Choose the right adsorbents

March 2015

All CO₂ plants use adsorbents to remove impurities. The main question is which adsorbent to choose, and it is absolutely crucial to choose the right adsorbent in order to obtain the required purity in the end product, in relation to health and safety specifications and in order to maintain supplier guarantee.

The right adsorbant gives safe results

The responsibilities of the Product & Technology department at Union include making recommendations about the right adsorbent to choose at the various CO₂ process plants that Union is supplying worldwide. Many years of experience and countless numbers of tests have taught the chemical engineers at Union that it is crucial to choose the right adsorbent and for the plant owner to keep using the recommended adsorbent in order to maintain plant performance.

Kristoffer Moos, Process Engineer, is one of the leading authorities within this field at Union and he explains: “Test results for the effectiveness of adsorbents to remove impurities are often based on measurements in air or nitrogen atmospheres. When the atmosphere is CO₂, these results can become very unreliable, as CO₂ will often have a significant interaction with the adsorbent and influence the uptake of the impurities. At Union Engineering, our focus is strictly on CO₂, and we base our research on impurities in a CO₂ atmosphere to obtain results that are also reliable in our plants.”

Kristoffer gives a few examples of how we choose our adsorbents:

Carbonblend #5

COS is a component that is especially difficult to remove from CO₂ by use of adsorbents. There is a high resemblance between the two molecules that makes it hard to remove selectively.

Union has tested a large range of adsorbents (more than 30) from different suppliers that all claimed to have the ability to adsorb COS from CO₂. The test showed significant differences between the adsorbents, many had a lower uptake than promised, some had none!

Based on extensive tests, we have now proven which of the adsorbents works and is therefore able to offer you the combination, that has the most efficient COS uptake.

An uptake that is proven in an atmosphere that resembles the actual operation condition in a CO₂ plant. This is why we know that Carbonblend #5 is the most efficient COS adsorbent on the market for CO₂ applications.

Puriblend #3

Molecular sieves have a long-proven record for selective water removal from gas streams. However, there are many suppliers on the market, and even though the products may look similar on paper, their effect can differ significantly.

At a specific plant, selective removal of water from the CO₂ was required and a molecular sieve was specified to achieve the target. Unfortunately, the target was not reached. The filling was replaced, but without improvement. A new combination, Puriblend #3, was therefore tested and chosen. Even though the fillings were identical on paper, it was only possible to reach the target for water removal once the new product was introduced.

This is why we know that Puriblend #3 is a high efficient molecular sieve for selective water removal from CO₂.

“Based on extensive tests, we at Union Engineering knows which of the adsorbents works”

Krisstoffer Moos, Process Engineer, Union Engineering