

SUMMARY

This report describes the development of a method for collection and analysis of dimethyl sulphide (DMS) in air samples. The work was specifically directed toward developing a method for personal samples collected in the breathing zone of kraft pulp mill workers. It can also be used for area sampling in the workplace and external environment.

The method uses standard industrial hygiene techniques to collect the samples. Analysis of samples uses readily-available materials and is straight-forward for a trained laboratory analyst. Sample analysis requires a gas chromatograph capable of analysing individual reduced sulphur gases. The procedure has considerable flexibility to allow the analyst to match the sample peak height to the detection limit of the gas chromatograph. Laboratory trials gave a detection limit equivalent to 0.002 ppm DMS (0.005 mg/m^3) for an air sample collected at 200 mL/min for 4 hours.

The method comprises four steps:

- a. Collection of air samples on large charcoal adsorbent tubes (400/200) at flow rates between 200 and 1000 mL/min for up to four hours.
- b. Solvent extraction of charcoal using diethyl ether.
- c. Vaporization of solvent extract in a gas dilution flask.
- d. Measurement of vapour concentration by gas chromatography.

Airborne concentrations of dimethyl disulphide (DMDS) can also be measured using this method. However, methyl mercaptan in air samples interferes with analysis of DMDS. Methyl mercaptan is not adsorbed onto charcoal and cannot be measured by this method, but some is oxidized on charcoal to produce DMDS. In addition, diethyl ether used in laboratory trials for solvent extraction contained an unknown peak that interfered with the analysis of low concentrations of DMDS by gas chromatography. This peak will not necessarily interfere when samples are analysed using different chromatography columns or a different detector.

The precision and accuracy of the method are acceptable. When air was drawn through spiked samples, mean recoveries of DMS were 97 to 109% and individual results were between 90 and 130% at the 95% confidence level. Mean recoveries for DMDS from high-level spiked samples were 87 to 89% and individual results ranged from 80 to 96% of the true concentration at the 95% confidence level.

The effect of humidity and temperature on recovery of DMS and DMDS was investigated in tests conducted at a pulp mill. Average recovery for DMS was 96% and 105% for DMDS from spiked samples run at a relative humidity of 72% and a temperature of 27°C. DMS and DMDS were not detected on the back sections of spiked tubes at relative humidities of 72 and 86% and temperatures of 27 and 32°C.

A comparison of DMS concentrations measured by colour detector tubes and charcoal tubes showed a large discrepancy. Two colour tubes gave readings of 2 ppm; the average result for two charcoal tubes was 0.5 ppm. The difference between these results may arise from the colour detector tube responding to other reduced sulphur gases in the air.