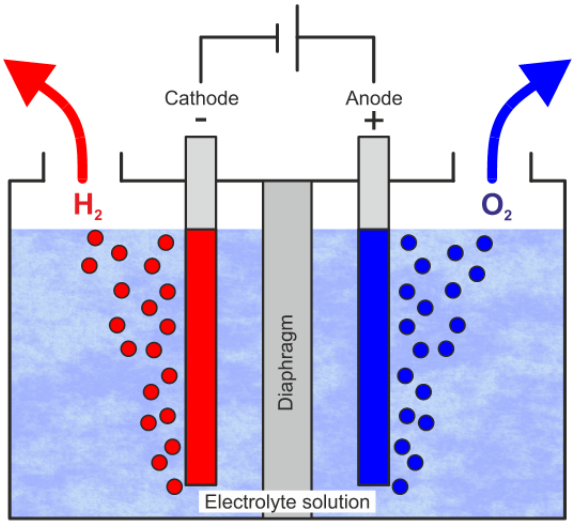
Water Electrolysis Process
Hydrogen Process Gas Analyzer

Basics and background

Water electrolysis can be considered as one of the most important technologies for long-term hydrogen production. Several Power-to-Gas technology projects are in place to investigate how to efficiently buffer the excessive energy being created by alternative energy sources. Electrolysis units of different sizes allow the conversion of electrical into chemical energy.

During the electrolysis process hydrogen (H_2) and oxygen (O_2) are generated. O_2 can be used by oxygen consumers (e.g. steel industry) while H_2 can be used directly or used to create methane in a subsequent methanation step. Both hydrogen and methane are gases which can be stored and transported safely. Monitoring of the process at various sample points by process gas analyzers is therefore an important requirement for cost reduction and sustainability.



Solutions – Use of hydrogen process gas analyzers

The purpose of gas analysis in the electrolysis process is to monitor the hydrogen concentration for control of efficiency. The plant optimization and research targets are membrane testing, mechanical redesign of cells and other critical components of the electrolyzer. The H_2 level can be monitored with a CONTHOS 3 – TCD gas analyzer.

The CONTHOS' highly corrosion resistant thermal conductivity detector with aluminum oxide ceramic, glass and quartz coated platinum measuring filaments enable excellent long-term stability for this application over many years. Stainless steel tubing and an optional infallible containment system, which is tested for extreme high pressure, enables a gas-tight measurement, even for hydrogen/ oxygen mixtures. In this way the CONTHOS TCD analyzer can be used for flammable gases which may turn explosive in case of oxygen ingress.

The CONTHOS 3 – TCD can, for example, analyze 95 – 100%, 99 – 100% up to 99.5 – 100% H_2 to determine the final gas purity of the generated hydrogen. Additionally or alternatively a measurement of 90 - 100%, 95 – 100% or 98 – 100% O_2 in H_2 or low ranges such as 0 – 1%, 0 - 2 % or 0 - 3% of H_2 in O_2 or O_2 in H_2 can be provided for hydrogen and oxygen purity or/and explosion protection. For hazardous areas the CONTHOS 3 – Ex p ATEX compliant Ex p system is available as well.

Conclusions

The special performance of the LFE CONTHOS 3 – TCD for analysis of H_2 with highly suppressed measuring ranges helps to monitor and analyze H_2 purity in the water electrolysis process. This enables the production of hydrogen in the desired quality during electrolysis leading to safety and optimal process performance.

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