

GAS ANALYSERS FOR CCS, DAC, AND E-FUELS



Carbon capture is the foundation of carbon dioxide (CO₂) capture and storage, or utilisation. Capturing CO₂ from a flue gas stream often relies on a solvent or solid adsorbent material that is sensitive to other chemicals in the raw flue gas such as sulphur dioxide (SO₂). So, the CO₂ separation, or capture, is often the last stage in a complex arrangement of flue gas treatment (FGT).

Measurement and control of the CO₂ purity through the CCTUS process and the analysis of critical impurities relies on gas analysis instrumentation. Some of the gas analysers are like those that have been used in continuous emissions monitoring (CEM) for decades. However, the measurement of CO₂ purity is an emerging requirement.

Much of the CO₂ captured from industrial processes today relies on a liquid amine solvent. It is a twin tower process where CO₂ from the flue gas is absorbed into the solvent in the first tower. The CO₂-lean flue gas then flows to atmosphere. The CO₂-rich amine is pumped to a second tower where heat is used to strip the CO₂ out of the amine solvent. The regenerated, CO₂-lean amine solvent is pumped back to the absorber tower to collect more CO₂ and the process operates continuously with the solvent being recirculated from the absorber to the stripper.

Over time, the amine solvent is degraded through reactions with oxygen and other impurities in the flue gas. It is particularly sensitive to sulphur compounds such as sulphur dioxide (SO₂) and the flue gas from coal or heavy fuel oil combustion will contain a high level of SO₂.

Removal of SO₂ is already implemented on many combustion plants in developed nations, to avoid the problem of acid rain. However, flue gas desulphurisation (FGD) is not universal, and it is only recently that developing nations such as China and India have implemented regulations to ensure that SO₂ emissions are reduced. It is likely that for some operators, implementation of CO₂ capture will require implementation of upstream SO₂ capture through FGD.

Hot/wet extractive, cold/dry extractive, and in-situ gas analysers for process control and CEM are all relevant for these various applications.

In addition to the measurement requirements between the raw flue gas and the CO₂ amine solvent absorption system, a CO₂ gas analyser in the 90 to 100% range must be used to measure the purity of the CO₂ liberated from the stripping tower. The CO₂ at this point in the process will be saturated with moisture. This must be monitored to control downstream processes such as CO₂ drying, liquefaction, or compression.

CO₂ can be purified and liquefied for transportation by road to other commercial utilisation applications. Prior to liquefaction, the CO₂ is dried on a regenerative dryer bed to avoid moisture



