

Wet Oxidation
powered by Ultrasound

UPR

Ultrasonic Plasma

Resonator



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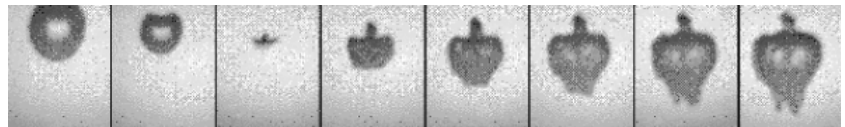
Supported by the
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Applications

- Industrial Wastewater
- Landfill Leachate
- Upgrading biological Systems (Disinfection, Nitrogen reduction)



Ultrasound



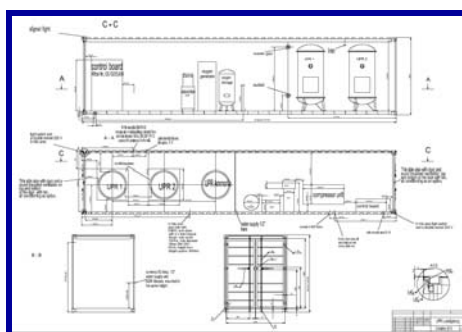
Phenomenon of Cavitation

The UPR utilizes the phenomenon of cavitation. Cavitation can be induced in any liquid (e.g., wastewaters), by specific ultrasound treatment. The cavitation process causes extremely high local pressures and temperatures, without significant temperature increase to the surrounding liquid medium.

As a result of the ultrasound treatment, chemical reactions transform the substances in the liquid (sono-chemical reactions). The mechanisms that decompose such targeted substances depend on the frequency and on its physical-chemical properties.

Benefits

- Low Investment and operational Costs
- High Treatment Performance
- Supplements existing Treatment Processes
- Mobile and Modular



Problem specific Container Solutions



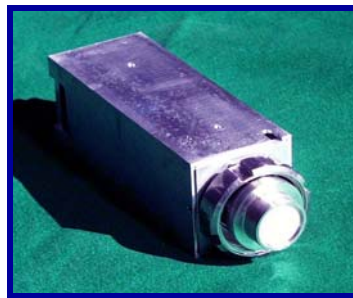
Process Description

Aided by a vacuum, the contaminated effluent enters the systems' mixing chamber, where oxidizing agents may be added if required. Here, a cavitation disc facilitates an ultra-fine nucleation of gases within the resulting mixture. In the resonance chamber, this emulsified effluent is then exposed to specific ultrasound frequencies.

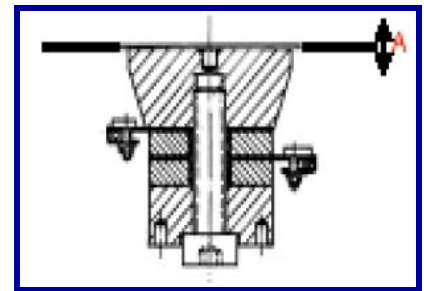
The combination of vacuum, nucleation, ultrasound energy, and - in some cases - injection of oxidizing agents results in an ultra-fine emulsified foam-like mixture significantly increasing the reaction surface area and producing oxygen and hydroxyl radicals.



Resonance Chamber



Ultrasound Generator Unit

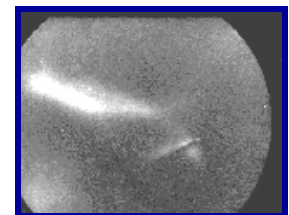


Piezo Holder

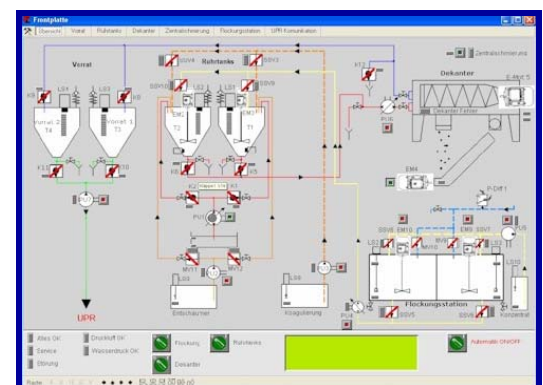
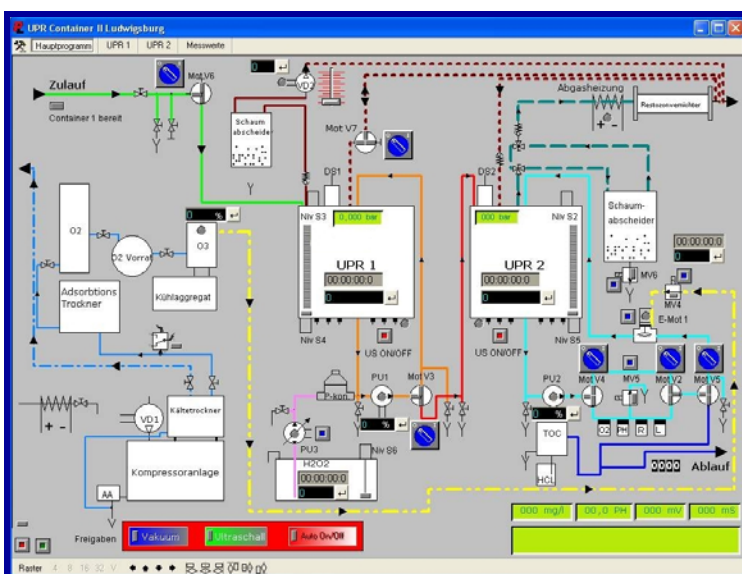
High local pressures and temperatures cause - among other reactions - destruction of biological protein-molecules, aromatic hydrocarbons and thiols resulting in elimination of unpleasant odors within the effluent.

Finally, the treated liquid leaves the system through an exit pump. The emerging liquid is free of objectionable odors and has significantly less pollutants.

The PC based computer controller automatically manages and interfaces with all critical UPR components and peripheral devices where necessary.



Cavitation Bubble



Overview PC Control:
Pre-Treatment and UPR

Performance Profile

Feasibility Studies

are conducted with a computer controlled, fully equipped mobile Demonstration Unit that can test a wide range of wastewater samples.



Flexibility through modular Design

The UPR System is designed in a modular fashion, facilitating optimum adaptability to on-site conditions. The space efficient construction of the UPR System supports ease of integration into existing treatment processes. This allows existing treatment systems to be supplemented and upgraded.



Overview of innovative in-house Developments

- **Cavitation Unit:**
Ultra-fineness of gases within fluids, providing an optimal reaction surface
- **Ultrasound Generator:**
Digital control of ultrasound with automated frequency regulation
- **Piezo Electric Unit:**
Direct feeding of ultrasound into the fluid, employing most advanced piezo technology, designed as “plug-and-play” modules
- **IPC Control:**
Software for a menu-driven, remote controlled system management

