

Average reading time: 3 minutes

Wastewater neutralization with carbon dioxide

CO₂ neutralizes alkaline
wastewater in an eco-friendly
and economical way



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Neutralization - a topic for many industries

Alkaline wastewater is generated in a wide variety of industrial operations. Alkaline wastewater can result from cleaning processes, cooling water treatment or the use of alkalis in production. Process-related contacts with raw or residual materials can also significantly increase the pH value



Messer has a wide range of rental equipment, which can be offered to customers for neutralization.

in wastewater. To protect environment, and wastewater treatment plants from damage and disruption caused by alkaline wastewater, European Union legislation requires relevant quantities to be neutralized before discharge.



Inline neutralization with liquid CO₂ is particularly cost-efficient due to the minimal hardware required for its implementation

Neutralization is also crucial in various industrial sectors, including pH regulation of process water in the paper and pulp industry, steelworks, mining operations, laundries, dairies, chemical manufacturing, food and beverage production and textile processing. CO₂ and know-how from Messer achieve optimum results in many neutralization tasks.

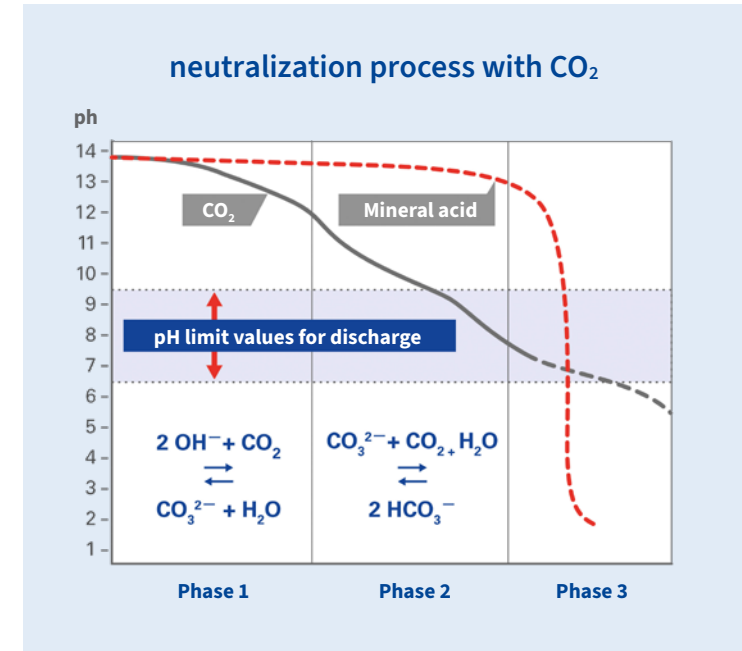
Carbon dioxide - weak acid, strong effect

Traditionally, mineral acids such as hydrochloric acid and sulfuric acid were used as neutralizing agents. But with the demand for environmentally compatible, safe and cost-effective processes, neutralization with CO₂ has become increasingly important.

Dissolved in water, CO₂ acts as a diprotic, weak acid. Compared to the strong mineral acids, CO₂ exhibits a much more continuous neutralization behavior. In addition, the pH decreases only slightly with further CO₂ addition beyond the neutral point, which prevents over-acidification – a common issue when using mineral acids – ensuring a controlled and stable pH level. There is no need for a complex regulation technique.

The salt load of the wastewater is not increased by chloride, sulfate, phosphate or nitrate during neutralization with CO₂. This poses an advantage not only from an ecologic perspective, but can also have a positive effect on discharge permits or freight-based wastewater charges.

Storage and dosing of CO₂ is much safer compared to aggressive and corrosive mineral acids. Furthermore, as an inert gas, CO₂ does not cause corrosion problems associated with chlorides and sulfates.



Schematic representation of the neutralization curves of a sodium hydroxide solution using CO₂ and mineral acid



User-friendly, precise process control

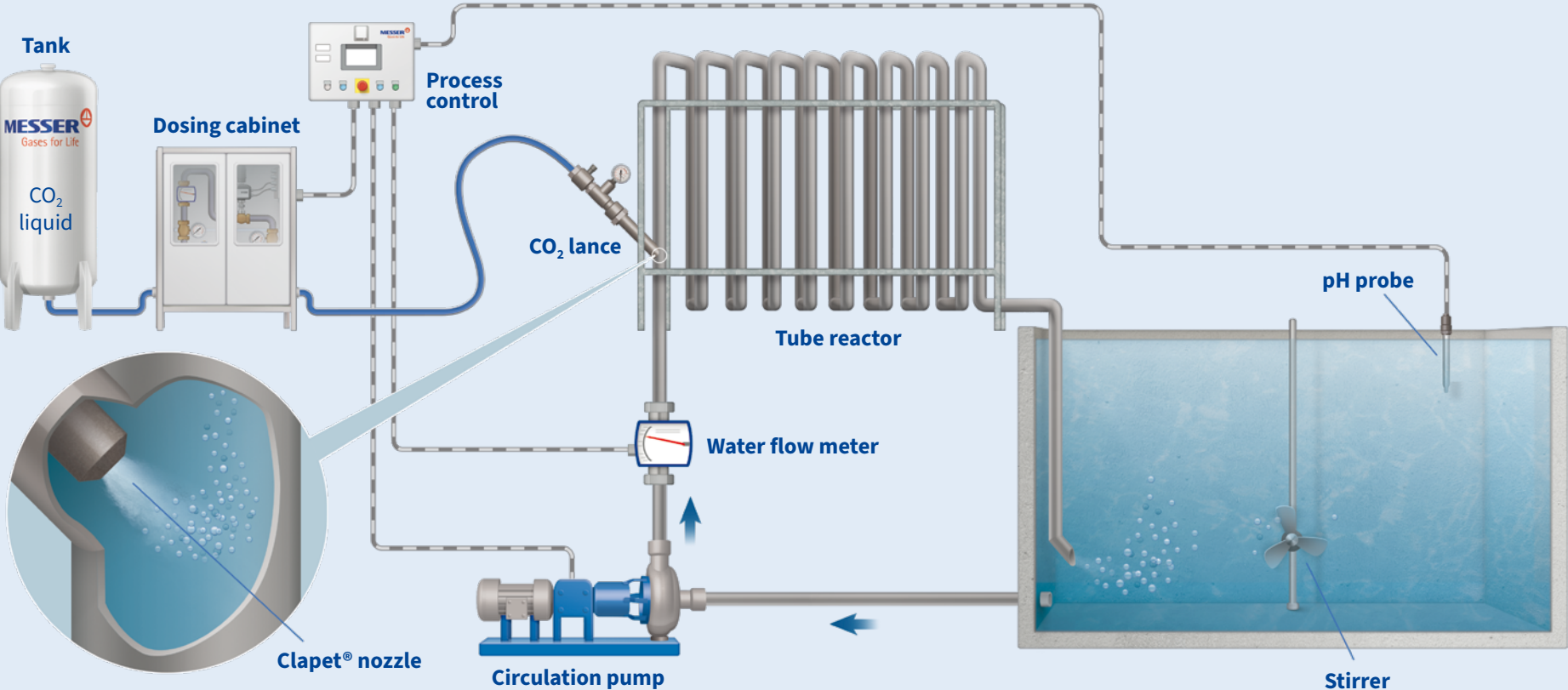
Practical implementation

The first step of every CO₂ neutralization project is to determine the appropriate point of injection. Often, existing plant components such as a wastewater pipeline, buffer or sedimentation basins can be used for this purpose. Our experts check the respective wastewater characteristics as well as the conditions on site, calculate the required CO₂ demand and propose appropriate injection systems.

Messer supplies hardware designed to meet your requirements for the regulation and injection of the CO₂. Our experienced application team will accompany you throughout the planning and implementation of your neutralization project, thus ensuring optimal operation efficiency of your plant.

Of course, Messer also takes care of the supply of CO₂ as required. Depending on the level of consumption, the supply takes place either in gaseous form from a cylinder bundle or in liquid form from a storage tank. Many reference plants, with capacities ranging from a few grams to 2,000 kg of CO₂ per hour, are already using know-how and gases from Messer.

Process design of neutralization with carbon dioxide in side stream



Your advantages at a glance


- Simple and precise regulation
- Over-acidification practically impossible
- No handling of dangerous, aggressive acids
- No corrosion problems
- No increase of salt load in wastewater
- Favourable operating costs
- Low space and personnel requirements
- Non-binding preliminary tests with Messer rental equipment possible




Safe storage and easy handling make CO₂ a more cost-effective option, with significantly lower storage/use efforts and costs compared to mineral acids

About Messer



 Messer is the world's largest privately owned specialist for industrial, medical and specialty gases. Under the brand, **Messer - Gases for Life**, the company offers gases and services in Asia, Europe and America. The cooperation between the more than 11,500 highly qualified international employees is based on mutual respect. Messer pays particular attention to diversity and inclusion.

 Messer's 'Gases for Life' are used in industry, environmental protection, medicine, the food industry, the electronics industry, welding and cutting technology, 3D printing, construction, research and science. Messer offers one of the largest product portfolios on the market and develops application technologies for gases in state-of-the-art competence centers. 'Gases for


Life' are as important as water and electricity in most industrial processes and can play a significant role in their decarbonization, for example through the use of green hydrogen, CCUS or oxyfuel technology. In its customers' processes, Messer's customized gas solutions ensure greater safety, efficiency, quality, capacity and environmental compatibility and/or reduce the associated emissions and costs.

As a pharmaceutical company, Messer is also a provider of medical and pharmaceutical gases and complete solutions and has proven itself to be a reliable supplier of vital products.

[Messer Image film >](#)

The company was founded in 1898 and is majority-owned by the Messer family.

Service and Advice

 **Take advantage of the experience of our application specialists. We will gladly show you how Messer's know-how and CO₂ can successfully be used for wastewater neutralization in your industry:**

- Waste management and recycling
- Construction industry
- Chemical and pharmaceutical industry
- Beverage industry and dairies
- Glass production
- Power plants
- Food industry
- Natural stone and concrete processing
- Pulp and paper industry
- Steel production to metal chemistry
- Textile and leather industry
- Drinking water production
- Laundries
- and many others

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