

ATHOS™

- sludge-to-energy/matter recovery
- reducing nuisances
- health & safety



Removing overall sludge production

ATHOS™, liquid phase oxidation

With less than an hour retention time in the reactor, the ATHOS™ process results in:

- high mineralization (less than 5% organic carbon content in the solid residue),
- an easily biodegradable liquid that can be returned to the biological treatment process (equivalent to $\approx 15\%$ total COD* in the sludge),
- continuous and safe oxidation, under continuous mixing,
- phase separation between gas and inorganic sludge.

The heat released by the oxidation reaction is recovered to heat the sludge, with no external energy supply.

*COD: Chemical Oxygen Demand

Process principle

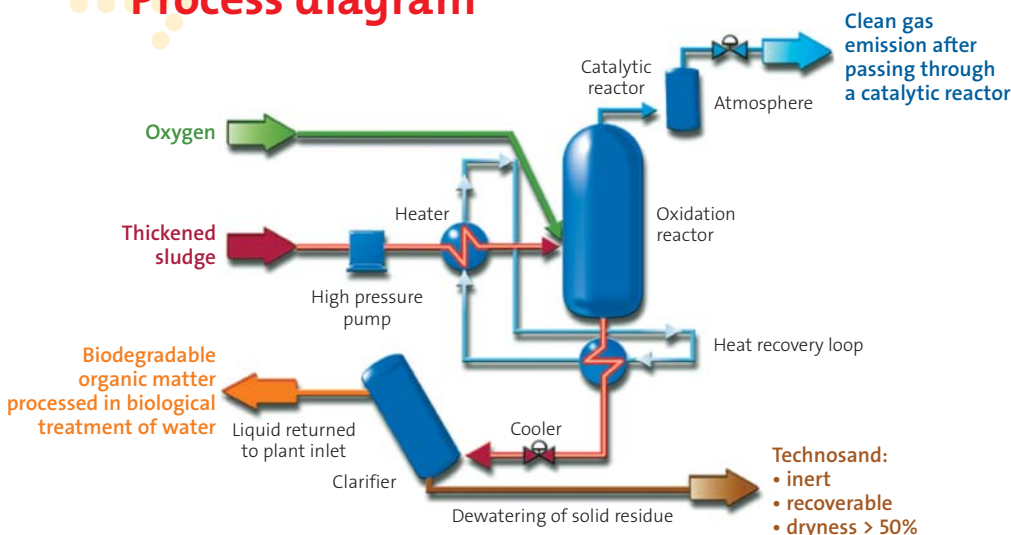
The ATHOS™ process is based on the principle of hydrothermal oxidation (HTO), an oxidation process in liquid phase that involves heating an effluent to a high temperature (250 to 300°C) and high pressure (70 to 150 bar) in the presence of an oxidizing gas (air or oxygen).

ATHOS™ is a new process combining HTO with biological treatment, which mineralizes the organic matter in the sludge under moderate conditions of temperature (235°C) and pressure (45 bar) in the presence of pure oxygen.

It generates 3 stable and/or recyclable by-products:

- clean gas emission,
- a biodegradable organic liquid,
- a primarily mineral-based solid.

Process diagram



Recycling of technosand for building materials



Technosand dewatered using a filter press



Performance

The ATHOS™ process complies with all regulations on the disposal of wastewater treatment sludge whilst remaining cost effective. It benefits from the technological expertise and track-record of Veolia Water, the world leader in the treatment of urban effluents.

An environmentally friendly process

ATHOS™ is a clean technology; all the sludge components are recycled, recovered or discharged to the natural environment with no adverse effects:

- final result: a concentrate of inorganic matter (technosand) accounting for only 1% to 2% of the initial liquid sludge quantity,
- opportunities of recycling the technosand in building materials,
- heavy metals stabilization in a non-leachable form (inert waste) in the solid residue,
- zero emission of polluted fumes or harmful by-products (nitrogen oxides, dioxins, furans),
- reduction in the greenhouse effect (50% drop in CO₂ emissions compared with incineration),
- destruction of toxic and malodorous (hydrogen sulphide, mercaptan, etc.) and organic micropollutants.

Reference plants

- *Toulouse-Ginestous, France (1998) - 50,000 P.E. **
- *Brussels-North, Belgium (2002) - 1.1 million P.E.*
- *Trucazzanno, Italy (2003) - 300,000 P.E.*
- *Epernay, France (2003) - 150,000 P.E.*
- *Aix-en-Provence, France (2005) - 150,000 P.E.*

*P.E.: Population Equivalent

www.veoliawaterst.com/athos

A cost-effective thermal process

Operating costs are reduced by:

- moderate operating conditions (temperature and pressure, limited O₂ consumption),
- reducing the dewatering stage (restricted only to the inorganic fraction of the sludge), with no chemicals addition.

A flexible process

ATHOS™ provides high operational flexibility:

- treats all types of thickened sludge (primary, biological, fresh or digested, urban),
- possibility of adjusting retention time, temperature and the O₂/organic pollution ratio,
- advanced automation.

A compact process

Due to its compact design, ATHOS™ can be fully integrated into the wastewater treatment plant and provides continuous sludge processing, as well as its by-products treatment.

ATHOS™ unit at Epernay (France)

