EPA/625/R-96/010a

Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air

Compendium Method IO-2.4

CALCULATIONS FOR STANDARD VOLUME

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Method IO-2.4

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Chapter IO-2
INTEGRATED SAMPLING OF SPM IN AMBIENT AIR

Method IO-2.4
CALCULATING STANDARD VOLUME

1. Introduction

1.1 Most atmospheric sampling techniques use a sampling train whereby air containing the pollutant of interest enters the train and passes through a sample collection device.

1.2 The weight of the pollutant collected is compared to the volume of air drawn through the train to extrapolate the concentration of the pollutant in the ambient air. The concentration is usually expressed in terms of $\mu g/m^3$, corrected to EPA's standard temperature and pressure (STP).

2. Calculation of Volume to STP

2.1 To compare gas sampling data collected by various agencies and organizations from around the country, EPA has specified that all gas volumes must be corrected to a set of predetermined standard conditions. For atmospheric or ambient sampling, these conditions are 25EC or 298K and 760 mm Hg.

2.2 The equation used to correct sample volumes (V_s) to EPA standard volume (V_{std}) conditions is:

$$V_{std} = (V_s)(P_{atm}/P_{std})(T_{std}/T_{atm})$$
$$V_{std} = (V_s)(P_{atm}/760 \text{ mm Hg})(298 \text{ K}/T_{atm})$$
$$V_{std} = (V_s)(0.39)(P_{atm}/T_{atm})$$

where:

V_{std} = volume of gas sampled, corrected to EPA's standard pressure (760 mm Hg) and standard temperature (25EC), m^3.

V_s = volume of gas sampled at atmospheric pressure (P_{atm}) and temperature (T_{atm}), m^3.

T_{std} = EPA standard temperature (25EC), 273 + 25 = 298 K.

P_{std} = EPA standard pressure, 760 mmHg.

T_{atm} = average atmospheric temperature during sampling (EC), 273 + 25 = 298K.

P_{atm} = average atmospheric pressure during sampling, mmHg.

0.39 = 298 K/760 mm Hg.

3. Federal Register Citation

3.1 The full text of EPA's specifications for correcting volumes to STP can be found in 40 CFR, Part 50, Appendix B.

3.2 All sample volumes must be corrected to STP.

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