

Application note

Monitoring oxygen in a catalytic oxidizer for CO₂ production

Summary

In the manufacture of carbon dioxide, one process step involves use of a catalytic oxidizer, which requires a premix of gases. The premixed gas must have an optimum oxygen content to support the chemical reaction in the oxidizer; however, excess oxygen can lead to inefficient reactions and a potentially explosive environment. Cost savings are realized when the oxygen is maintained at specific concentrations, for an efficiently run process.

Application

The oxygen concentration is measured before and after the addition of air to the pre-mixture. The oxygen measurement controls the amount of air added to the mixture. The process brings 95% carbon dioxide (CO₂) along with water vapor and hydrocarbons to in-series compressors. The gas is compressed to 300 psig before being filtered. Air is then added so that the background hydrocarbon gas is converted to CO₂ before reaching the oxidizer. The oxygen content must be maintained below 6%.

Benefits:

- Speed of response
- High accuracy, low drift measurement
- No moving parts



Application specifications

Application	0 – 21% O ₂ in CO ₂ with hydrocarbon background
Pressure	300 psig at sampling point, regulated to atmospheric pressure at inlet to analyzer
Temperature	Ambient

Challenge

Speed of response is key, given that this controls the process. This analyzer measures excess oxygen in this case, the amount of air above and beyond that needed for stoichiometric combustion, to ensure a complete reaction in the catalytic oxidizer. Accuracy and stability of the measurement are also vital requirements.

The solution

Panametrics' CGA351 zirconium oxide analyzer uses the perfect technology to make this measurement. The analyzer package is available in both a 19" rack mount or wall mount configuration. The instantaneous speed of response of the analyzer addresses process control concerns. In addition, the zirconium oxide sensor measures oxygen in excess of that needed for combustion, therefore making the perfect measurement for this application.