



ClimateAdvanced® Treatment

Regenerative chemical desulfurization

Biogas treatment systems

In biogas plants, one of the main problems in operation and maintenance is the high concentrations of hydrogen sulfide (H_2S) in the biogas. The technologies used so far have been the addition of iron oxides in the digesters (high operating costs), biological scrubbing towers (high investment costs), or chemical scrubbing towers (high operating and maintenance costs). SUEZ AIR & CLIMATE, together with Air Dep, have developed a regenerative chemical desulfurization system with low investment, operating and maintenance costs.

ADVANTAGES AND BENEFITS OF THE SOLUTION

- ⊕ **Very high desulfuration efficiency**
- ⊕ **Low investment costs / low operating costs** due to recovery of chemical reagents (AD21)
- ⊕ **Low NaOH consumption:** only for pH adjustment
- ⊕ **Chemical elimination of H_2S** so high adaptability to potential variations in H_2S concentration
- ⊕ **No risk of clogging** in the scrubbing tower (no carbonate formation)
- ⊕ **No addition of O_2** in clean biogas
- ⊕ As it is not a biological system, it is **less sensitive to changes** in process conditions (flow rate, concentration, etc.)

DESCRIPTION OF THE TECHNOLOGY

The desulfurization system is a chemical-regenerative system, widely used in plants where the produced biogas contains high concentrations of H_2S .

The scrubbing tower facilitates direct contact between the scrubbing liquid (AD21) and the counter-current biogas, effectively removing H_2S . After scrubbing, the biogas passes through a droplet separator to remove any entrained droplets from the process. Following this initial stage, the desulfurized biogas leaves the equipment ready to be sent for further valorization in cogeneration engines, or enrichment to biomethane.

The washing liquid, after passing through the first stage of chemical absorption and having absorbed the H_2S , reaches the oxidation tank where air is injected by a fan and a small amount of soda to adjust the pH of the process, thus regenerating the AD21.



The stream coming from the second stage reaches the decanter, where the elemental sulfur S^0 decants. This by-product can be directed to a leachate plant, managed externally (as it is not hazardous) or used for the manufacture of phytosanitary products.

In the upper part of the decanter, the AD21 product is recovered for recirculation to the oxidation tank.

KEY FIGURES

**50-5.000
Nm³/h**

The system is capable of treating **biogas flows** between 50-5,000 Nm³ /h, with the possibility of increasing the treatment flow rate by means of equipment installed in parallel.

<20.000ppm

The system is capable of **treating H₂S concentrations** in the biogas up to 20,000ppm.

<100ppm

High scrubbing efficiency, obtaining biogas streams with an **H₂S concentration at the outlet** of less than 100 ppm.

Type of desulfurization: regenerative chemistry.

Regenerative chemical desulfurization of biogas using the chemical desulfurization of biogas DBC system, facilitated by the use of AD21, results in significantly lower NaOH consumption compared to traditional systems. This is because it is solely used for pH adjustment rather than the removal of H₂S from the biogas.

AD21 is a patented product that allows the absorption and neutralization of H₂S contained in biogas. The chemical compound consists of a mixture of iron oxides that can be regenerated in a basic medium.



Regenerative chemical process: reactions

The following reactions take place in the scrubbing tower to remove H₂S.



Air is blown into the oxidation tank to oxidize the iron and recover the AD21.



DESIGN AND EFFICIENCY DATA

The desulfurization system is capable of treating biogas streams with high and medium concentrations of H₂S with high scrubbing efficiency, obtaining output values below 100ppm H₂S, with low operating costs.

INDUSTRIAL APPLICATIONS.

Regenerative chemical desulfurization is a system widely used in biogas production plants with a high H₂S load. It is also applied, among other installations, in:

- Biomethanization plants
- Wastewater treatment plants
- Landfills.



SUEZ

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