Australian/New Zealand Standard™

Methods for sampling and analysis of ambient air

Method 11.1: Determination of methane and non-methane organic compounds in ambient air—Direct-reading instrumental method

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EV-007, Methods for Examination of Air, to supersede AS 3580.11.1—1993, Method 11.1: *Determination of volatile organic compounds—Methane and non-methane volatile organic compounds—Direct-reading instrumental method.*

This Standard incorporates Amendment No. 1 (March 2016). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This Standard has been developed as a performance-based standard, which may include direct-reading instrumental methods other than FID detection.

FOREWORD

Hydrocarbons are minor constituents of ambient air, with methane the dominant species, typically being present at a level of approximately 1.8 p.p.m.C. The major natural sources of organic compounds are the production of methane by bacteria under anaerobic conditions, e.g. swamps, ruminant animals and the emission of terpenes by leaves. The major anthropogenic sources are motor vehicles (often contributing 40% to 50% or more of the non-methane organic compounds), solvent evaporation (such as from surface coatings, printing and adhesives), and petroleum refining and distribution.

Non-methane volatile organic compounds in the atmosphere are active in the production of photochemical smog, which is characterized by the presence of elevated concentrations of ozone. In the presence of sunlight, organic compounds, nitrogen and oxygen undergo complex chemical reactions, which ultimately lead to the formation of ozone and other oxidized species. Ozone is an irritant to the respiratory system and elevated concentrations of the gas have a deleterious effect on the lung function.

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METHOD

1 SCOPE

This Standard sets out a method for determining methane and non-methane organic compounds in ambient air using a direct-reading instrument. The method applies to the determination of hydrocarbons in ambient air within the concentration range 0 to 20 p.p.m.C. by volume.

The methane and non-methane organic compound content of the air is most commonly measured using an automatic or intermittent sampling direct-reading instrument containing a flame ionization detector (FID) and the results obtained are reported as a methane equivalent response. The analysis is sensitive to all hydrocarbons, but will also respond to almost all organic compounds and will yield responses more or less depending on the number of carbon to hydrogen bonds in the compound. Empirical data generally show that the relative sensitivity to various hydrocarbons is approximately equal on a carbon mass basis. Unsaturated, oxygenated and halogenated compounds give a lower response.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS
3580 Methods for sampling and analysis of ambient air
3580.2.2 Method 2.2: Preparation of reference test atmospheres—Compressed gas method

AS/NZS
3580 Methods for sampling and analysis of ambient air
3580.1.1 Part 1.1: Guide to siting air monitoring equipment

ISO/IEC
Guide 98-3: 2008 Uncertainty of measurement—Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)

ISO/TR
15916 Basic considerations for the safety of hydrogen systems

Environment Protection and Heritage Council, Peer Review Committee (PRC)
National Environment Protection (Ambient Air Quality) Measure, Technical Paper No.5, Data Collection and Handling, 2001.

Global Environment Centre Foundation. September 1998
Technology of Air Pollution Continuous Monitoring in Japan

3 DEFINITIONS

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

3.1 Full scale (FS)

The nominated maximum concentration for which an instrument has been calibrated.

3.2 Level 1 calibration

A simplified, two-point analyser calibration used when analyser linearity does not need to be checked or verified.

3.3 Level 2 calibration

A simple check of an analyser's response. These checks may be performed using non-certified test atmospheres (e.g. expired test cylinders).