CARUS WATER



Industrial Waste Treatment

CAIROX® Potassium Permanganate

TECHNICAL BRIEF

TECHNICAL SUMMARY

Permanganate is used in industrial wastewater systems to oxidize organic and inorganic pollutants. These pollutants include but are not limited to sulfides, mercaptans, chlorinated solvents (trichloroethylene, perchloroethylene, and vinyl chloride), cyanides, phenols, chelated metals, aldehydes, olefins, organic sulfur compounds, amines, and other oxidizable compounds. Permanganate reacts over a wide pH range and requires no additional catalyst.

These problems can occur during chemical production, in food processing, soil and groundwater remediation, oil refining, mining, pulp and paper production, textile manufacturing, at a wide variety of industrial facilities.

APPLICATION

Aqueous permanganate solutions are applied in wastewater treatment systems, usually ahead of the coagulation, settling, or filtration process. Insoluble manganese dioxide (MnO_2) is formed as an oxidation by-product and may have to be removed prior to discharge to the sanitary sewer or receiving stream. Laboratory tests are performed to determine the dosage of permanganate necessary to oxidize the target pollutant and reduce the concentration to acceptable levels. In most cases, no pH adjustment is necessary.

CHEMISTRY

Phenols
Sulfides + MnO_4 → MnO_2 + Oxidation Co-Products
Mercaptans

DOSAGE

Dosages to control pollutants in a particular waste stream should be determined through laboratory testing and plant trials.

FACILITY REQUIREMENTS

Proper feed equipment specially designed to handle permanganate is recommended and available from Carus. The product must be put into solution before being introduced into the system. Operators should be trained to monitor permanganate residuals and to exercise proper safety precautions when handling the oxidant.

BENEFITS

Permanganate can completely oxidize phenols and other organic pollutants. It may not be necessary to satisfy the permanganate demand of the wastewater to effectively fragment the organic to a non-toxic, non-hazardous reaction co-product.

The manganese dioxide formed will, by adsorption, assist in removal of many organic and inorganic pollutants.

REFERENCES

Wilcox, P., Colgan, T., Casting Plant Cuts Phenol Treatment Costs in Half, Carus Chemical Co., Peru, IL (1998). *Carus Form # CX 5604*

Carus Chemical Company, Industrial Waste Treatment, *Carus From # CX 5505* (1998)

Lee, D., *The Oxidation of Organic Compounds by Permanganate and Hexavalent Chrome*, Open Court, LaSalle, IL (1981)

For further information on CAIROX® potassium permanganate or CARUSOL® liquid permanganate product characteristics and availability, contact Carus Corporation at 1-800-435-6856.

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TECHNICAL BRIEF

OTHER APPLICATIONS

- Drinking Water Treatment
- Wastewater Treatment

CARUS VALUE ADDED

LABORATORY SUPPORT

Carus Corporation has technical assistance available to answer questions, evaluate treatment alternatives, and perform laboratory testing. Our laboratory capabilities include; treatability studies, feasibility studies, and analytical services.

FIELD SERVICES

As an integral part of our technical support, Carus provides extensive on-site treatment assistance. We offer full application services, including technical expertise, supervision, testing, and feed equipment design and installation in order to accomplish a successful evaluation and/or application.

CARUS CORPORATION

During its more than 100-year history, Carus' ongoing reliance on research and development, as well as its emphasis on technical support and customer service, have enabled the company to become the world leader in permanganate, manganese, oxidation, and base-metal catalyst technologies.

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