

Synthesis Gas - Syngas Processing Hydrogen Process Gas Analyzer

Basics and background

Syngas is a resource for the production of hydrogen, ammonia, methanol and synthetic hydrocarbons. Raw synthesis gas is a mixture of carbon monoxide (CO) and hydrogen (H₂). The raw material for syngas production can be natural gas, liquid gas, naphtha or coal as well as some alternative sources which are becoming more important. Raw syngas can be converted into the final desired components, in particular hydrogen. This includes the catalytic conversion of CO reacting with steam and pressure swing adsorption to remove the CO and CO₂ impurities and ultimately achieve hydrogen with the desired purity.

In this process, analytical equipment helps to monitor several different gas concentrations during the various steps for generation of syngas and/or hydrogen.



Solutions – Use of process gas analyzers

The first step of a steam reformer is to react natural gas (commonly used) with steam to create raw syngas by formation of H₂ and CO. The reformer efficiency can be measured with NDIR - unreacted CH₄ and CO for preparation of the shift converters. The H₂ level can be monitored with a CONTHOS 3 – TCD gas analyzer.



During the next step shift converters remove the CO by reaction with steam to form CO₂ and H₂. The residual CO concentration can be measured to control the efficiency of the shift converters.

The CO₂ is then absorbed in an amine scrubber and the measurement of CO₂ helps to determine scrubber efficiency. A final step can be a methanator to convert traces of CO and CO₂ into CH₄.

The traces of CO and CO₂ can be monitored with NDIR analyzers. For process control, LFE can offer the measurement of hydrogen for process monitoring and gas purity. The CONTHOS 3 – TCD can, for example, analyze 0 – 50 up to 100% H₂.

Highly suppressed ranges such as 90 - 100%, 95 – 100%, 98 - 100% or up to 99.5 - 100% H₂ are also available for gas purity monitoring of the final pure hydrogen.

Conclusions

The special performance of the LFE CONTHOS 3 – TCD for analysis of H₂ helps to monitor and analyze gas purity during the

synthesis gas/ hydrogen process leading to optimal process performance.

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