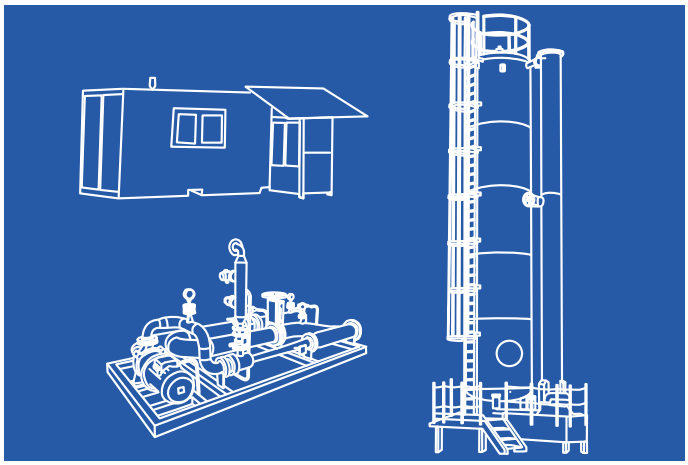
Air Liquide
creative oxygen

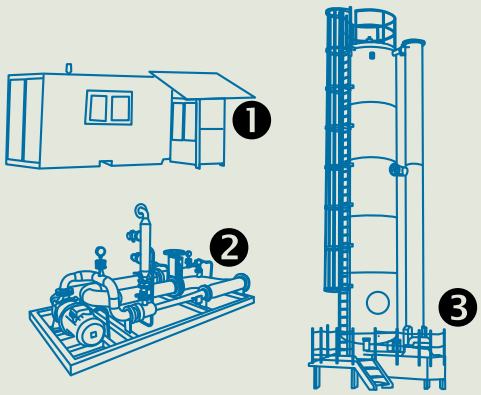
OZONATION UNIT

- Highest available oxidizing potential
- Cost-effective off-gas re-use
- Ozone (O_3) residual decomposition into oxygen



The Concept

As regulatory requirements have evolved, new ozone-based water treatments have emerged. And since each ozone application is specific to water pollutants, Air Liquide always conducts thorough pre-analysis to determine the optimal ozone dosage for discharge limits without side effects. We then perform sizing calculations to design an ozone plant installation made up of three modules:



1. Ozone production unit
2. Injection and pumping unit
3. Reaction and safe off-gas decomposition unit

Using our patented **OXY INJECTOR-TURBOXAL** system or **OXY INJECTOR-VENTOXAL** system, the oxygen-rich off-gas from the **OZONATION UNIT** can be recovered at atmospheric pressure and re-used to make up for oxygen injection in upstream or downstream biological basins.

Applicable Industries

The **OZONATION UNIT** suits the most demanding requirements for strong oxidation in a sustainable manner. It encompasses multiple water treatments such as:

- Pretreatment of surface water for the production of drinking water
- Bleaching in the pulp and paper Industry
- Oxidation of toxic components like cyanides and phenols
- Fine polishing of wastewater after biological treatment
  - Reduction of the non biodegradable fraction
  - Destruction of micro-pollutants
- Discoloration of textile process water
- Bio-sludge conditioning and excess sludge reduction

Main references can be found in:

- Municipal Water Supply and Disposal
- Pulp and Paper
- Chemical industry
- Pharmaceutical
- Food and Beverage

Special Features

Ozone is easily soluble in aqueous liquids and oxidizes all compounds very rapidly.

Thanks to its advanced design, the **OZONATION UNIT** leaves less than 0.5% ozone in exhaust gas.

The operating conditions (e.g. pH, temperature, flow rates, cleaning cycles, etc.), are set in order to focus the ozone efficiency on breaking down the targeted pollutants.

Our customers can take the ownership of the ozone production.

Ozone generators fed by pure oxygen are 50% to 60% cheaper, as much as 1/2- 1/3 smaller and 10% less power-intensive than air-fed generators which work with less oxygen in the ambient air (21%). Pure-oxygen-fed generators reach higher ozone concentrations (typically 14%).

Cooling down an ozone generator in combination with a liquid oxygen supply is also possible.

Our technical offer includes standalone running systems as well as customized solutions interfaced with our customer PLC.

In each case we do:

- Pre-analysis of dissolved compounds
- Lab tests (ozone concentration, pH values, pressure conditions, etc.)
- Pilot test at customer site if needed
- Sizing calculation at the required scale
- Manufacturing, assembling and commissioning

The following process data is available to the customer:

- Safety information (detection of ozone leakages, reaching explosion limits, overfilling vessels, breakdown of measurements).
- Flow rates of gases and liquids
- Quality parameter of intermediate and end products

A control software is programmed by our experts in close collaboration with the operators and handed over with a full documentation.

Offered Modules

❶ The ozone production unit produces ozone at highest efficiency levels.

❷ The injection and pumping unit includes ozone priming unit, backflow protection system, pump, liquid-piping.

❸ The reaction and safe off-gas decomposition unit consists of ozone reactor, injection and mixing system, pressure and level control, off-gas treatment. **INJECTOR-BICONE** is the best option for small scale ozone reactor.

Technical Data

Technical Data	Characteristics	
Ozone gas concentration	**8-14%**	**Oxygen feed-gas**
Feed-gas quality	**O_2 concentration >98%**	**Dew-point: -65°C**
Generator power consumption	**6-10 kW/kg O_3**	**Depending on target ozone concentration**
Cooling Water	**1.5 m³/kg O_3**	**Max. temperature increase ΔT=5°C**
Ozone exposed materials	**PTFE, stainless steel**	**Free of oil and grease**
Oxygen Off-gas	**6-8 kg O_2/kg O_3**	**Possible off-gas re-use**
Ozone safety	**MAC-value: 0.06 ppm***	**Odor threshold: 0.005-0.02 ppm***
Container Dimensions	**1 kg/h O_3 Generator - 10 Feet Container**	
	5 kg/h O_3 Generator - 30 Feet Container	
	10 kg/h O_3 Generator - 40 Feet Container	
	>10 kg O_3 Generator - Customized	
Ambient air monitoring	**Oxygen/Ozone**	

*Concentration value ppm = part per million
*PTFE: polytetrafluorethylene
*MAC-value: maximal allowable concentration describes the concentration for toxic compounds at a working place

Related Offer

The **OZONATION UNIT** is part of our **Nexelia for Biological Treatment** and **Nexelia for Tertiary Treatment** solutions, which are designed and tailored to meet your specific needs. These comprehensive offers combine the best of our gas-application technologies and expert support. As with all solutions under them **Nexelia** label, we work closely with you to pre-define a concrete set of results, and we commit to delivering them.

Contact us

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