

An Explanation of Advanced Oxidation

Oxidation is a chemical reaction in which an element or ion is increased in positive valence, losing electrons to an oxidizing agent. To oxidize is to change a substance by chemical reaction by combining it with oxygen, such as fire or rust.

CHEMICAL OXIDIZERS

(in order of strength)

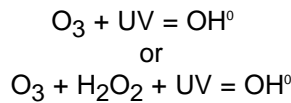
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| <ol style="list-style-type: none"> 1. Fluoride * 2. Hydroxyl Radical * 3. Ozone * 4. Hydrogen Peroxide 5. Permanganate | <ol style="list-style-type: none"> 6. Chlorine 7. Bromine 8. Iodine * 9. Oxygen |
|---|---|

* Elements of the Catalytic Oxidation Process

By utilizing Redundant Oxidizers, the speed and efficiency of the oxidation process is greatly increased, in some cases over 40 times. Oxidants considerably stronger than chlorine include Hydroxyl Radical (OH[°]), Ozone (O₃), and Hydrogen Peroxide (H₂O₂). These oxidizers are preferred for potable water treatment or water recycling as they leave no dissolved byproducts as chlorine does. OH[°], O₃ and H₂O₂ consist of hydrogen and oxygen.

Oxidizing reactions of interest in pollutant removal is OH[°] or Hydroxyl Radical, a byproduct of the Catalytic Oxidation process. OH[°] is very unstable, thereby making it very aggressive or a free radical. The Hydroxyl or free radical occurs when ozone or hydrogen peroxide reacts with UV radiation and protolysis occurs. Although the Hydroxyl Radicals are short lived, they have a higher oxidation potential than ozone, chlorine, or hydrogen peroxide, and their unstable nature increases their reaction speed. A strong benefit of Catalytic Oxidation is the end products of CO₂ and H₂O, or Carbon Dioxide and Water.

Catalytic Oxidation occurs with:



O₃ - Ozone
 UV - Ultraviolet
 OH[°] - Hydroxial Radical
 H₂O₂ - Hydrogen Peroxide

- For potable water treatment UV and O₃ are used in our UV/O₃ Catalytic Systems.
- The addition of H₂O₂ is added to O₃ and UV in our CO³P Catalytic Oxidation Systems and is highly recommended for

The Advantages of Catalytic Oxidation

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| <ul style="list-style-type: none"> • Redundancy of Oxidants • Disinfectant - kills bacteria & virus • Oxidation of organics to CO₂ & H₂O • Oxidation of inorganics, iron, etc. • Color removal - Ozone breaks chromophones bonds | <ul style="list-style-type: none"> • Odor Removal - removes sulfur, nitrogen, and organic odors • Algae Control - directly kills algae and algae food source • Suspended Solids Removal - micro coagulation aiding filtration • Safety - the byproducts are CO₂, H₂O, O₂, and H |
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Applications

I. RGF's UV/O₃ Catalytic Oxidation Systems:

RGF's UV/O₃ Catalytic Oxidation Systems destroy by oxidation and precipitation the following potable water contaminates up to 40 times faster and more effectively than UV or ozone alone:

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| <ul style="list-style-type: none"> • Bacteria • Viruses • Iron * | <ul style="list-style-type: none"> • Algae • Odors • Oils, Fats and Grease | <ul style="list-style-type: none"> • Color • BOD/COD • Chlorine | <ul style="list-style-type: none"> • Manganese * • VOC's * by precipitation |
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- RGF's UV/O₃ Catalytic Oxidation Systems produce a hydroxyl radical (HR) by activating ozone with UV light. These systems are intended to be used for potable water sterilization treatment.

II. RGF's CO³P Catalytic Oxidation Systems:

RGF's CO³P Catalytic Oxidation Systems destroy by oxidation and precipitation up to 40 times faster and more effectively than UV, Ozone, or hydrogen peroxide alone virtually all organics and most metals.

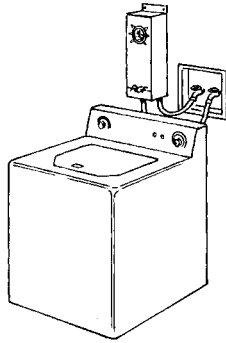
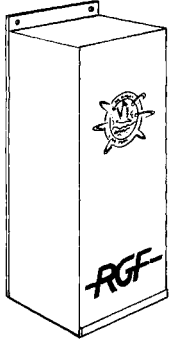
- RGF's CO³P Catalytic Oxidation Systems produce a hydroxyl radical (OH[°]) by activating ozone and hydrogen peroxide with UV light. These systems are intended to be used for wastewater oxidation and hazardous wastewater treatment.



ADVANCED OXIDATION WATER TREATMENT SYSTEMS

RGF LaundryPure™ System Household Laundry Advanced Oxidation System

Laundry detergents are primarily made up of phosphates, and phosphates are described by the EPA as one of our most threatening water pollutants. The RGF LaundryPure™ System will eliminate all the problems associated with traditional detergent based laundry programs. RGF has refined the advanced oxidation process for use on residential laundries. The environmentally friendly RGF LaundryPure™ System utilizes four of nature's most effective and safe cleaning technologies: Ozone, Ultraviolet Light, Hydroxyl Radicals and Natural Enzymes. The hydroxyl radicals and natural enzymes break down dirt, oils, heavy soiled areas and stains during the wash cycle. Then, during the final rinse, the hydroxyl radical is again injected for a final cleaning disinfection.



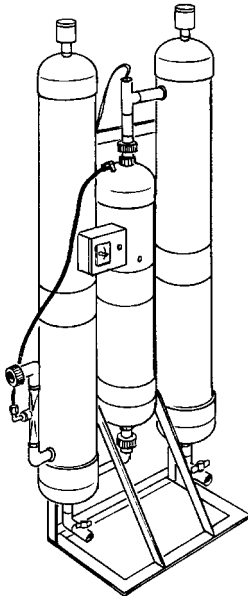
BENEFITS:

- *Eliminates harmful detergents - helps save our environment*
- *Reduces Fabric Decay*
- *Eliminates Skin Allergies caused by Detergents*
- *25% fluffier Towels and Sweaters*

- *Dimensions:* 22" H x 6.5" W x 6.5" D
- *Connections:* 3/4" hose for cold water spigot
- *Electrical:* 120 VAC 60 Hz 3 Amps
- *Max. Pressure:* 90 PSI
- *Ozone Production:* H.O. 185 Nm Ultraviolet Light Source

Description	Treatment Capacity	Max Flow Rate	Ship Wt.
RGF LaundryPure™ System	---	10 gpm	15 lbs.
RGF Ozone Activation Enzyme Tablets	100 Loads	---	2 lbs.

RGF HomePure™ Catalytic Oxidation System Potable Water Oxidation System



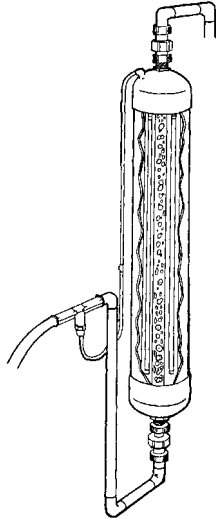
RGF's HomePure™ Catalytic Oxidation System is an inline ultraviolet light and ozone water sterilization system intended to disinfect municipal water sources prior to entry into your home's water system. The system utilizes one ultraviolet light source, which provides 40,000 mW-sec/cm² of disinfection capabilities, well over twice the recommended minimum dosage required by the Department of Health, Education, and Welfare. Plus, the HomePure™ System adds ozone through venturi injection for additional disinfection capabilities making it the best water sterilization system on the market. The addition of ozone with the UV light activation creates a hydroxyl radical which is a much stronger oxidizer than ultraviolet light or ozone alone. An optional Pre-Filter for particulate filtration and an optional post carbon filter are available for water clarification.

- *Dimensions:* 7' H x 1.5' L x 1' W
- *Electrical:* 120 VAC 60 Hz 2.0 Amps
- *Max. Pressure:* 90 PSI
- *Max Flow Rate:* 10 gpm
- *Ozone Production:* H.O. 185 Nm Ultraviolet Light Source

Item #	Description	Ozone Output @ 10 gpm water flow	Retention Time @ 10 gpm water flow	UV Intensity Dosage	Ship Wt.
HOPU-16	HomePure™ System	596 ppm - 0.864 g/hr	2 minutes	40,000 mW-sec/cm ²	213 lbs.
OP-089	Optional Pre-Filter	---	---	---	6.8 lbs.
OP-087	Optional Post Carbon Filter	---	---	---	6.8 lbs.



RGF UV/O₃ Catalytic Chambers UV / Ozone Catalytic Oxidation Chambers



RGF's UV/O₃ Catalytic Chambers are a combination of ozone and ultraviolet light in one easy-to-service chamber. The combination of the UV and ozone produces a hydroxyl radical which is an extremely effective oxidizer. With optional service unions on each end, a cloth swab can be easily passed through the quartz tube for cleaning. Two sizes to choose from to fit your application. Both models require an Ozone Venturi to operate.

- *Dimensions:* UV-O3-ST: 6"D x 39"L
UV-O3-XL: 8"D x 39"L
- *Electrical:* UV-O3-ST: 120/220 VAC 50/60 Hz 1.0 A
UV-O3-XL: 120/220 VAC 50/60 Hz 2.0 A
- *Ozone Production:* H.O. 185 Nm Ultraviolet Light Source

Note: Please specify power requirements at time of order.

<i>Item #</i>	<i>Description</i>	<i>Ozone Output @ 20 scfh</i>	<i>UV Intensity Dosage</i>	<i>Ship Wt.</i>
SA-005T	6" UV / O ₃ Catalytic Chamber	405 ppm - 0.432 g/hr	20,000 mW-sec/cm ²	22 lbs.
SA-006T	8" UV / O ₃ Catalytic Chamber	596 ppm - 0.864 g/hr	40,000 mW-sec/cm ²	31 lbs.
PT-086	1" Ozone Venturi	---	---	1 lbs.