Australian Standard®

Methods for sampling and analysis of ambient air

Method 10.1 Determination of particulates—Deposited matter—Gravimetric method

PREFACE

This Standard was prepared by the Standards Australia Committee on Methods for Examination of Air to supersede AS 2724.1, *Ambient air—Particulate matter*, Part 1: *Determination of deposited matter, expressed as insoluble solids, ash, combustible matter, soluble solids and total solids*. This Standard deals with the determination of particles which rapidly settle from the air.

Other methods for the determination of particulate matter are as follows:

AS		
2724		*Ambient air—Particulate matter*
2724.2	Part 2:	*Determination of suspended matter expressed as equivalent black smoke by filter paper soiling, to be used in conjunction with AS 2509, Determination of acid gases (expressed as sulphur dioxide)*
2724.3	Part 3:	*Determination of total suspended particulates (TSP)—High volume sampler gravimetric method*
2724.4	Part 4:	*Determination of light scattering—Integrating nephelometer method*
2724.5	Part 5:	*Determination of impinged matter expressed as directional dirtiness, background dirtiness and/or area dirtiness (directional dust gauge method)*
3580.9.6	Method 9.6:	*Determination of suspended particulate matter—PM_{10} high volume sampler with size-selective inlet—Gravimetric method*
3580.9.7	Method 9.7:	*Determination of suspended particulate matter—PM_{10} dichotomous sampler—Gravimetric method*

This edition differs from the 1984 edition by the inclusion of an optional sample filtration procedure, additional information on techniques for determining insoluble solids, ash and combustible matter and the gauge washing technique. This edition has also been reformatted to fit into the AS 3580 series of Standards.

FOREWORD

The material sampled by this method is predominantly dust particles which, because of their size, rapidly settle from the air. This dust can be a nuisance by soiling property in the vicinity. Some common sources of such particles are minerals processing, bulk materials handling, mining operations, industrial processes, incineration and natural causes such as wind-blown dust.

This method is used primarily to establish long term trends and to investigate localized dustfall.

This procedure has been widely used in Australia for over 35 years and, during this time, extensive data has been collected. This data is not directly comparable with that obtained by other deposit gauge methods. During the preparation of this method, cognizance was taken of BS 1747, *Methods for measurement of air pollution*, Part 1: *Deposit gauges*.

METHOD

1 SCOPE This Standard sets out a method for the sampling of particulate matter which is deposited from the atmosphere and procedures for the gravimetric determination of the mass deposition rate of insoluble solids, ash, combustible matter, soluble solids and total solids from ambient air.

NOTES:

1 The sample obtained by the sampling procedure specified may be used for chemical tests or microscopic analysis.

2 The method provides a means for measuring the mean concentration of particulate matter in air over a sampling period, normally one month. Concentrations of 0.1 g/m^2.month and above may be determined using a monthly sampling period.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1152 Test sieves

2162 Code of practice for the use of volumetric glassware

2164 One-mark volumetric flasks

2166 One-mark pipettes

2922 Ambient air—Guide for the siting of sampling units

3 DEFINITIONS For the purpose of this Standard, the definitions below apply.

3.1 Deposited matter—the particles which are collected in the deposit gauge (see Clause 6.2) and which pass through a 1 mm mesh sieve complying with AS 1152.

3.2 Total solids—the mass of the particulate matter deposited in the gauge.

3.3 Soluble matter—the mass of the soluble portion of the deposited matter.

3.4 Insoluble matter—the mass of the insoluble portion of the deposited matter.

3.5 Combustible matter—the mass of that portion of the insoluble matter lost during combustion.

3.6 Ash—the mass of that portion of the insoluble matter remaining after combustion.

4 PRINCIPLE Over a given sampling period, particles which settle from the ambient air are collected in a vessel and retained together with any rainwater. The sample is sieved to remove any extraneous matter and the filtrate containing the deposited matter is quantitatively transferred to a filtration apparatus. The insoluble and soluble material are separated by filtration and the mass of the dried insoluble solids is gravimetrically determined.

From the dried, insoluble solids, the ash and combustible matter are determined. From the filtrate, the soluble solids are determined. The total solids are obtained by the addition of the insoluble solids and the soluble solids. The mass deposition rate of deposited matter is then calculated from the mass of solids obtained and the exposure period.

5 REAGENTS

5.1 General requirements During the analysis, only reagents of recognized analytical grade and distilled water or water of an equivalent purity shall be used.

5.2 Copper sulfate solution Dissolve 7.8 g of copper sulfate pentahydrate ($CuSO_4.5H_2O$) in water and dilute to 1 L in a volumetric flask.

6 APPARATUS

6.1 Glassware Grade A volumetric glassware shall be used throughout. Volumetric flasks shall comply with AS 2164, and pipettes shall comply with AS 2166. Use of volumetric glassware shall comply with AS 2162.

6.2 Deposit gauge (see Figure 1)—Comprising a 150 ±10 mm diameter funnel (nominal angle of cone sides 60 degrees) of glass, or other demonstrably unreactive material, supported firmly in the neck of a wide-mouth, glass bottle of a suitable size, preferably of minimum volume 4 L, by means of a rubber or plastic stopper with a groove or outlet pipe to allow water overflow under excessive rainfall conditions.

NOTES:

1 The size of the bottle should be selected after consideration of the expected rainfall over the sampling period.

2 Stoppers should preferably be constructed from a non-reactive, non-friable substance. Rubber stoppers should be replaced when ageing is evident.