

The Continuous CH₂O Measurement Methods Employed in the Intercomparison

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Three different, widely used, continuous, automated methods for the measurement of ambient CH₂O were employed in the intercomparison. The principles of operation of these instruments are described briefly in this talk. 1) In the coil/DNPH/HPLC method of BNL the ambient formaldehyde is scrubbed (with a measured efficiency) into an aqueous, acidified solution of 2,4-dinitrophenylhydrazine using a glass coil. The CH₂O and other soluble aldehydes are derivatized to form the hydrazones which are separated by HPLC using isocratic elution and a monitor wavelength of 370 nm. Sample injection was made every 5.0 min and represented an average over a time period of 2.5 min. The limit of detection (LOD) was 30 pptv. 2) The 1,3-cyclohexadione (CHD) diffusion scrubber method of TTU draws air through a Nafion membrane based diffusion-scrubber (with efficiency determined), and gaseous formaldehyde is collected at the surface of the hydrophilic membrane tube and permeates inside into a flowing stream of water. Aqueous CH₂O then reacts with CHD and ammonium acetate to produce a fluorescent dihydropyridine derivative which is measured by a filter fluorimeter. The sampling period was 2 min with 4 min period for zero air. Thus the time resolution was 6 min. The technique is selective to CH₂O with a gas phase LOD of 10 pptv. 3) The coil enzyme method of URI is based upon the fluorescence measurement of the reduced form of nicotinamide dinucleotide which is produced by the reduction of its oxidized form by CH₂O, using formaldehyde dehydrogenase enzyme as the catalyst. In the application of the method, ambient CH₂O vapor is collected in aqueous solution using a coil collector (with measured efficiency). The instrument duty cycle was 15 min of ambient measurement followed by 15 min of blank determination. Signals were recorded as 1 min averages. The technique is selective to CH₂O with a LOD of about 20 pptv.

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