



Red-Oxy System Oxidant and Adsorption Equipments



Dosing Equipment for **RED^x-OXY^x** The dosing tank with mixer and the dosing pump should make the solution for one week. The flow control equipment to dose should be proportional. **Watch Water®** recommends the use of water-meters with contact cables.

DOSING AMOUNT

The chemical requirement could be approximated according to the half-reaction requirement basis. Here are two examples:

Example 1:

To neutralize 80 mg/l of phosphate dose 80 mg/l of **OXY^x** and 40 mg/l of **RED^x** dosing prepared solution. This would treat 1250 m³ of water with dosing solution prepared from 5 kg of **OXY^x** and 2.5 kg of **RED^x**.

The Dosing table* proportion according to the upper limit TDS is as below.

Parameters	Drinking water	Brackish water	Water/Sea water	Sewage/waste water
TDS limit	Up to 2000 mg / l	Up to 10 000 mg / l	Up to 40 000 mg / l	Up to 50 000 mg / l
Dilution strenght	5%	5%	5%	5%
RED^x	50 ml/m ³	125 ml/m ³	200 ml/m ³	250 ml/m ³
OXY^x	100 ml/m ³	250 ml/m ³	400 ml/m ³	500 ml/m ³
ADSORB^x	50 ml/m ³	125 ml/m ³	200 ml/m ³	250 ml/m ³
Total Dosing	200 ml/m ³	125 ml/m ³	800 ml/m ³	1 000 ml/m ³

A real prototype of **REDOXY®** Dosing system-
manufactured by **Watch Water®** Germany

WARNING: Do not add salt (NaCl) in the OXY^x tank.

Example 2:

Total B = Value 1 + Value 2. Select dosing 1 x B amount of the prepared 5% **OXY^x** dosing solution with combination with 0.5 x B amount of the prepared 5% **RED^x** dosing solution. If **ADSORB^x** is added it shall be also 0.5 x B amount of the prepared 5%.

Cations (mg/l)	Anions (mg/l)
Iron	As (III)
Lead	As (v)
Copper	Phosphate
	Silicate
Value 1	Value 2

* Adjustment might be required to achieve the desired performance.

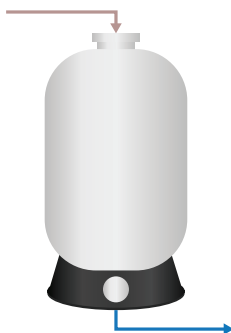


In order to get the best results and to ensure the necessary Ferric Hydroxide production, the operator should take into account the "Total Contaminants" to be removed. In order to achieve the best oxidation results to treat mixture of one or more impurities such as Biological impurities the same amount of oxidant to be used as in the process of Adsorbent production in the reaction tank. Biological impurities are those materials having biological origin. Thus any cells, bacteria, viruses, tissues or components thereof, whether from plants or animals can be considered to be biological impurities. This process will destroy sulfur-containing impurities and compounds containing sulfur atom including nitrogen-containing impurities, radioactive impurities etc.

There is virtually no limits of BOD or COD including TOC that REDOXY[®] cannot handle.

Reaction Tank

Simple reaction tank should be chosen to provide a internal contact time of 3 to 5 minutes. The sludge and precipitation formed in the Reaction Tank must be removed before feeding the water to the **KATALOX LIGHT[®]** Filtration system.



KATALOX LIGHT[®] for Filtration

Water is fed to the **KATALOX LIGHT[®]** units for the filtration stage after contact reaction tank. For **KATALOX LIGHT[®]** sizing please check **KATALOX LIGHT[®]** technical datasheet.

All salts and impurities captured by adsorbent are easier to filter out with **KATALOX LIGHT[®]** media, leaving iron free water containing none of the toxic byproducts. In addition the nature of **KATALOX LIGHT[®]** can be utilized in urban or any industrial water treatment plants. Since the **REDOXY[®]** technology is the highest effective and disinfectant technology, it is possible to replace every chlorinated drinking water equipment.

Therefore, any water, wastewater, irrigation water, surface water or ground water mixed with organic, inorganic or biological impurities in water can install **REDOXY[®]** adsorption/disinfection equipment.

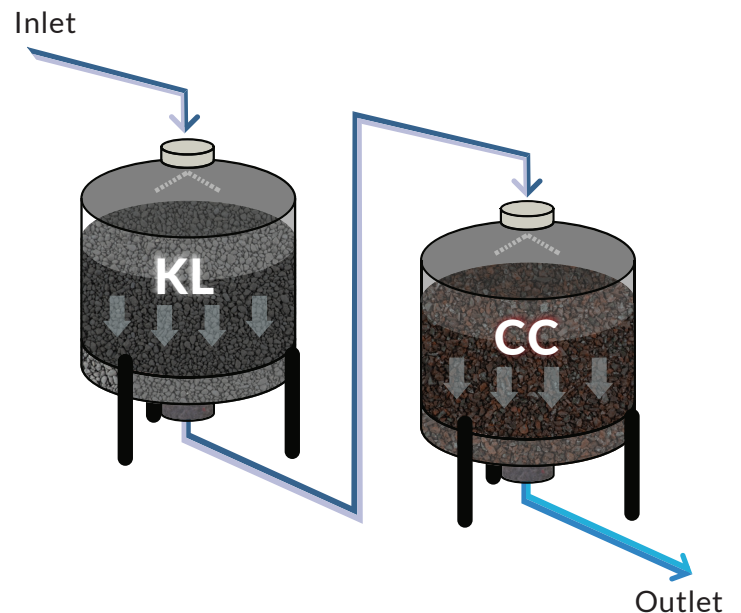
Note:

If ferrate dosing is low the results may not satisfactory and on the other hand if ferrate yield is too high, the pressure drop in the **KATALOX LIGHT[®]** unit will be high.

Reaction tank models	Flow rate	Inlet / Outlet	Contact time
10 x 54	0.5 – 1.0 m ³ / h	¾ inch	3 to 5 minutes
13 x 54	1.0 – 2.0 m ³ / h	1 inch	3 to 5 minutes
16 x 65	2.0 – 3.0 m ³ / h	1 inch	3 to 5 minutes
18 x 65	3.0 – 5.0 m ³ / h	1½ inches	3 to 5 minutes
24 x 69	5.0 – 8.5 m ³ / h	2 inches	3 to 5 minutes
30 x 72	8.5 – 13.0 m ³ / h	2 to 2½ inches	3 to 5 minutes
36 x 72	13.0 – 21.0 m ³ / h	2 to 2½ inches	3 to 5 minutes
48 x 82	22.0 – 36.5 m ³ / h	3 to 4 inches	3 to 5 minutes

Catalytic Carbon for Polishing

The waste water contaminants can include aluminium, chlorine, atrazine and all possible bioaccumulative organics and in the polishing process the presence of **arsenic, cyanide, chromium, pathogens and selenium**; as in the second process the activated carbon is the media with Metal Hydroxide coating and iron fillings. Presence of fluorides, lead and copper including phosphates and nitrates are also not a problem. All the waste waters can be discharged as to **legally allowed limits**. **CATALYTIC CARBON®** technology has solved the problem of trace toxic contaminants prior to discharge. **CATALYTIC CARBON®** shall be used as a polish filter in after the **KATALOX LIGHT®** to remove any trace contaminants to provide the best quality re-usable water



Future of Water and Wastewater

Imagine wastewater so clean that you could bottle it. Imagine an oxidant so strong yet safe. Imagine a disinfectant so powerful but without any byproducts (DBPs). Imagine 1000 liters of wastewater with just few grams of solid waste. Imagine a water treatment facility so safe that you never have to worry about dangers associated with manufacturing Ozone gas or transporting, storing and using Acids and chlorates to produce chlorine gas. All technologies using salts and water and manufacturing HOCl are useless, just useless!

REDOXY® mobile lab has proved to water and wastewater companies around the world that **REDOXY®** on-site test offers significant advantages to prove that this is the only technology which proves its efficiency on site and no other technology can prove it.

APPLICATIONS



Oil & Gas Industry
Mining & Fracking



Irrigation /
Drinking Water



Chemicals &
Pharmaceuticals



Sewage /
Surface Water



Industrial
Wastewater



Landfill Leachate
Paper & Pulp



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Water
Quality
ASSOCIATION

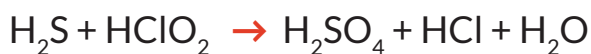
PREMIUM QUALITY
MADE IN GERMANY

**FILTERSORB
FILTRATION
ADSORPTION
INSTANT PRODUCTS
OXY TREATMENT
SYSTEMS**

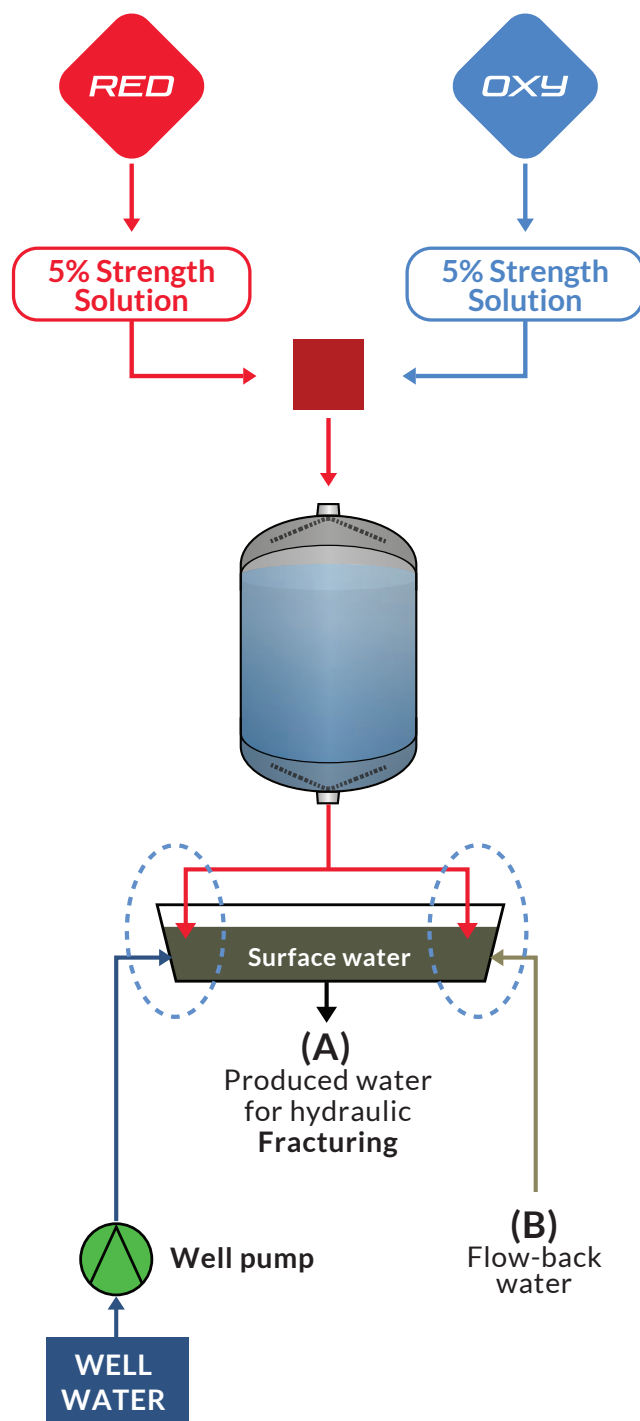


Oil-Field Industry

Watch Water[®] REDOXY[®] process and system that can be used to treat any kind of water or waste water and remove Hydrogen sulfide in the produced water is the most advanced process in oilfield industry. Treatment of used oilfield water containing large amount of hydrogen sulfide is guaranteed using REDOXY[®] process. After removing Hydrogen sulfide with REDOXY[®] water can be reused because it isn't toxic, corrosive or flammable. Big advantage of using the REDOXY[®] oxidation process is, absolute GREEN CHEMICAL oxidizer. REDOXY[®] does not contain any chlorine, chlorine dioxide as the chlorine have a complex chemistry with H₂S. Example reaction between chlorine and Hydrogen sulfide include



Chlorine dioxide oxidize sulfide elemental sulfur that creates precipitation or bulk precipitation. If the water contains a precipitate, it can not be reused as it clog pipes, plug pore throats and damage equipments and formations.



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MADE IN GERMANY

REDOXY
TREATMENT



Treating Hydrogen Sulfide (H₂S) including Oilfield's water

Watch Water® explains the process of fracturing and oilfields waste water. Waste water is a product of injecting water downhole or is formation water that flows from the formation to the **surface**.

As shown on the drawing on page 12 oilfield waste water includes produced water, flowback water and the well water or a combination comprising at least one of the foregoing. Produced water typically is water that flows to the **surface** during production of oil and gas from a subterranean hydrocarbon source.

Flowback water on the other hand, generally is water that flows to the surface after performing a hydraulic fracturing job. The oilfield waste water **(A) Produced water** and **(B) Flowback water** (see Fig. on page 12) contains a plurality of neutral and ionic species that include the elements which are causing heavy scale, corrosion and biofouling. Formulation of **RED^x** Granules contains the iron catalyst with unique combination of ingredients to clarify the oilfield waste water with a flocculent which has the highest capacity to adsorb heavy metals like

- Antimony
- Arsenic
- Copper
- Iron
- Lead
- Manganese
- Phosphorus
- Selenium
- Sulfur
- Uranium

The oilfield waste water also contains high amounts of polyvalent ions these are divalent alkaline earth metals such as Ca²⁺, Mg²⁺, Sr²⁺, Ba²⁺ these cations present cause sulfate precipitation in an amount that depends on pH, that the sulfate solubility depends on the pH or the solubility product constant of the particular sulfate compound as CaSO₄, MgSO₄. Therefore to control sulfate produced by oxidation of sulfides the **OXY^x** contains sequestrants in the formulation having advantages which avoid the precipitation of cations and form scale. To avoid any corrosion the **OXY^x** does not contain any oxidizers such as hydrogen peroxide, calcium peroxide or sodium hypochlorite's.

OXY^x an exclusive formulation of **Watch Water®** to treat waters with high content of sulfides (H₂S) with its very high oxidation power with **RED^x** changes sulfides to sulfates in forming a Recycled water that is useful as a hydraulic fracturing water or in enhanced oil production water. The formulation of **OXY^x** includes,

1. strong biocide
2. scale stabilizer
3. corrosion inhibitor
4. friction reducer
5. pH-adjusting agent
6. scale inhibitor and very important
7. a surfactant.

OXY^x is the best formulation to kill bacteria and reduce the risk of any biofouling, stabilizing water hardness and provide the best corrosion prevention. **OXY^x** in combination of **RED^x** reduce all water and fluid tensions.

REDOXY®: Forging Better Future
The Ultimate Defence against Oilfield Wastewater

**FILTERSORB
FILTRATION
ADSORPTION
INSTANT PRODUCTS
OXY TREATMENT
SYSTEMS**



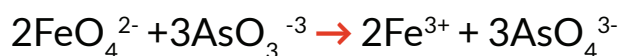
Arsenic removal

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 **REDOXY[®]** makes the fresh adsorbent because of using a soluble form of iron (**RED^x**) to treat all waters.

Most importantly, **REDOXY[®]** 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 **REDOXY[®]** treatment is that a reaction between arsenite and **REDOXY[®]** is extremely rapid (within milliseconds) for all forms of arsenic.

Oxidation Kinetics

In order to provide our customers of how well **REDOXY[®]** will work with "real life". To treat water with 50 ppb Arsenate at pH from 7 to 8 only 0.5 mg of **REDOXY[®]** 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. **REDOXY[®]** is the best oxidation method and the reaction kinetics is as shown below:



REDOXY[®] in small drinking water systems

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 **REDOXY[®]** systems to solve more than 90% of water quality and treatment problems faced by small communities and villages.

REDOXY[®] 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 as low as 0.05 cents to treat one cubic meter (264.2 gallons) of water. **REDOXY[®]** does not react with bromide like ozone, so the carcinogenic bromate is not produced in the treatment of bromide-containing water.

BEFORE



AFTER

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

The days of Ozone, Chlorine, Chlorine gas and Toxic Biocides are gone ...

... Thanks to REDOXY[®]!



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REDOXY[®]
TREATMENT



REDOXY TEST KIT

Still not convinced with our product? You can check the performance of our **REDOXY®** technology yourself easily with our mobile Lab-Kit.

Step 1: To begin test, a sample jar should be filled with the contaminated water.

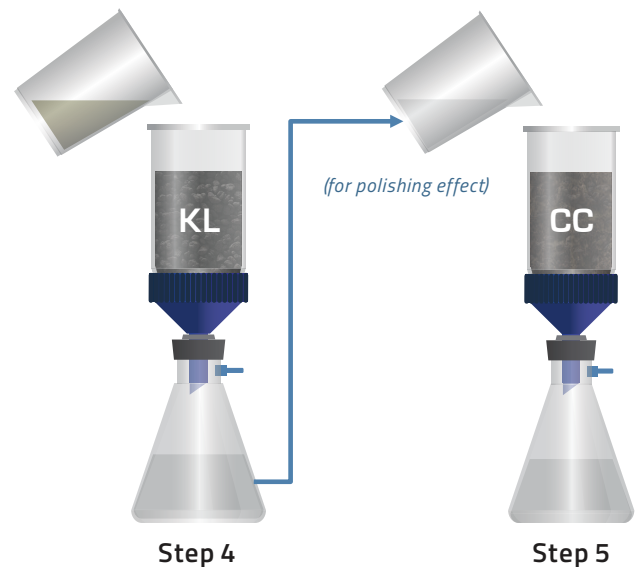
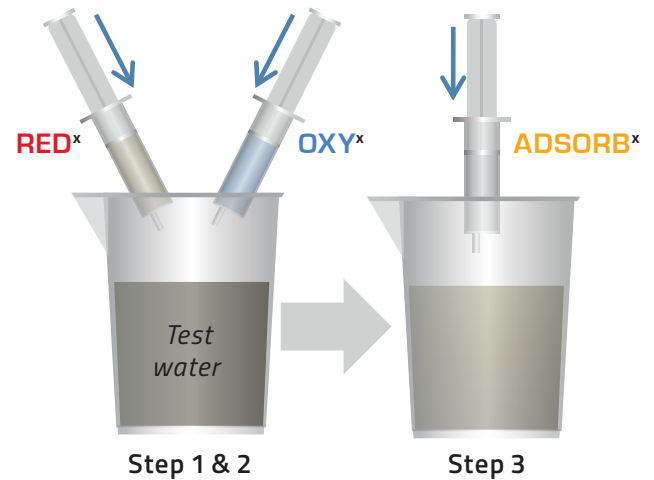
Step 2: And then, **RED** and **OXY** are injected into the sample.

Step 3: Subsequently, **ADSORB** is added to obtain the best results forming immediate sludge and precipitation.

Step 4: The treated sample is then poured through **CRYSTOLITE™** or **KATALOX LIGHT®** filtration media column and then collected again.

Step 5: The collected sample is again poured through **CATALYTIC CARBON®** column for polishing effect.

The **REDOXY®** LAB test can be conducted as a set of comparative tests, usually consisting of 2 to 4 columns in each run. Samples from both the columns can be sent to investigate water quality parameters.



TEST, ADJUST, ADAPT REDOXY LAB KIT

Available to purchase for TRIAL TESTING



A Test Result with **REDOXY®** Lab showed the measured 95 % reduction of very high concentration of sulfate.

Water origin:
wastewater from stone-wash facility in Germany



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PREMIUM QUALITY
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REDOXY
TREATMENT

- FILTERSORB
- FILTRATION
- ADSORPTION
- INSTANT PRODUCTS
- OXY TREATMENT
- SYSTEMS

DESCRIPTION

The complex and persistent organic chemicals found in petrochemical effluent make typical treatment procedures ineffective. Watch Water®, after thorough research, suggested our client REDOXY® very advanced oxidation process. It provided an effective solution for treating petrochemical wastewater and addressing the challenges faced by our client.

Through our innovative technology and commitment to sustainability, the undisclosed company established itself as a leader in the field of petrochemical wastewater treatment.

Petrochemical Wastewater Treatment Location: Undisclosed (due to NDA)



Cleaning of Fracking Wastewater Location: USA



Watch Water®'s expertise in wastewater treatment technologies and knowledge of water chemistry played a significant role in cleaning the fracking wastewater in the USA. Our innovative approach to water and wastewater treatment using radical based AOP technology proved to be an effective and eco-friendly solution to the problem of water pollution.

This project serves as an example of how sustainable and eco-friendly solutions can help solve the most challenging water pollution problems around the world.

FROM WASTE TO WONDER

Disclaimer : The information in this publication is based on reliable data and is provided in good faith, without warranty or performance guarantee, as product use conditions are beyond our control. Watch Water GmbH, Germany, does not offer express or implied warranties, including merchantability or fitness for a specific purpose. Users should assess product suitability and performance with their equipment. Specifications may change without notice. Watch Water GmbH, Germany, is not liable for consequential or incidental damages, such as lost profits from product use.



Standard Packaging

Packaging	Weight of product	Quantity/ pallet	Gross Wt./ pallet	Certification
Box (4 x 5 kg Bags)	20 kg	48	1080 kg	NSF/ANSI/ CAN 60
Drum	60 kg	18	1163 kg	

★ Other packaging can be considered on request

