

# RAYOX® MODULAR TREATMENT SYSTEM

Model 120 (120kW System)

## Description

The RAYOX advanced oxidation system supplied by Calgon Carbon Corporation destroys dissolved organic contaminants in water. In this system, a proprietary high-powered, medium pressure lamp emits high energy UV radiation through a quartz sleeve into the contaminated water. An oxidizing agent, typically hydrogen peroxide, is added to the contaminated water and is activated by the UV light to form oxidizing species called hydroxyl radicals, via:



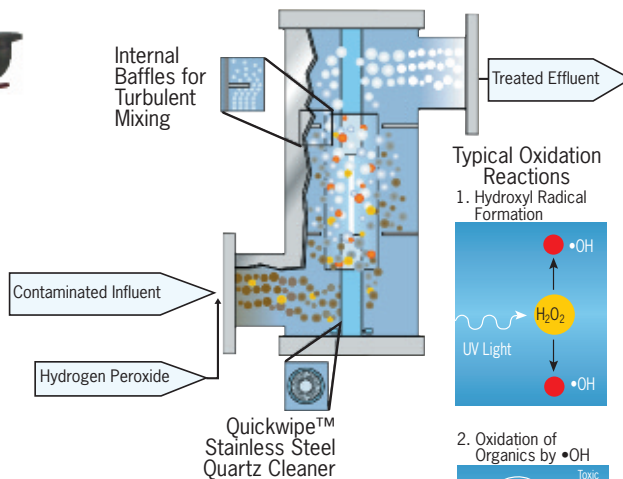
The hydroxyl radical then reacts with the dissolved contaminants, initiating a rapid cascade of oxidation reactions that ultimately fully oxidizes (mineralizes) the contaminants. The success of the system is based on the fact that the rate constants for the reaction of  $\bullet OH$  radicals with most organic pollutants are very high. The hydroxyl radical typically reacts several million times faster than chemical oxidants such as ozone and hydrogen peroxide. In addition, many organic contaminants are split into smaller components by the direct absorption of UV light in the UV-C spectral range emitted by proprietary medium pressure UV lamps. The RAYOX system and its components are covered by numerous patents.

## Specifications

		<b>Rayox 120</b>
Configuration		4 x 30 kW Reactor
Power Supply		480 VAC, 3ph, 60 Hz (alternate power supplies available)
Control System		PLC AB Micrologix
Shipping Weight		9,000lbs/4,100kg
Materials	Wetted Parts -	316SS, Quartz, Fluoropolymers
External Parts		Epoxy Coated Steel, 316SS
Size		137" L x 49" W x 88" H

## Features

- Skid-Mounted Module
- Proven, Fully Automated PLC System Control
- Patented, Field Proven Lamp Cleaning Devise
- OSHA Approved
- NEC Compliant
- CSA Approved
- 3,000 Hour Lamp Warranty
- State-of-the-Art Lamp Power Supply
- Safety Interlock Switches
- Easy Installation
- Upgrade for outdoor installation available



RAYOX is a registered trademark of Calgon Carbon Corporation

## The Customer's Problem

The Kelly Air Force base in San Antonio, Texas, needed to remediate multiple groundwater contaminants including DCA, DCE, TCE, and vinyl chloride.

The United States Air Force contracted with a major engineering company to assess various technologies, including air stripping, activated carbon, and UV Oxidation.

Due to the presence of vinyl chloride, air stripping was ruled out because of stringent air regulations.

## Calgon Carbon's Solution

UV Oxidation was selected as the technology to be used for the groundwater remediation. Calgon Carbon Corporation was awarded a contract to lease a 30kW trailer-mounted RAYOX unit to demonstrate UV Oxidation technology at several well sites on the base. The results formed the basis of the full scale design.

The Air Force proceeded with groundwater remediation at two well sites on the base, Zone 1 and Zone 2. Calgon Carbon Corporation was awarded the contract for both treatment systems on the basis of cost and technical merit.

The destruction of DCE controlled the design of Zone 1, while the destruction of 1, 1-DCA controlled the design of Zone 2. The systems were delivered in the summer of 1993.

Site Characteristics	Zone 1
Flow	130 gpm
Influent	1, 2-DCE - 1,200 ppb (total) TCE - 130 ppb Vinyl Chloride - 120 ppb
Effluent	1, 2-DCE - < 70 ppb cis, < 100 ppb trans TCE - < 5 ppb Vinyl Chloride - < 2 ppd
System	Model 90 (90 kW total)
O&M Cost	\$1.34/1,000 gal

## Site Characteristics

## Zone 2

Flow	200 gpm
Influent	1, 1-DCA - 40 ppb 1, 2-DCA - 20 ppb 1, 2-DCE - 300 ppb (total) TCE - 170 ppb PCE - 200 ppb Vinyl Chloride 240 ppb
Effluent	1, 1-DCA - < 3.5 ppb 1, 2-DCA - < 5 ppb 1, 2-DCE - < 70 ppb cis < 100 ppb trans TCE - < 5 ppb PCE - < 5 ppb Vinyl Chloride - < 2 ppb
System	3 x Model 90 (270 kW total)
O&M cost	\$1.98/1,000 gallons

## Hydrogen Peroxide Supply

Calgon Carbon offers full service and supply of various grades and concentrations of Hydrogen Peroxide solutions. Designed around each customer's individual needs, this service ensures that the scheduling of all deliveries is done to provide an uninterrupted supply of Hydrogen Peroxide.

Calgon Carbon also offers a telemetry system that provides hands-off management through remote monitoring and local display of tank levels. This fully comprehensive system offers reports detailing the tank level, amount of delivered and consumed product as well as dosing rates recorded on a daily basis. This, in time, provides historical data on usage allowing for effective budgeting and supply management. The installation of this monitoring system allows us to schedule prompt and adequate deliveries specific to your tank level requirements.

All deliveries and system components adhere to stiff OSHA requirements and industry guidelines. The technicians and drivers used are fully certified and authorized for peroxide handling. Our technicians have been dealing in peroxide supply for over twenty years.

Calgon Carbon can provide on-site inventory monitoring and scheduling of deliveries when it is convenient for you. Calgon Carbon also has the largest network of producers and distributors in North America, which means we will always have product available when you need it.

*Making Water and Air Safer and Cleaner*

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