

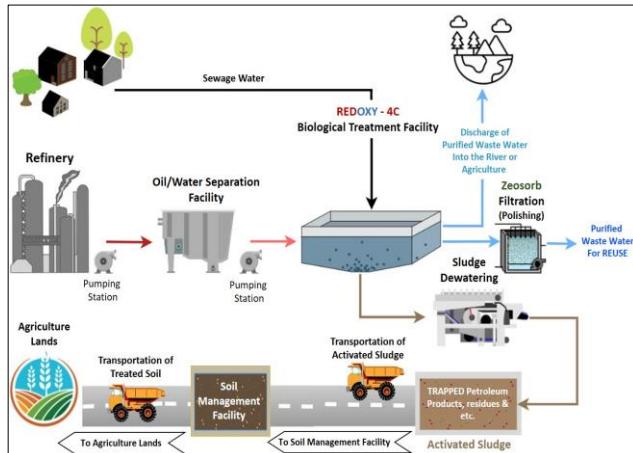
UNIQUE

REDOXY-TREATMENT

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REDOXY-4C

RedOxy-4C Biological Treatment Facility



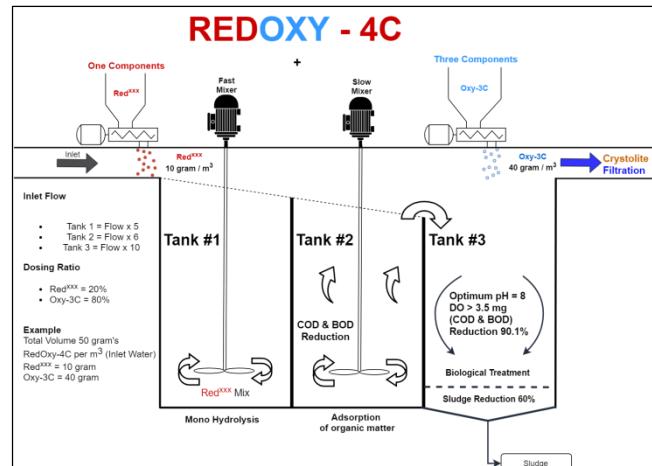
Treatment of Waste Water from the Refinery and Petrochemical Industry

The biological treatment facility is intended for any waste water treatment using **UNIQUE** Technology from **Watch Water®**. These technology uses very **Advanced Oxidation Process** making it possible to intensify the processes by manyfold excluding the secondary sludge basins from the process chart, remove suspended substances by 100%, **Chemical Oxygen Demand (COD)** by 90.1%, **Biological Oxygen Demand (BOD)** by 90.1% and reduce the space occupied by 6 times compared to traditional waste water treatment plants. Up to 90% of treated water can go for Agriculture applications. The remaining water will go with the sludge and further advanced treatment could be managed by **Soil Management**.

The soil management receives trapped watered petroleum products from different industries. All types of sludge undergo necessary treatments like:

1. Dewatering
2. Purification
3. Bio-destruction which makes it reusable.

Trapped petroleum products are used as Carbohydrates for bacteria and residues as soil for backfilling in **agricultural land**. This is a unique feature of **RedOxy-4C**.



Please see page no.2 for Tank Size Calculation and Example

- Treatment facilities will use very small area. 6 to 8 times less than conventional technologies.
- Using **RedOxy-4C** (Biological Treatment) will save the Refineries, Petrochemical Industries and any other Industries to build bulky secondary sludge basins for trapping activated sludge after **Oxy-3C** treatment, this will reduce huge investments and half the cost's – Area used will reduce up to 4-5 times.

Major Pollutants in Petroleum Industry

- | | |
|--------------------|---------------------------------------|
| □ Suspended Solids | □ Mercaptans |
| □ Free Oil | □ Hydrogen Sulfide (H ₂ S) |
| □ Ammonia | □ High COD |
| □ Sulfides | □ High BOD |
| □ Phenols | □ High TDS |
| □ Chlorides | |

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MICROBIAL DEGRADATION OF HYDROCARBONS

Tank Volume calculation for RedOxy-4C Treatment

Example:

If inlet Flow = 5 m³/h, then

- Volume of Tank 1 = 5 x Inlet Flow = 5 x 5 = 25 m³
- Volume of Tank 2 = 6 x Inlet Flow = 6 x 5 = 30 m³
- Volume of Tank 3 = 10 x Inlet Flow = 10 x 5 = 50 m³

Recommended dosing percentage for RedOxy-4C

Red^{xxx} = 20%

Oxy-3C = 80%

Example:

Optimum dosing rate for given water = 50 grams/m³ then

Red^{xxx} dosing = 20% of 50 gram = 10 gram/m³

Oxy-3C dosing = 80% of 50 gram = 40 gram/m³

What is Red^{xxx}?

Red^{xxx} granular beads Formulated as FeO₄²⁻ (anion) and possesses **unique properties** as strong oxidizing potential and simultaneous generation of **Adsorption** sites. For this reason, **Watch Water®** has chosen Red^{xxx} for hard to treat waste water. Red^{xxx} could degrade or oxidize organic, inorganic impurities and remove suspended/colloidal particle materials using Granular dosing and mixing unit (see process chart) for further details.

Red^{xxx} can even treat **Micropollutants** in water purification processes. Red^{xxx} is very promising in the removal of **BOD** and **COD**. Red^{xxx} is a promising application for 50% sludge reduction, biogas desulfurization and remove phosphates in sewage treatment systems. Utilization of Red^{xxx} is recommended to treat highly contaminated waters.

Red^{xxx} as a multipurpose water and wastewater **Granular**, due to its **Green Nature**, which is the center of attention these days. Red^{xxx} have the potential to become one of the Catalyst for future generation.

The effectiveness of the Red^{xxx} treatment is also reflected in the dosage. Very small dose of Red^{xxx} are sufficient for Hydrocarbon treatment. 10 grams of Red^{xxx} is a sufficient dose for 99% removal of organic compounds at pH 8, temperature 25°C and contact time of 30-40 minutes. If the concentration of **Hydrocarbons** is low, the required Red^{xxx} concentration is also low.

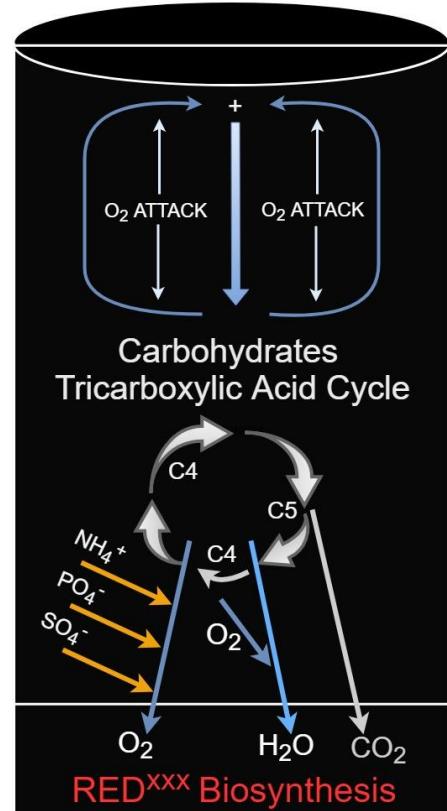


Figure 1. Cell biomass + Growth

Advantages of Red^{xxx}

- Very Powerful**
- Very fast**
- Very Effective**
- Very Economical**
- Reduction of sludge**
- Green Technology**

Very Selective Oxidant for

- Hydrogen Sulfide**
- Phenols**
- Olefins**
- Polycyclic Aromatics**
- Amine or Aniline moieties**

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UNDER AEROBIC CONDITIONS

Introduction

The most rapid and complete degradation of the majority of organic and inorganic pollutants including **Fats, Oils and Grease (FOG)** is only possible with application of **RedOxy-4C** under aerobic conditions. The **Figure 1** shows the main mechanism of changing Hydrocarbons into Carbohydrates with oxygenation. The initial **Red^{XXX}** attack on organic pollutants is an advanced oxidation process for **Hydrocracking** and the incorporation of oxygen. This reaction is the key of **Catalyst Ferrate (FE VI)** and **Peroxidases** to convert all organic pollutants step by step into intermediates of the central intermediary metabolism. As in **Figure 1** the **Tricarboxylic Acid Cycle**.

Hydroxylation is the step of **Oxy-3C**. In this step the **Oxidative** degradation of organic compounds in water, wastewater and any source of **Toxic water**. It is extremely important in detoxification since hydroxylation

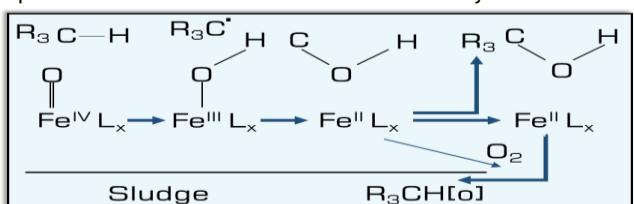
converts **lipophilic** compounds into water-soluble (Hydrophilic compounds) that are almost removed by **OXY-One**. All pharmaceuticals are also deactivated in the process of Hydroxylation.

Bio-Oxylation - Biological Process

The biological process involves conversion of a Carbohydrate group (**CH**) into Carbon Oxygen Hydro group (**COH**). **Bio-Oxylation** is an oxidative process. The oxygen that is inserted into the C-H bond is derived



Since O_2 itself is a slow and unselective BIOOXYLATING agent, Ferrate Catalysis is required to accelerate the speed of the process and to introduce selectively.



REDOXY-4C GRANULES FOR BIOREMEDIALTION

The most frequently Hydroxylated residue in wastewater is very large biomolecules of one or more long chain of amino acids. The key elements of an **amino acid** are as follows.



The degradation of petroleum Hydrocarbons can be mediated by specific Enzyme system. The initial attack on substances based on chemicals found within an organism that are

not naturally produced. For example, Drugs, Antibiotics PCB's, PVZ, Hormones, estrogens and heavy metals.

Organic compounds in petroleum and crude oil industry uses **Bisphenol (BPA)**, **Nonylphenol (NP)** and these are the major pollutants in wastewater plants. These effects have shown to result in adverse Environmental effects on a global scale in potential **ECOTOXIC concentrations**. Activated sludge by **RedOxy-4C** is a very robust method to reduce BPA and NP concentration by more than 99% through biodegradation under strong Aerobic conditions of **OXY-Three** by **OXYGENASES**.

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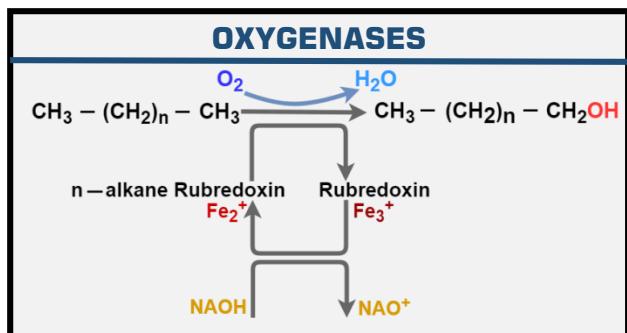
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REDOXY-4C GRANULES FOR BIOREMEDIATION



Benefits of OXY - Three

- Accelerates natural biodegradation of organics and petroleum Hydrocarbons
- Optimised for further degradation of pollutants in sludge
- Long duration of released oxygen up to 12 months.
- Adsorb micro-nutrients from wastewater; Nitrogen, Phosphates and Potassium (NPK) which are beneficial for aerobic microorganisms.

HOW MICROBES WILL CLEAN UP THE WASTE FROM EVERY POLLUTED WATER WITH ORGANICS?

Organics, Inorganics including Carbohydrates from Petroleum Hydrocarbons (PH) bacteria and other microbes are the only quick solution that will ultimately clean up the ongoing difficulty of **Micro-plastics, Pharmaceuticals waste, PFOA's , BPA and Hydrocarbon problems** in all waste water system , Lakes, and Oceans around the world. However, to achieve such results with bacteria and microbes, the requirement of continuous oxygen release is necessary.

OXY-Three will give trillion of Bacteria, and Microbes a steady **oxygen** to consume the contaminants. **OXY-Three** will break the **Fat, Oil and Grease** into tiny **carbohydrates** that can be easily consumable by bacteria. If the waste (food) is in very small droplets, microbial degradation is rapid and much quicker. **RedOxy-4C** is the next generation wastewater remediation.

AEROBIC WASTEWATER WITH OXYGEN

FUTURE = OXY-3C : Aerobic

OXY-3C: Aerobic wastewater treatment with pure oxygen without any influence of polluted air from atmosphere. There is no requirement of any aeration pumps, oxygenation equipment, diffusion hoses or any electrical control systems. The great benefits of all is the automation process without the need for installation engineers, supervision, commissioning services, maintenance, spare parts, and reduced energy consumption for affordability.

OXY-3C : Most efficient technology available in water and wastewater treatment industry. Based on 40 years of experience, Watch Water has developed a complete portfolio of

PAST = Aeration Plants

This is absolutely not the efficient process, as air bubbles from aeration consist of 20 percent of **Oxygen** and the rest is Nitrogen and polluted air, which is not required. Watch Water team knows very well that **Oxydes** products are more efficient to deliver oxygen to these water-dwelling bacteria than to send polluted **Air bubbles** to them through the wastewater.

As we humans, we do not fill our lungs up with water and then pump air bubbles into them to receive oxygen, we simply breath the air around us directly into our lungs. Why should the way the bacteria take in oxygen be any different?

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FUTURE = OXY-3C : Aerobic

Oxygenation, Catalyzation, Filtration and Adsorption processes to meet customer's needs. **Oxydes** products are designed for temporary to permanent aeration solution and from low to high oxygen demand.

Free-flowing granules designed to settle on the bottom of the basins for continuous dose of oxygen. Without the necessary requirement for external power and any diffusion hoses or injections. The purpose of **OXY-3C** is added through the granular doser as it is flowing directly to the sediment surfaces and endorsing this technology as the ideal choice for Water, Wastewater and Petrochemical industry.

RedOxy-4C treatment technology operates on the concept of "**PASSIVE AERATION**" whereby the water is flowing directly from Tank Number 3 to **Water Reuse**. Leaving behind the bacteria in sludge and water with high **Dissolved Oxygen** for irrigation and fertilization discharged to nature.

"WATCH WATER CHALLENGES EVERY CITY TO BUILD A WASTEWATER TREATMENT PLANT THAT IS RIGHT ACROSS THE STREET FROM COMMERCIAL PROPERTIES AND CLOSE TO RESIDENTIAL PROPERTIES"

High content of oxygen can accommodate more bacteria in sludge to destroy more pollutants. The bacteria can then continue to remove organic carbon and nitrogen pollutants from the sludge in a way that produces substantially less **Greenhouse gases**, Odors and Sludge. The remaining sludge could be used as soil for Agricultural or Horticultural applications.

PAST = Aeration Plants

The current wastewater treatment technologies around the world are more than 120 years old. Currently, most of the **electricity consumed** by the wastewater treatment plants is to **OXYGENATE WASTEWATER**. This past method of OXYGENATE wastewater is an inefficient process and the perfect solution is through **OXY-3C**. Leaving **OXY-3C** to have a huge potential to revolutionize the wastewater treatment industry.

OXY-3C can offer significant operational saving for any nation by reducing the volume of Electricity, Maintenance and operational costs by 100 percent. In addition, **OXY-3C** process can dramatically lower the carbon footprint associated with treating world wastewater.

In conventional methods, aeration tanks in wastewater treatment constitute a significant source of Aerosol emission. Considerably a huge number of microorganisms are emitted into the atmosphere from wastewater collection tanks and secondary settling tanks. Wastewater treatment plants ranks highest for atmospheric pollution because of aeration. They are a substantial emitter of microorganism conveying aerosols or pathogenic bacteria, viruses and fungal spores. Particularly, wastewater aeration causes the emission of smaller or larger droplets containing protein material and this causes various allergies, and some legionella. The biggest source of biological aerosols are Aeration tanks.

Using **RedOxy-4C** instead of extended aeration is recommended as the only method for reducing emission of bio aerosols. It seems necessary for responsible organizations and official to meet Watch Water branches around the world.

"The World Leader in Clean Oxygen Solutions for Wastewater Treatment Plants and Clean Air Solutions"