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Entitled

*DEVELOPMENT AND CHARACTERIZATION OF A PORTABLE APPARATUES FOR CONTINUOUS
MEASUREMENT OF HYDROGEN SULFIDE IN GAS STREAMS*

by

Bashar Yousef Salman Abu Hattab

Faculty Advisor

Dr. Sayed Marzouk, Department of Chemistry

College of Science

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Abstract

A novel detection scheme for the hydrogen sulfide (H_2S) was described and patented recently by researchers at UAE University. This detection scheme and the described bench-scale analyzer offered the advantage of low-cost solution for real-time monitoring of percentile levels of H_2S with excellent signal stability. However, this previous work suffered from two major limitations, i.e., the relatively low sensitivity and slow response time, which mainly hindered its commercial utilization. Therefore, the aims of the present work were to enhance the detection sensitivity, decrease the response time, and to develop a portable prototype of the H_2S analyzer based on the improved calorimetric detector. The calorimetric detection scheme was substantially improved by replacing the diffusion scrubber, reported previously, with a direct mixing of the H_2S containing gas stream with the sodium hydrogen and hydrogen peroxide reagents. Also, the heavy stainless steel mixing block was replaced with a carefully designed light-weight stainless steel alternative. The improved detector, two reagent pumps, two reservoirs, thermocouples-data acquisition card, compact PC and lithium ion battery were the main component used to construct a portable H_2S analyzer. The analyzer was optimized and fully characterized. The presented analyzer succeeded to lower the previously reported response time (i.e., 7 min) to 70 sec. and also the limit of detection was decreased from 200 ppm to 20 ppm. Additional advantages of the presented analyzer compared to the previous report include: (i) portable version with gross weight of approx. 8 kg; (ii) stand-alone operation for up to 4 hours at least, (iii) lower reagent consumption, and (iv) single waste stream instead of two. Also, the reported advantages did not compromise the previously reported advantages such as the impressive signal stability or the low cost to any extent. The presented analyzer is a milestone toward the serious efforts to commercialize the H_2S analyzer based on the calorimetric detection as a lower cost alternative to the existing expensive analyzers.

Keywords: H_2S Determination, Thermometric detection, Portable gas analyzer.