

Determination of odour concentration by dynamic olfactometry



Environment
Protection
Authority Victoria

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Guidance

About this guidance

As Victoria's independent environmental regulator, EPA has a key role in protecting the community from offensive odours. It develops policies, regulations and guidelines to prevent and control odours from odour-generating industries.

This guide has been developed to help licence holders and consulting analysts to obtain and report reproducible odour measurements.

Analyses of odour from licensed premises should be undertaken in accordance with the EPA-approved method (Standards Australia/Standards New Zealand, 2001). For purposes of regulatory testing and reporting to EPA, it is strongly advised that this guideline is adhered to. It is also recommended that the guidance is followed where sampling and analyses are performed for other purposes to ensure consistent quality of results.

This guide is to be used in conjunction with [EPA Publication 440.1](#) (EPA Victoria, 2002). It establishes best-practice procedures for preparation, handling, storage and measurement of environmental odour samples but does not provide guidance on sampling methodology.

Sampling procedures

A minimum of two simultaneous samples (duplicates) should be collected for a constant emission source. Additional samples should be collected if emissions are variable (clause 10.4.3, AS4323.3).

Odour sample storage and transportation

Odour sample bags must be stored under stable temperature conditions (below 25°C and above dew point) and away from direct sunlight (clause 10.3.3).

Rapid changes of pressure conditions such as those associated with air freight should also be avoided as this can cause sample degradation, due to condensation effects associated with a change of altitude and/or diffusion of samples through bag walls due to pressure changes in the bags. (Bakhtari, 2014).

If air transport cannot be avoided, sample stability must be verified (clause 9.3.1, AS4323.3) as described in 'Demonstration of sample stability'

below. It is also recommended to use polytetrafluoroethylene (PTFE) bags in this case.

The time between sampling and analysis must be as short as possible and preferably less than six hours (VDI 3880:2011 clause 4.8) as this minimises changes in the sample during storage (Hansen, Adamsen, Feilberg, & Jonassen, 2011), (Eusebio & Laura Capelli, 2017), (Kima, et al., 2012), (Kozziel, et al., 2012) (Le, Sivret, & Stuetz, 2013).

Demonstration of sample stability

The period between sampling and measurement must not exceed 30 hours (as per clause 10.3.3 of AS4323.3). For storage periods of longer than six hours, proof should be provided that the odour concentration of the specific source samples has not varied by more than an acceptable factor (as described in the next paragraph).

If a storage time of greater than six hours is required, sample stability must be verified in accordance with the VDI standard 3880:2011: Olfactometry – Static Sampling (Verein Deutscher Ingenieure, 2011). A summary of these requirements is as follows:

The stability check is to be performed for each source and process condition. A further examination can be omitted if the stability of odour samples has been proven at sources with similar waste gas compositions.

To assess the stability of odour samples over time, a minimum of three samples must be analysed per source and process condition. Ideally, five samples should be analysed to increase statistical validity. Each of these samples is to be examined as soon as possible within six hours of sampling. The samples then need to be re-analysed after the storage time for which stability is being demonstrated. The geometric means are calculated for each set of analyses.

If, due to storage time, the geometric means of each set of analyses differ by less than a factor of 1.5, the samples can be deemed stable. This factor is derived from the requirements of overall sensory quality in EN 13725 (European Committee for Standardisation, 2006).

The procedure used in the analyses, inclusive of the evidence of sample stability, is to be



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documented in the measurement report.

The use of bags of thick polymer material is recommended in order to improve sample stability (that is, reduce diffusion through the bag).

It is recommended that PET or PTFE bags are used when sampling highly volatile, low-molecular weight odours or if the holding time exceeds six hours (Szyłak-Szydłowski, 2015) (Koziel, et al., 2012).

Pre-dilution

The sample must be diluted when there is a risk of condensation (for samples with high moisture content) or if the sample is hot (Clause 10.3.2.1 AS4323.3).

In addition, samples should be pre-diluted with nitrogen with a nitrogen/sample ratio of 6:1 to reduce sample losses from chemical transformation processes (Clause 10.3.3(c)).

Odour panel

Odour panel members must be screened with n-butanol prior to assessing environmental samples and results used to update the panel members' odour threshold history (clause 9.7.2, AS4323.3).

The panel should start with a minimum of six panel members. After retrospective screening results, no less than four panel members may be used to calculate the panel threshold (clause 9.7.3, AS4323.3).

If, during an assessment, a panel member produces two consecutive 'certain' but incorrect responses, then that panel member's results must be excluded from the calculation of that measurement.

The recommended detection mode for odour threshold measurements is forced-choice (clause 11.1.3, AS4323.3) with a step factor of 2 (clause 11.4, AS4323.3).

Number and order of presentations

The presentation of sample should be in ascending order, with a minimum number of five presentations (clause 11.3.1, AS4323.3).

Number of rounds to determine a panel threshold

Initially, three rounds of sample are to be presented to the panel, with the data from the second and third presentation being used in the threshold calculations (clause 11.5, AS4323.3). Subsequent analysis of duplicates or other samples in the same

session require only two presentations, with both to be used in threshold calculations.

Minimum information recording requirements for the final NATA endorsed report

The following information should be included in the report in conjunction with the minimum reporting requirements as described in clause 12.1.1 and 12.1.2, AS4323.3):

- the precision of odour measurements based on n-butanol results
- the panel n-butanol threshold value
- the time interval between sampling and analysis
- sample bag material
- transportation conditions
- number of panelist used to calculate panel threshold.

References

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