PHOTOOXIDATION

Description/Application

The photocatalytic oxidation describes an air treatment technique alternative to thermic catalytic oxidation or adsorption techniques. This method was established and successfully implemented at Delta Umwelt-Technik GmbH.

The process air to be treated passes through the UV reactor with special catalyst material. The reactions described below are taking place. Particularly powerful is the photooxidation in desorption plants (stripping) for groundwater treatment with high vinyl chloride and cis-1,2-dichlorethene contaminations.

Reaction process

The primary reaction is always the photolysis (see equation A). The formed decomposition products react with the simultaneously formed oxidants in equation B to E.

A: splitting of the pollutant

R-R+hυ -> R°+R°

(wavelength λ < 250 nm)

B: oxygen splitting

O_2+hυ -> 2O°

(wavelength λ < 190 nm)

C: ozone generation

O_2+O° -> O_3

(wavelength λ < 190 nm)

D: ozone splitting

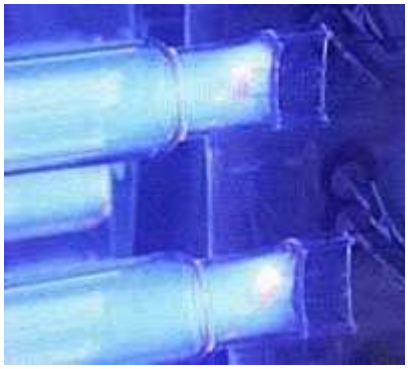
O_3+hυ -> O_2+O°

(wavelength λ < 260 nm)

E: production of OH° radicals by air moisture

H_2O+hυ -> H °+OH°

(wavelength λ < 190 nm)



Advantages

- **No emissions into the atmosphere,** thru circulated stripping air as internal process stream for desorption (zero emission technique),
- set up a stable CO_2 balance between effluent and process air,
- thus no pH increasing thru CO_2 stripping,
- thus no precipitation of oxidation products, i.e. Fe-III, carbonates und hydroxides,
- **end products are CO_2, water und HCl,**

- elution of HCl thru effluent water in the desorption column at simultaneously low acidification of the effluent,
- thus especially Fe-II stays dissolved,
- this prevents precipitation and sedimentation,
- **low operating temperature / energy consumption,**
- **high operating efficiency thru avoidance of consequential costs (disposal).**