TECHNOLOGY DATA SHEET TDS806

Cavitation Stripping Gases from Liquids and Oxygenation and Biological Control

CAVITATION STRIPPING OF GASES

Hydrodynamically generated cavitation is a powerful tool to strip dissolved gases from water and effluent. The substantial pressure drop in cavitation systems, causes dissolved gases to come out of solution. Global Advantech's cavitation scrubbing systems are designed to maximise generation of hydrodynamic cavitation using water pumped at high pressure. Cavitation stripping may be used for many applications, including:

- Stripping methane, ammonia and hydrogen sulphide from landfill leachate.
- Stripping methane, volatile hydrocarbons and hydrogen sulphide from produced water in oil and gas production.
- Stripping methane from aqueous muds used in drilling some oil and gas wells.

- Stripping methane and volatile hydrocarbons from flowback water produced during hydraulic fracturing.
- Stripping methane from crude oil.

CAVITATION OXYGENATION OF WATER AND EFFLUENT

Cavitation systems are highly efficient at forcibly aerating/oxygenating anoxic water. When the water jets in cavitation systems travel through air (or oxygen), they draw substantial quantities of air into their pressure recovery chambers. The high pressures in these chambers dissolve the air into the anoxic water rapidly increasing dissolved oxygen levels. Conditions present in the cavitation units can also promote oxidation of some organic compounds, sulphides and ammonia.

Applications include:

- Emergency oxygenation of surface water, e.g. treating a stream after contamination by an accidental discharge of sewage or animal slurry.
- Oxygenation of industrial effluent prior to aerobic biodegradation treatment.

BIOLOGICAL CONTROL USING CAVITATION

The other important use of cavitation is in the physical control of organisms/biological contamination in water. Where the energy releases and shockwaves from cavitation are used to destroy (lyse) the cells of bacteria, algae, larvae, etc. Treatment applications for use of cavitation for biological control include:

- Cooling tower water.
- Ship's ballast water.
- Groundwater, water from rivers, lakes, etc., in hydraulic fracturing to recover shale gas/coal-bed methane.
- Water treatment and effluent treatment.

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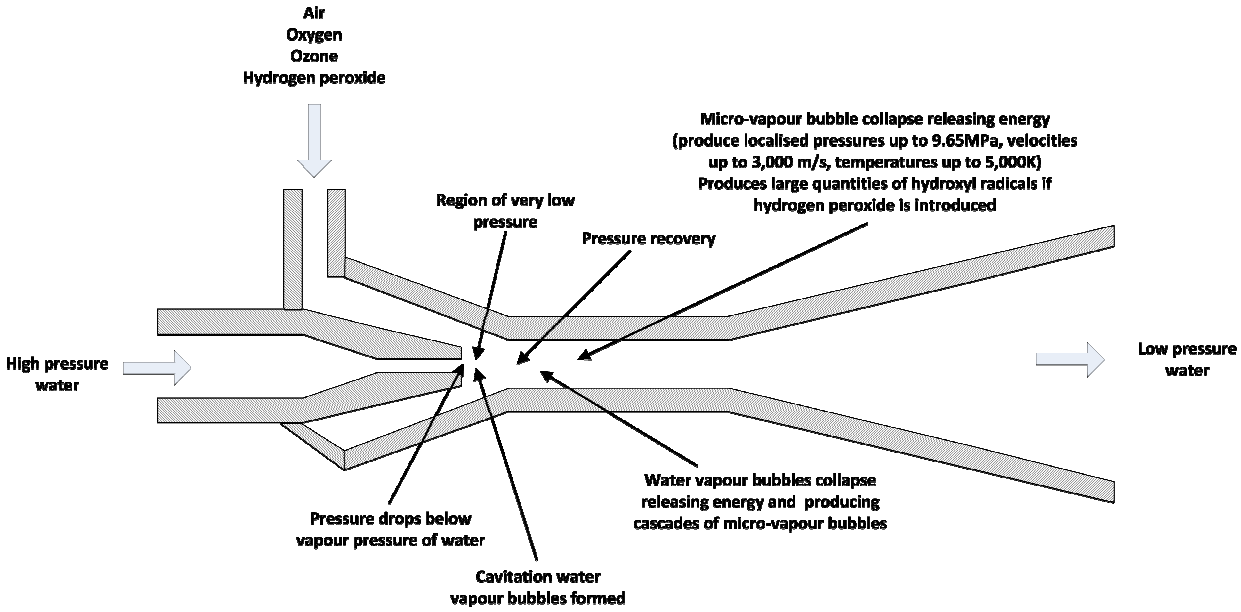
Cavitation Stripping Gases from Liquids and Oxygenation and Biological Control

CAVITATION

Cavitation is a physical phenomenon, it occurs when flowing water or another liquid is subjected to rapid changes of pressure. Vapour bubbles form in lower pressure regions of the water/liquid, when these vapour bubbles enter regions of higher pressure, they collapse. These collapses release significant amounts of trapped energy and produce shock waves, which exert localised pressures reaching 9.65Mbar. The collapsing vapour bubbles also generate high velocity micro-jets of liquid (up to 3,000m/s), which impinge against hard particulates and surfaces in the immediate vicinity. In many situations cavitation can be highly destructive, damaging ships' propellers, pumps, valves, pipes, etc. However, Global Advantech's cavitation systems efficiently harness these extreme pressure drops and localised energy releases.



Hydrodynamic cavitation generation

GLOBAL ADVANTECH'S CAVITATION SYSTEMS

Global Advantech's cavitation stripping, oxygenation and biological control systems contain a number of innovative design features and benefits to ensure effective operation:

- Multiple cavitation stages in parallel to efficiently treat large volumes of water -10m^3 per hour to 5,000m^3, depending upon the number and size of cavitation units and pumps available.
- Cavitation systems with available with pressurised air, oxygen and ozone and chemical feed (hydrogen peroxide, etc.), to:
  a. Increase rates of oxygenation and biocidal activity
  b. Improve the rates oxidation of some organic compounds, ammonia and sulphides.
- Cavitation systems available as stand-alone units or integrated with Global Advantech's electrocoagulation systems as part of a comprehensive water or effluent treatment solution. (For more information, please refer to Technology Data Sheet: *TDS801 Electrocoagulation and Advanced Electrochemical Oxidation.)*

Cavitation Stripping Gases from Liquids and Oxygenation and Biological Control

APPLICATIONS FOR CAVITATION SCRUBBING SYSTEMS

Application	Stripping dissolved gasses from liquids	Oxygenation of wastewater, effluent	Destruction of bacteria, algae, larvae
OIL + GAS			
Drilling platform waste water, slops, etc.		✓	✓
Produced water, flowback water	✓	✓	✓
Refinery process, storage tank, ground water	✓	✓	✓
Distribution depots storage tank, ground water	✓	✓	✓
Treatment of production waste sludges, interceptor sludges, etc.	✓	✓	✓
MINING + MINERALS			
Quarry lagoons		✓	✓
Mine discharge water, tailings ponds		✓	✓
MARINE + TRANSPORT			
Tanker + ship bilge water		✓	✓
Tanker + ship ballast water		✓	✓
Cruise liner wastewater		✓	
WASTE MANAGEMENT			
Landfill leachate	✓	✓	✓
Intensive animal production	✓	✓	✓
Anaerobic digestate	✓	✓	✓
WASTEWATER TREATMENT			
Treatment plant	✓	✓	✓
BUILDINGS MANAGEMENT			
Cooling water/towers	✓	✓	✓