Comparative analysis of hydrogen sensors in a test chamber following ISO 26142:2010 standards

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Abstract This study presents a comparative analysis of three commercially available hydrogen (H-2) sensors using a self-developed test chamber constructed in accordance with ISO 26142:2010. Sensor performance was assessed based on accuracy, stability, repeatability, response and recovery times, and selectivity to carbon dioxide (CO2). Absolute error and relative error analyses were used to quantify accuracy statistically. Results showed that Sensor 1 and Sensor 2 achieved the highest accuracy, with Sensor 2 also demonstrating good stability. Repeatability testing indicated that Sensor 1 produced the most consistent multi-cycle measurements. Sensor 2 exhibited the fastest response behavior, although its response and recovery times slightly exceeded ISO 26142:2010 thresholds. All sensors maintained selectivity toward H-2 in the presence of CO2. Overall, the findings highlight the importance of controlled test conditions and standardized assessment protocols. Among the sensors evaluated, the electrochemical-based sensor demonstrated the strongest overall performance across key parameters.

Keywords **Author Keywords:** Hydrogen; Carbon dioxide; Electrochemical sensors; Test chamber; ISO 26142:2010

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