

Performances of available analytical methods to control the purity of hydrogen according to ISO14687-2

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Abstract

Hydrogen purity dispensed at hydrogen refuelling points should comply with the technical specifications included in the ISO 14687-2 standard "Hydrogen fuel – specification- part 2: Proton exchange membrane (PEM) fuel cell". However, for routine laboratory/analysis, performing the whole set of analyses is currently extremely challenging due to the low detection limits to reach and the number of analyses required. In the EMPIR (European Metrology Programme for Innovation and Research) project 15NRM03 "Metrology for sustainable hydrogen energy applications", we have reviewed the current performances of the analytical methods that are proposed so far for the 13 gaseous species to analyse (incl. availability of validation data; limit of detection, repeatability, precision, robustness ...). We have also gathered information on methods using dedicated multi-component analyzers (as OFCEAS, CRDS, FTIR). The review will provide indications on analytical methods suitability and cost for the implementation of hydrogen quality laboratory.

Another challenge when performing hydrogen purity analysis according to ISO14687-2 standard is the parameters that cover a large number of species, the so-called total species. In the project, we have developed speciation methods for the total species (sulphur, halogenated, hydrocarbons) at amount fraction lower than the ISO14687-2 threshold d values. The application of the speciation methods will enable the measurement of the actual contaminants present in hydrogen for FCEV which possibly could lead to suggestions for the replacement of "total species" with the actual contaminants.

This poster gives an overview of the results that have been obtained.