WASTEWATER REMEDIATION BY ULTRAVIOLET (UV) RADIATION ©

The Problem

Halogenated and Aromatic Hydrocarbons

Contaminated groundwater and industrial wastewater often contain dissolved hazardous organic compounds such as **halogenated and aromatic hydrocarbons** that are difficult to treat biologically. An economical treatment process requires the use of several treatment stages. Generally an adsorption treatment stage such as activated carbon is used in the final stage. However, the remaining exhausted activated carbon incurs additional running costs, secondary disposal problems and environmental dis-advantages.

The Solution

Photolysis and Photooxidation by UV Radiation

Our laboratory and field investigations have proven that these hazardous compounds can, under suitable conditions, be either completely destroyed or changed to biologically degradable compounds by using short wave **UV radiation**. Depending on the chemical composition of the wastewater, the toxic organics can be destroyed either via direct **photolysis** or in the presence of an oxygen donor via **photooxidation**. Inorganic toxic compounds such as cyanide, nitrite and hydrazine can also be oxidized so that their toxic properties are neutralized.

The Process

Extensive Expertise with Customized Solutions

In order to obtain the optimum results various pre-conditions are required. The correct pre-treatment of the waste water is therefore of utmost importance, both for effectiveness of the process and for profitability. With our **extensive expertise** in the field of water technology, we are able to determine a **customized solution** to meet the requirements for each individual situation. The wastewater treatment plant pictured above has a 10 kW UV lamp and was built for a paint factory for the degradation of AOX via photolysis.

Malhis Engineering

Environmental and Chemical Technologies

Photolysis

Halogenated Hydrocarbons

Halogenated hydrocarbons can be destroyed using short wave UV radiation. Under suitable conditions it is possible to separate the bound halogen atoms that are present in the toxic organic molecule by **photolysis** into halogen radicals which become hydrolytically bound in an inorganic form. They thereby lose their toxic properties. Figure 1 shows the kinetic degradation of the parameter AOX in wastewater from a paint factory.

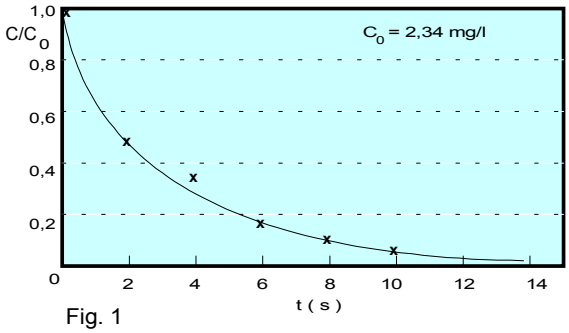


Fig. 1

Photo Oxidation

Aromatic Hydrocarbons

Aromatic hydrocarbons can be oxidized by using UV radiation in the presence of an oxygen donor. A complete oxidation will produce carbon dioxide and water. In many cases a partial **photo oxidation** is quite sufficient whereby the toxic compounds are transformed to biologically degradable compounds. Figure 2 shows the degradation curves of phenol and xylene by UV activated hydrogen peroxide.

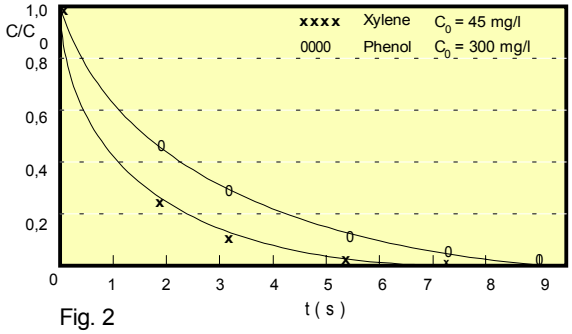
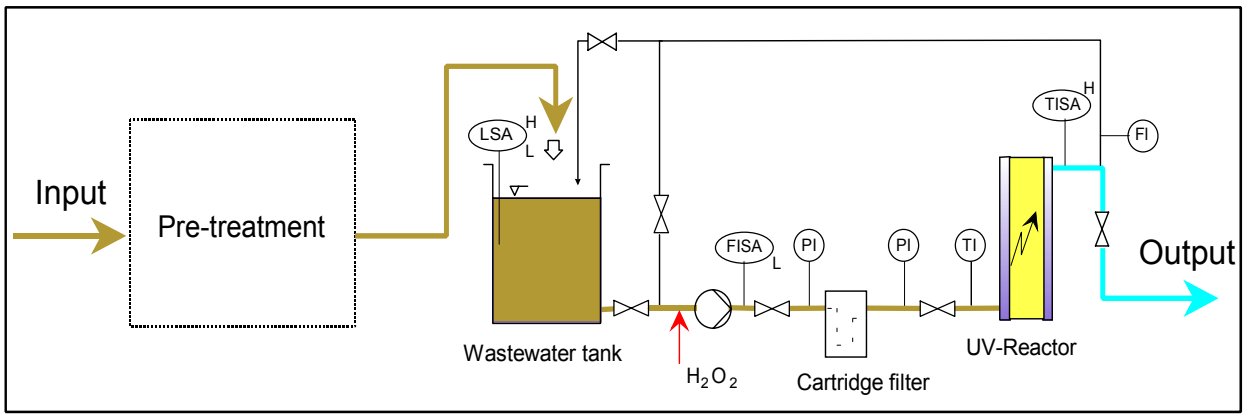


Fig. 2



Advantages of the UV Process

No secondary disposal problems
High purification performance
Low operational costs
Flexability due to modular construction

Furthermore We Provide Consulting, Engineering & Construction for:

Hazardous waste remediation
Hazardous wastewater remediation
Purification of spent air/gas and odor control
Recovery of recyclables

Malhis Engineering
Environmental and Chemical Technologies

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