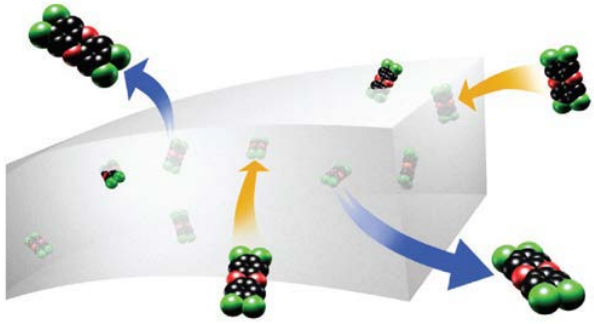
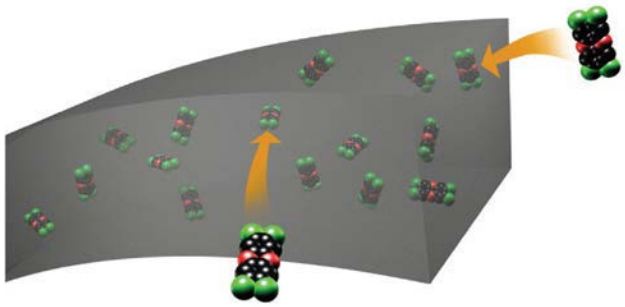


Dioxins and PP - dioxins are released when conditions change



Dioxins and ADIOX technology - no memory effect

Easy to introduce

ADIOX technology can be applied in various processes, where dioxin emissions needs to be reduced.
It is suitable for installation in wet scrubber systems or other containers in a gas cleaning system and at thermal treatment plants for:

- Municipal solid waste
- Hazardous or chemical waste, especially chloride- based
- Sludge
- Biomass
- Steel and metal

Typical applications

- Integrated in a multi-functional scrubber for primary dioxin removal
- In a dry or semi-wet process, installed separately in an absorber
- As a polishing filter and to prevent/reduce the memory effect
- Combined with selective catalytic reduction (SCR) technology

Features and benefits

- Easy installation
- High availability
- Efficient dioxin removal, even during start-up conditions
- Long replacement intervals
- Cost-effective due to the integration in traditional packedbed scrubber systems
- No residual byproduct - the dioxins are destroyed by incineration of used material

Product types

ADIOX dioxin removal products are available as different types of tower packings (Telpac or Rauchert Hiflow of various sizes) or as droplet separators (demisters) of the knitted mesh type or the lamella type.

Innovative technologies from SPIG

GMAB's unique and innovative flue gas treatment technologies can be retrofitted into existing plants and integrated with our total package solution.

- Multistage/multifunctional scrubbers
- ADIOX dioxin removal technology
- MercOx™ mercury removal process

ADIOX® Dioxin Removal Technology

A proven flue gas cleaning technology for reducing dioxin emissions

GMAB provides GMAB™ flue gas cleaning and flue gas condensation technologies for a wide range of applications, including waste-toenergy, co-incineration and hazardous waste incineration plants.
The ADIOX technology, developed in 2001, is in operation at more than 100 installations worldwide.

Typical application is for wet flue gas cleaning after waste incineration, but ADIOX technology can also be used with dry flue gas cleaning and in metal and chemical industries where dioxins are present in the gas phase. The technology is very reliable and also prevents or reduces the “memory effect.”
The ADIOX technology can reduce dioxin concentration in flue gas to well below 0.1 ng TEQ/Nm^3 to meet the levels defined in the Waste Incineration BAT conclusions. (2019)

Efficient and reliable dioxin removal

How dioxins behave in common flue gas cleaning

Dioxins are readily absorbed from flue gases into plastics such as polypropylene (PP). Dioxin molecules tend to migrate to the surface if conditions change when they are inside plastics, and so are released back into the flue gas. This increase in thedioxin content of the flue gas is known as the “memory effect.”

How the ADIOX dioxin removal process works

The ADIOX process is based on the high affinity of dioxins

for cabon - when in contact, the bond between dioxins and carbon is very strong.
Dispersing small particles of carbon in PP plastics, a material ideal for dioxin removal is formed.
A dioxin molecule that is present in the flue gas is first absorbed into the PP. From here, it migrates to a carbon particle, where it is strongly adsorbed (bonded to its surface).
The plastic acts as a selective filter with an affinity for dioxin molecules, among others.
As the affinity for carbon is so high, there is no tendency for dioxin molecules to be released even when the concentration of dioxin molecules in the flue gas decreases. As a result, the memory effect is kept to a minimum.

Dioxins

Dioxins, or polychlorinated dibenxo-p-dioxinsand polychlorinated dibenzo furans (PCDD/Fs) are a group of persistent and extremely toxic chlorinated organic compounds. Dioxins are very stable and accumulate as they move up the food chain to humans. Dioxin concentrations are commonly reported as toxic equivalents (TEQ), which is the sum of the congener concentrations multiplied by their specific TEQ factors.
The extreme toxicity of 2,3,7,8 Tetra-CDD (also known as Seveso dioxin) is the reference and has a TEQ factor of 1.
Dioxins and furans containing higher numbers of chlorine atoms (including the 2, 3, 7 and 8 positions) have lower TEQ factors.
Since 1997, the World Health Organisation (WHO) has recognised 2,3,7,8 TCDD as carcinogenic for humans.
Major sources of dioxin emissions and contamination include processes like waste incineration, metal production, biofuel incineration and uncontrolled combustion, for example fires at landfill sites. The European regulations stipulate that air emissions should be less than 0.1 ng TEQ/Nm^3. Dioxin emissions have previously been used as argument against waste incineration. In fact, waste incineration only contributes a small percentage of the total air emissions. The existing EU prohibition of depositing combustible material has resulted in increased waste incineration, thereby reducing the risk of uncontrolled landfill fires, which may cause large and widely dispersed dioxin emission sources.
Under stable combustion conditions, dioxins are almost completely destroyed during incineration, but are reformed to some extent during cooling of the flue gas and during dust separation at temperatures between 200 to 450 C.
The waste incinerators act as dioxin sinks since more dioxins are destroyed than formed.