WATCH WATER.
A Water Company

Part I : General Description

RED-OXY® TREATMENT

OXIDATION - ADSORPTION - FILTRATION

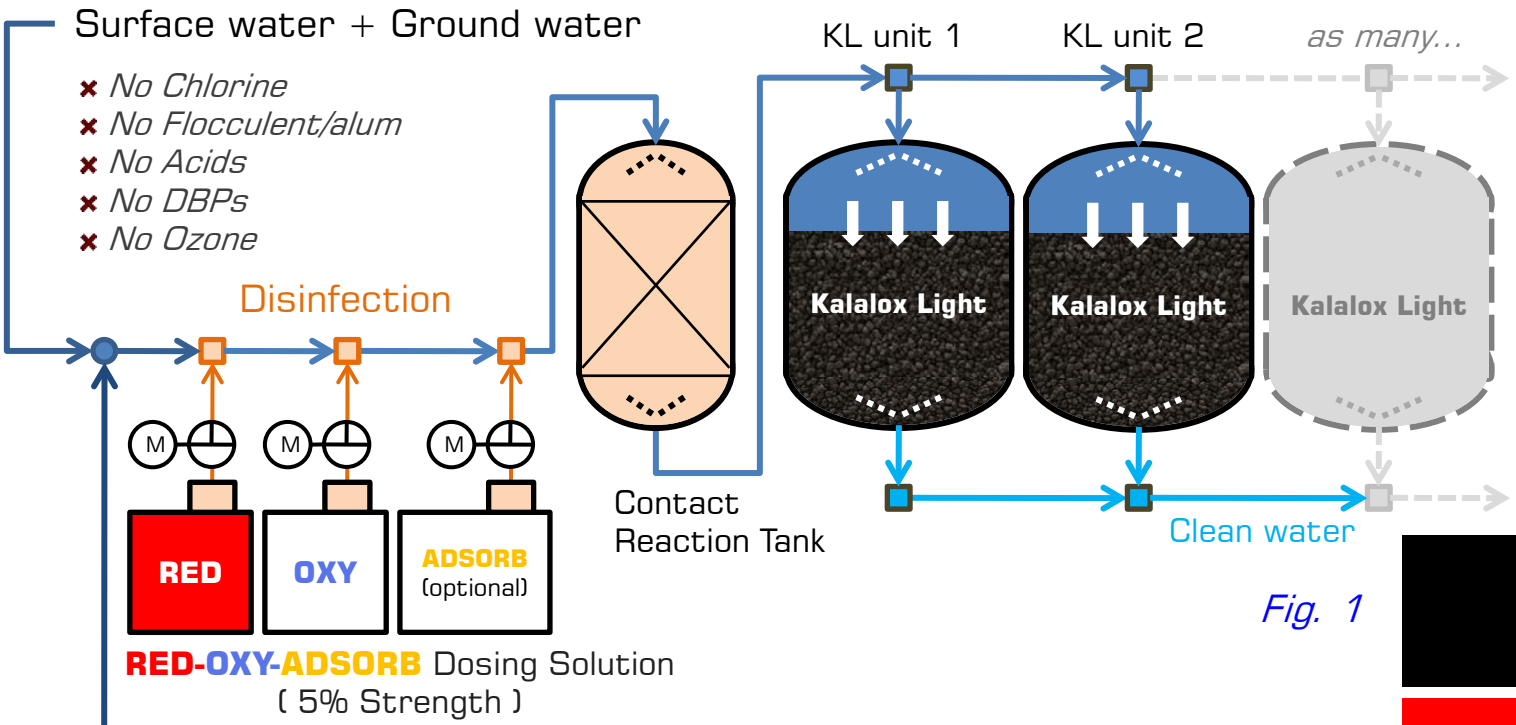


Fig. 1

Wastewater from any source

Contaminants treatable by RED-OXY

- Metal Cations removed
- Anions removed
- Oxidation Inorganic/organic Contaminants
- Disinfectant Oxidant
- Endocrine Disrupting Chemicals (EDCs)
- Pharmaceuticals
- Pesticides

Well Pump

Well Water

Contaminant List
(subjected for update)

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 (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
Fonnic 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

Oxidation
(inorganic & organic Contaminants)
Continues...

N-methyliminodiacetic acid
Oxylic acid
Phenol
p-Aminobenzoic acid
P-Hydroqiunone
p-Nitroaniline
p-Toluidine
Sarcosine
Thioacetamide
Thiodiethanol
Thiosulfate
Thiourea
Thioxane
Trimethylaldehyde

Disinfectant & Oxidants

Aerobic spore-bearers
B. Cereus
Bryopsis sp.
Caulerpa taxifolia
Dasya baillouviana
Enteromorpha intestinalis
Eschericha coli (E. Coli)
F-specific RNA-coliphage QB
f2 Coliphage
S. aureus
S. bovis
S. globigii
S. facalis
S. fiexneri
Sphaerotilus
S. Typhumurium
Styela plicata
Sulfite-reducing clostiridia
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
COD
Chlorobenzene
Dichloromethane
Diethylphthalate
Dimethylphthalate
Ethylbenzene
Hexachlorobenzene
Nitrobenzene
Napthalene
Pentachlorophenol
Phenanthrene
Toluene
Trichloroethylene

Endocrine Disrupting Chemicals (EDCs)

Bisphenol A
Estrone (E1)
17 b-Estradiol (E2)
17 a-Ethynylestradiol (EE2)
16 a-Hydroxyestrone
4-Nonylphenol
4-tert-Octyphenol

Pharmaceuticals

Sulfamethoxazole
Ibuprofen

Pesticides

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

High Purity FERRATE

Red-Oxy® 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.

Red-Oxy® is the safest oxidant, inexpensive and "environmental friendly", especially for potable water and waste water treatment applications. Red-Oxy® is an ideal treatment for industrial and municipal effluent containing hazardous organic and inorganic compounds as explained on page no. 2-3. Using Red-Oxy® 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, are for sure more toxic than the parent contaminants.

Red-Oxy® 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 $Fe(OH)_3$ 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 Katalox-Light leaving iron-free water containing innocuous by-products.

Red-Oxy® Process

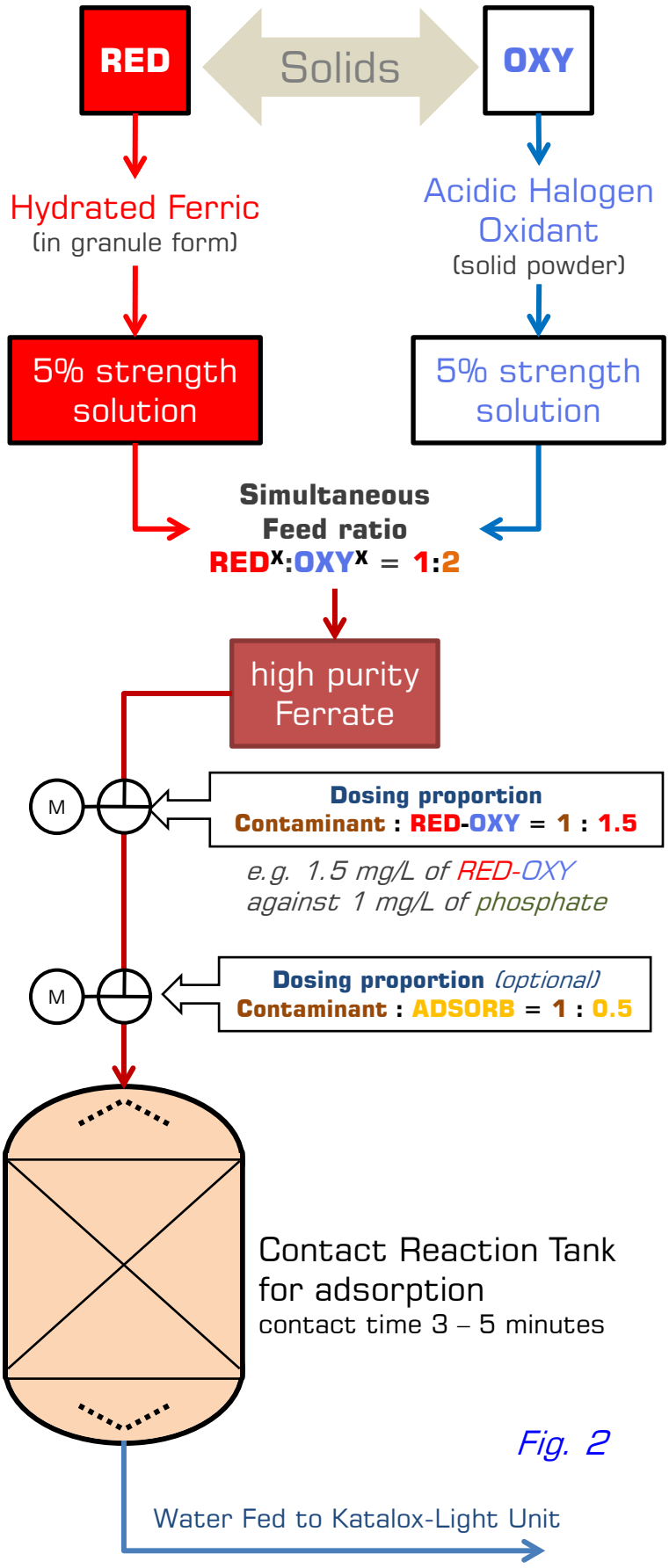


Fig. 2

What is Red-Oxy®?

Red-Oxy® Generated Ferrate with Watch-Water ® process s 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 generated 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

Hexahydrate Granules ⟷ **RED^{X}**

+

Acidic Halogen Oxidant ⟷ **OXY^{X}**

Red-Oxy® spontaneously decomposes in the presence of all contaminants listed on page 2 & 3, in any kind of water into strong oxygen and the most powerful Adsorbent based no ferric hydroxide with the surface area of 3500 m^2/gram.

The chemical formation reaction is

$$Fe(OH)_3 + ¾O_2 + 2OH^-$$

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 2 & 3. As many of the reactions are pH based reaction 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 $HFeO_4^-$

Red-Oxy® 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** and a chemical disinfectant which in future is **OXY^{X}** and the sand filter in future are Katalox-Light systems. However only adding ISOFT Corrosion Control chemicals may be necessary if after treatment corrosion-control is needed. Watch-Water has developed this technology in INSTANT form of **RED** & **OXY^{X}** to save transportation cost of chemicals.

Solutions for all contaminants problem just got much easier. How to approach come thousand so of communities, municipalities to use this innovative treatment : Red-Oxy® - Oxidation and Adsorption represents an improved Multiple Applications.

All conditions → One Solution

Oxidant and Adsorption Equipments

First : Dosing Equipment for RED^{X}

In order to get the best results and to ensure the necessary Ferric Hxdroxide production, the operator should take into account the „Total Contaminants“ to be removed.

Total contaminants and dosing ratio is 1 to 1. 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.

Example:	**Cations (mg/L)**	**Anions (mg/L)**
	Iron	As (III)
	Lead	As (V)
	copper	Phosphate
		silicate
	Value1	Value2

Second : Dosing Equipment for OXY^{X}

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. All other impurities as listed on the “contaminant list” (page 2 & 3).

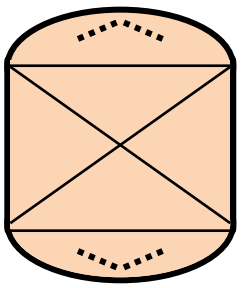
Total **B** = Value1 + Value2. Select dosing 1x**B** amount of the prepared 5% OXY^{X} dosing solution with combination with 0.5x**B** amount of the prepared 5% RED^{X} dosing solution.

e.g. to neutralize 80 mg/L of phosphate dose 80 mg/L of OXY^{X} & 40 mg/L of RED^{X} dosing prepared solution. This would treat 1250 m^3 of water with dosing solution prepared from 5 kg of OXY^{X} and 2.5 kg of RED^{X}.

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.
- There is virtually no limits of BOD or COD including TOC.

Third : Reaction Tank



Simple reaction tank should be chosen to provide a internal contact time of 3 to 5 minutes

Flow rate	Reaction Tank models	Inlet/Outlet	Contact time
m^3/h		inches	minutes
0.5 – 1.0	10x54	¾	3 to 5
1.0 – 2.0	13x54	1	3 to 5
2.0 – 3.0	16x65	1	3 to 5
3.0 – 5.0	18x65	1½	3 to 5
5.0 – 8.5	24x69	2	3 to 5
8.5 – 13.0	30x72	2 to 2½	3 to 5
13.0 – 21.0	36x72	2 to 2½	3 to 5
22.0 – 36.5	48x82	3 to 4	3 to 5

Katalox-Light 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 Red-Oxy® 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 Red-Oxy® Adsorption/Disinfection equipment.

Watch-Water® is proud to announce the newest addition to the

Oxidation and Adsorption in One process, Red-Oxy® Treatment

Message from the Leader board

Our partners will build
- Laboratory pilot Scale
- On-site Pilot Scale

We will be using any kind of water samples. This will allow us to prove the technology.

If you ask, is FeO_4^{2-} is the solution for
- Disinfection
- Oxidation and
- Adsorption followed by KL filtration

- for water treatment in future ?
The answer is YES!

Red-Oxy® is the most powerful multi-purpose and environment friendly technology known in water-treatment.

Red-Oxy® is available as INSTANT product (solid granule/powder form) that can be delivered worldwide without unnecessary water.

99% purification/separation can be achieved using Red-Oxy® (Ferrate Hexahydrate) Technology.

Packaging:
- 4 x 5 kg bags of **RED**^{X} (Hydrated Iron in solid form) in a box
- 4 x 5 kg bags of **OXY**^{X} (oxidizer chemical in solid form) in a box
- 4 x 5 kg bags of **ADSORB**^{X} (adsorbent chemical in solid form) in a box

Distributed by:

Address:

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Fax:
Email:

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A Water Company

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