

METHOD STATEMENT



Determinand:

Airborne Particulate Matter.

Matrix:

Filter

Principle of Method:

A clean, dried, and weighed filter is fitted to suitable monitoring equipment that will pass air at a known rate through the filter for a known time. The filter is dried to remove moisture and then reweighed. The PM value is reported as μg of particulate matter per cubic meter of air ($\mu\text{g}/\text{m}^3$). Air monitoring is typically over a 24-hour period, although longer time periods will allow for lower detection limits.

Sampling and Sample Preparation:

Filters are prepared by the laboratory before issue and are dried upon receipt at the laboratory to remove moisture. Clinical transportation conditions are recommended to eliminate accidental particulate contamination. Sampling by trained operatives is essential for the generation of reliable data.

Interferences:

In a humid environment, moisture can collect on the filter. This moisture can have a number of effects.

1. Gases within the air such as sulphur dioxide, carbon monoxide and nitrogen dioxide can dissolve in the moisture, forming dilute acids that can interact with solids caught on the filter. This can result in the loss of analyte (e.g., carbonates are liberated as CO_2) or metals can be converted to salts (e.g. lead to lead nitrate). Both of these processes will affect the final result.
2. The moisture (if excessive) can restrict the airflow through the filter, giving a false low result.
3. If the moisture is not removed from the filter, it will be incorrectly counted as part of the particulate matter mass.

For reliable sample measurement, accurate results will only be obtained from a well-maintained analytical balance in a suitable environment, with a stable platform and no drafts.

Performance of Method:

With a theoretical sampling rate of 5 litres per minute over a 24 hour period and with a balance capable of $\pm 10 \mu\text{g}$, an estimated detection limit of $2.8 \mu\text{g}/\text{m}^3$ is possible.

The reported uncertainty is an expanded uncertainty calculated using a coverage factor of 2, which gives a level of confidence of approximately 95%.

Determinand	Uncertainty of Measurement %
PM10	14.38

References:

BS EN 12341:2014 Ambient air – Standard gravimetric measurement method for the determination of the PM10 or PM2, 5 mass concentration of suspended particulate matter. ISBN 978 0 580 78524 5.

BS ISO 15767:2009 Workplace atmospheres – Controlling and characterizing uncertainty in weighing collected aerosols. ISBN 978 0 580 58086 4.