

RAYOX® MODULAR TREATMENT SYSTEM

Model 90 (90kW System)

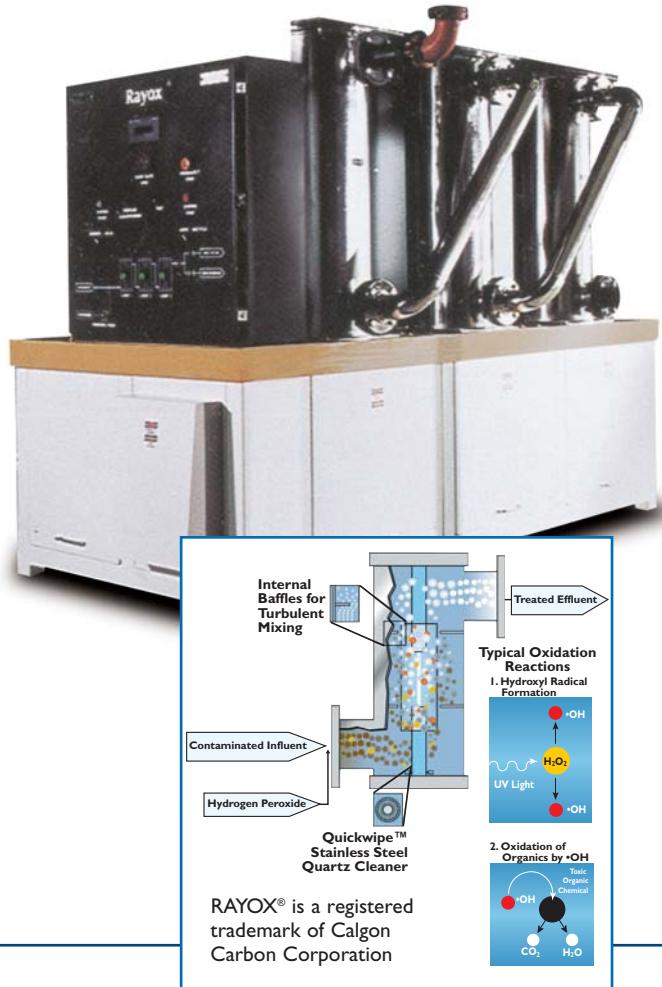
Overview

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 $\cdot\text{OH}$ 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.



System Specifications

- Configuration: 3 x 30 kW Reactor
- Power Supply: 480 VAC, 3ph, 60 Hz (alternate power supplies available)
- Control System: PLC AB Micrologix
- Shipping Weight: 7,000lbs/3,200kg
- Materials: Wetted Parts - 316SS, Quartz, Fluoropolymers
- External Parts - Epoxy Coated Steel, 316SS
- 107" L x 49" W x 88" H

Model Features

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

Equipment and Systems

Visit our website at www.calgoncarbon.com, or call 800-422-7266 to learn more about our complete range of products and services, and obtain local contact information.

RAYOX® MODULAR TREATMENT SYSTEM

Model 90 (90kW System)

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

Kelly Air Force Base, San Antonio, Texas

Zone 1

- Flow: 130gpm
- 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

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 ten 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.

Visit our website at www.calgoncarbon.com



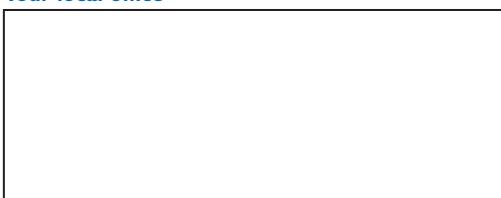
CALGON CARBON CORPORATION

Calgon Carbon Corporation
P.O. Box 717
Pittsburgh, PA USA 15230-0717
I-800-422-7266
Tel: 412-787-6700
Fx: 412-787-6713

Chemviron Carbon

European Operations of Calgon
Carbon Corporation
Zoning Industriel C de Feluy
B-7181 Feluy, Belgium
Tel: + 32 (0) 64 51 18 11
Fx: + 32 (0) 64 54 15 91

Your local office



ES-LEOTR90-0205

©Copyright 2005 Calgon Carbon Corporation, all rights reserved.