AIR TREATMENT ODOUR REMOVAL

Working at WWTP and a number of industrial halls and plants represents a potential risk of creation of problems with odour.
In the past, the annoying odour from biological processes was disposed of by the help of biological filters. These filters, nevertheless, were operationally unreliable, bulky and required considerable operational costs.
Currently, there are already reliable physico-chemical technologies using ionization or photo catalytic oxidation for cleaning these waste gases.
The physico-chemical methods are very efficient and suitable in removal of unpleasant odours, e.g. H_2S, NH_3, $(CH_3)_2S$, VOC.

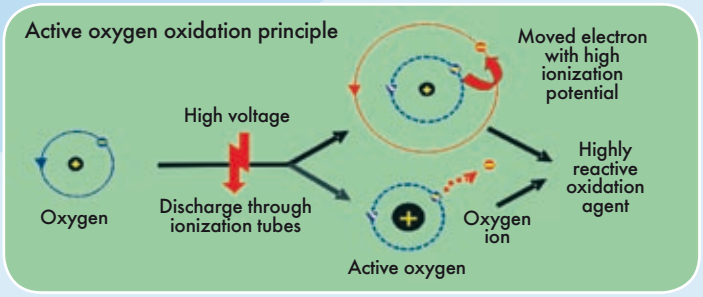
ADVANTAGES

- high operational stability
- minimum space requirements
- no chemicals needed
- low operational costs
- minimum maintenance requirements
- reliable and instantaneous air cleaning
- lowering the amount of germs
- possibility to recover a high proportion of air providing thus for a pleasant climate
- high quality of recovered air – no multiple degrees needed

IONIZATION – ODOUR REMOVAL WITH ACTIVE OXYGEN – SYSTEM IonActOx

The creation of the active oxygen is a natural process which sterilizes and deodorizes the atmosphere.
Well known is the fresh and clean air after a storm when the atmosphere is cleaned by physico-chemical processes, e.g. initialized by lightning.
In the ionization unit, a strong electrostatic field is created.
In the air passing through two electrodes, chemical reactions occur subsequently. The resulting effect is that, on the one hand, the electron in the atom moves to an orbit with a higher energetic potential and, on the other hand, a real oxygen radical is generated at the same time. I.e., it comes simultaneously to both oxygen activation and ionization. The activated oxygen is consequently a strong oxidizing agent. Compared to the oxidation with the neutral oxygen, the oxidation with the active oxygen has a number of advantages. Reactions occur instantaneously and even the strong pollutants are oxidized at once. Malodorous substances are oxidized into water, carbon, oxides and other harmless compounds. Malodorous substances are degraded in the same way.

- System IonActOx (cleaning with active oxygen) – a system suitable for air treatment in closed premises
- System IonActOx-IB with bypass – a system able to process large volumes of air



The ionization process is used particularly for odour removal in building premises such as drying plants, sludge basin spaces, office rooms, waste water treatment plants, pumping stations, flotation units in dairies etc. As the ionization depends particularly on the oxygen activation, the application of this technology is very flexible. In case the ionization units are installed in rooms, the polluted air is treated directly.
The ionization unit activates the oxygen in the air, a space polluted with malodorous substances serves for the realization of the end reaction. The air exhaustion from the room can thus be limited to minimum or (with some applications) even completely excluded. The consequence is low operational costs, particularly for heating (or cooling in warm climate). The discontinuous operation of the unit is possible. If the ionization unit cannot be installed in a room, it is possible to ionize also the outdoor (fresh) air and to mix it with the polluted air for the end reaction.

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ASIO Ltd.
Tuřanka 1, P.O.Box 56, 627 00 Brno, Czech Republic
Tel.: +420 548 428 111, fax: +420 548 428 100
E-mail: asio@asio.cz, www.asio.cz

www.asio.cz

Ionization - IonActOx - IAO (implementation examples)		
Type of building	Screen room	Screen room (mech. pretreatment)
Odour	middle	low concentration
Contamination	HS, NHL	
Volume of building	230 m^3	3 500 m^3
Air circulation	4 000 m^3	4 000 m^3
Type of unit	IonActOx	Vario 3000/90
Number of units	1 piece	4 pieces
Dimensions of unit	680 x 680 x 2720 mm	910 x 810 x 3100 mm /1 piece
Weight of unit	400 kg	250 kg / 1 piece
Material	stainless steel AISI 304 (1.4301)	stainless steel AISI 304 (1.4301)
Ventilator	radial	radial
Material Control	galvanized steel	galvanized steel
Panel	1 piece	1 piece
Dimensions of control panel	500 x 500 x 230 mm	–
Material	stainless steel AISI 304 (1.4301)	–
Energy consumption	1,5 kW (maximum)	–
Power supply	400 V / 50 Hz / 16 A necessary	–

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PHOTO CATALYTIC ODOUR REMOVAL – SYSTEM PhoCatOx

This process is a combination of the photo oxidation based on the UV radiation effect and of the catalytic oxidation. It is used particularly in those environments which are burdened with a large amount of hardly decomposable (oxidizable) malodorous and organic substances. The contaminated air is brought into the tunnel where UV radiation brings about a chemical reaction. Organic substances are decomposed because particles of oxygen, ozone and other oxidizing ions are generated. UV radiation supports this process because in addition it breaks up molecules of decomposed substances. This process enables to oxidize even hardly decomposable or specific substances such as hydrosulphides, ammonia, mercaptan etc. and thus to remove odour. Relatively short capture times are enough for oxidation. The filling is made up of a special catalyst which has to correspond to the pollutant content in the air.

Photo catalytic oxidation is particularly suitable for treatment of very polluted waste gases, e.g.:

- odour removal in water treatment plants
- storage, treatment and drying of sludge
- treatment of residual water from tanks containing a mixture of water and oils
- reception of fecal wastes
- recycling plants

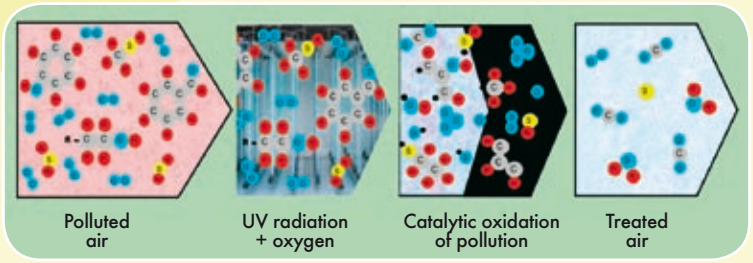

Photo catalytic oxidation process

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The ionization unit activates the oxygen in the air, a space polluted with malodorous substances serves for the realization of the end reaction. The air exhaustion from the room can thus be limited to minimum or (with some applications) even completely excluded. The consequence is low operational costs, particularly for heating (or cooling in warm climate). The discontinuous operation of the unit is possible. If the ionization unit cannot be installed in a room, it is possible to ionize also the outdoor (fresh) air and to mix it with the polluted air for the end reaction.

Photo catalytic oxidation - PhoCatOx - PCO (implementation examples)				
Type of building	Pumping station	Pumping station	Screen room (mech. pretreatment)	Sludge thickening
Odour	low concentration	low concentration	low concentration	strong odour
Volume of building	1 400 m^3	2 700 m^3	3 500 m^3	1 500 m^3
Air circulation	1 400 m^3	2 700 m^3	3 500 m^3	1 500 m^3
Frequency of air exchange	1 x	1 x	1 x	1 x
Type of unit	PhoCatOx	PhoCatOx	PhoCatOx	PhoCatOx
Number of units	–	–	–	–
Dimensions of unit	1 600 x 1 200 x 4 000 mm	2 300 x 2 300 x 3 400 mm	1 600 x 1 200 x 4000 mm	1100 x 1200 x 3200 mm
Weight of unit	1 500 kg	3 000 kg	1 600 kg	1 000 kg
Material	stainless steel AISI 304 (1.4301)	stainless steel AISI 304 (1.4301)	stainless steel AISI 304 (1.4301)	stainless steel AISI 304 (1.4301)
Energy consumption	3,5 kW	6,0 kW	7,5 kW	4,3 kW
Odour filter	part of equipment	part of equipment	part of equipment	part of equipment
UV chamber	part of equipment	part of equipment	part of equipment	part of equipment
Catalyst	part of equipment	part of equipment	part of equipment	part of equipment
Ventilator	part of equipment	part of equipment	part of equipment	part of equipment
Material	–	–	–	aluminium
Connection	–	–	–	230 / 400 V / 50 Hz
Control panel	part of equipment	part of equipment	part of equipment	part of equipment
Dimensions	–	–	–	600 x 600 x 230 mm
Material	–	–	–	stainless steel AISI 304 (1.4301)
Connection	–	–	–	400 V/ 50 Hz/ 16 A