

News Release

P355/21e
October 28, 2021

50 years of BASF's gas treatment in industrial scale

- **Comprehensive portfolio for 10 years under the brand OASE®**
- **Innovation OASE digilab: Analyzing samples almost in real time**
- **Important contributions to sustainability in the value chain**

The purification of gases has a long tradition at BASF since the development of the Haber-Bosch process. Fifty years ago – in 1971 – the company started up an ammonia plant at its Ludwigshafen site using a new gas scrubbing technology that has revolutionized industrial gas purification ever since. This involved the removal of carbon dioxide (CO₂) from synthesis gas for the production of ammonia, an important starting material for the manufacture of fertilizers. Today, BASF is one of the world's leading companies in gas treatment offering customers from various industries efficient solutions for the treatment of different gases, for example natural gas, synthesis gas and biogas. Around the world, these solutions are proving their worth for the company's customers in some 500 reference plants worldwide.

BASF has been marketing its portfolio of technologies, gas treating agents and comprehensive services for ten years under the brand name OASE® - Gas Treating Excellence. As an "accelerator" in the BASF portfolio, OASE products are among the system solutions with a significant sustainability contribution in the value chain. Compared to conventional technologies, OASE offers the highest efficiency in gas treatment and thus makes important contributions to conserving

resources and reducing emissions by saving energy. Gas treatment is essential for the use of natural gas and synthesis gas because certain components must be safely removed before the gases can be used.

Since 1971, BASF has pursued a consistent course of innovation and growth in the field of gas treatment. The company has also developed technologies for natural gas, synthesis gas, refinery waste gases, flue gas and biogas. In the last decade, further technologies have been added. In 2019, BASF created "OASE connect", an innovative digital platform that allows customers to optimize their plant operations with the help of a simulation tool, store sample analyses and learn more about gas treatment technologies with e-learning materials. 2020 saw the launch of BASF OASE[®] sulfexx[™], a highly energy-efficient gas treatment technology developed together with ExxonMobil that helps refiners and gas processors meet their sulfur removal targets while reducing CO₂ emissions.

Analyze samples in real time with OASE digilab

With the upcoming launch of "OASE digilab" this year, BASF is taking another step in digitalization that will further improve the efficiency of gas treatment: Together with the startup trinamiX, a BASF Group company, the OASE team has developed a method to analyze the composition of the gas treating agents in the OASE processes in near real time. Previously, this was a laborious and time-consuming process because the samples taken from the process at the respective customers had to be sent to two special BASF laboratories in Ludwigshafen (Germany) and Wyandotte (USA) and analyzed there.

"OASE digilab" works with trinamiX's near-infrared spectroscopy (NIR spectroscopy) solution. It combines a mobile NIR-spectrometer with data analysis (chemometrics) to qualitatively and quantitatively determine the composition of the sample. In future, users will be able to inject the samples from their plant directly into the digilab device and receive the analysis of the components within a few seconds.

"OASE digilab" revolutionizes the quality control of gas treatment. Customers who use this service can continuously monitor the condition of their gas treatment plant

and operate it with the optimal solvent composition," emphasizes Dr. Torsten Katz, Head of Global Technology Gas Treatment Solutions at BASF.

Future technology on course for growth

As gas exploration continues to develop, so does gas treatment. In recent years, numerous projects in the Floating Liquefied Natural Gas (FLNG) field have been developed worldwide, opening up significant gas fields under the world's oceans. The technically demanding process of extracting natural gas on the high seas and usually from great depths requires significant adaptations to gas treatment. BASF has therefore invested a great deal of effort in further developing its technology under these conditions, in particular to optimize the technology for marine and ship movements. First success: The latest FLNG project of the Malaysian oil and gas company PETRONAS uses the new OASE gas treatment technology. This is BASF's first FLNG reference in this field worldwide.

BASF also has successes to show in the classic LNG field: At the beginning of 2021, Qatargas published a letter of award for the construction of four new LNG production plants in the North Field East Project off the northeastern coast of the Qatar Peninsula. This field is believed to hold around ten percent of the world's gas reserves, with reserves of around 25 trillion cubic meters. The development of this field is currently the largest global LNG project. Qatargas has selected BASF OASE technology for all four (4) of their new gas liquefaction trains.

Efficient, reliable and flexible: The process

In order to remove acidic components such as CO₂ and/or hydrogen sulfide (H₂S) from gases, the feed gas is brought into counter current contact with the fully regenerated OASE amine solution into an absorption column. Here, the acidic gases react with the amine solution and are thus removed from the gas. The acid gas laden rich amine is heated up and given to a regeneration column, where the acidic components are separated from the solution. The regenerated OASE solution is then cooled and recycled back to the absorber columns. In many cases, the CO₂ is so pure that it can also be used for chemical purposes.

The BASF gas treatment process requires relatively little energy, offers very high availability and delivers a large yield of gases with high purity. Its flexibility also allows the selective separation of certain gas components. The OASE gas treating solvents used are characterized by high stability and long service life, so that only minimal quantities need to be refilled.

Additional information about BASF and gas treatment can be found here: www.basf.com/oase.

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About BASF

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