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Occupational Exposure to Mineral Oil Metalworking Fluid (MWFs) Mist: Development of New Methodologies for Mist Sampling and Analysis

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**Abstract:**

**Objective:** a new method of measuring mixed mist and vapour oil and to overcome the difficulties of loss of vapour oil during sampling and interference problems is proposed

**Methods:** The sampling train was  $\varnothing$  37 mm closed-face polystyrene cassette containing glass fibre filters, (GF/B, Whatman), coupled with a Solid Phase Extraction (SPE) cartridge (6 ml Polypropylene tube and frits, ref 57242 and 57181, Supelco) containing 1 g of XAD-2 (ref 1-0357, Supelco). The flow rates were 2 l/min for all round tests. For particular fraction, gravimetric methods were done with filters conditioned before and after sampling after conditioning during 24 hours in controlled humidity box (52 % RH  $\pm$  5 %) before weighing by microbalance. Volatile fraction on XAD-2 cartridges was extracted by elution of 20 ml of distilled CH<sub>2</sub>Cl<sub>2</sub>. After evaporation to small volume (5 ml), under gentle nitrogen stream, the final solution was transferred into a small vial and gravimetric determination of volatile oil fraction can also be done by gentle evaporation of extract solution, repetitive weigh of residue on vial and calculate the theoretical amount of volatile oil fraction.

**Results:**

Oil mist was generated with light, medium and heavy mineral oils based MWF in a home-made glass nebulizer using compressed-air in an experimental chamber of 10 m<sup>3</sup>. The generated range of oil mist can be regulated in the range of 0.1 to > 20 mg/m<sup>3</sup>. An inter-laboratory circuit to validate sampling and analytical approaches was organized and the accuracy results of the new developed methods give fully satisfaction.

**Conclusions:**

A new and validated method of measuring mixed mist and vapour oil is proposed: by determining separately the aerosol fraction on filter and by adding a absorber cartridge (XAD2) for trapping vapour fraction of oils, completed by a selective determination of vapour oil fraction (C<sub>12</sub>-C<sub>24</sub>)

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