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QUANTIFICATION OF HYDOGEN

Method that uses a flame ionization detector to dermine hydrogen (UOL130)

THE PROBLEM

The quantitative analysis of hydrogen is important in various industrial processes. So far, a continuous detection of hydrogen by applying chromatographic (gas chromatography) and non-chromatographic (temperature-programmed reduction, TPR) methods has only been feasible when thermal conductivity detectors were used. However, the sensitivity of these detectors lies in the millivolt range and is therefore not very high. Some mass spectrometers are also capable of determining hydrogen, however, quantification is extremely difficult because of hydrogen's low molecular mass. Apart from these methods, there is no other way to detect and quantify hydrogen continuously.

THE SOLUTION

The Carl von Ossietzky University in Oldenburg, Germany, developed a method which markedly improved the quantitative determination of hydrogen. A so-called TPR is conducted by coupling a flame ionization detector (FID) to a methanizer. Adding a certain amount of carbon monoxide (CO) and an excess amount of hydrogen immediately upstream of the FID, CO will react with hydrogen to yield methane. Methane produces a FID signal which is proportional to the amount of hydrogen in the sample. The method is innovative insofar as it sends ahead of the known method of flame ionization a reaction which makes hydrogen, otherwise undetectable by FID, quantitatively detectable as methane. The idea has been realized on a laboratory scale and has to be optimized for industrial processes.

ADVANCES AND APPLICATIONS

The developed method enables a continuous and quantitative detection of hydrogen. Compared to thermal conductivity detectors, this method has a 1000-times higher sensitivity. It is robust and can be easily integrated into existing procedures.
The main fields of application are in gas-chromatography (as a flame ionization detector) and in temperature-programmed reaction. Users of this technology are manufacturers of scientific instruments operating in the field of analytical technology and gas analytics.

FIELD OF APPLICATION
Measuring the concentration of hydrogen

KEYWORDS
Inverse TPR, flame ionization, analytics

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AN INVENTION OF
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