Ackred. nr. 1993
Provning
ISO/IEC 17025

REPORT

Accredited by Swedac
REPORT issued by an Accredited Laboratory
This report may only be reproduced in its entirety, unless otherwise approved in writing by the issuing laboratory

REPORT

Manager
Sofie Eckerman
Phone number
+46 10 505 99 38
Mobile phone number
+46 706 91 02 25
Email
Sofie.eckerman@afry.com

Date
2023-01-29
Project ID
D0104851

Measurement Report – Odour analysis at SORBECO AB

Client: SORBECO AB

ÅF Infrastructure AB
Strategic Environmental Services

Reviewed

Sofie Eckerman

Markus Olofsgård

Table of contents

Attachments

Summary

The odour samples were analysed using dynamic olfactometry and sensory assessment with an odour panel according to SS-EN 13725/2006.

Obtained analysis results from the sensory assessment are reported in Table 1.

Table 1. Results of odour analysis at AFRY January 26, 2023.

Sample point	Odour concentration (l.e/m^3)
IN	73200
UT	14578

1 Introduction

On behalf of Sorbeco AB, AFRY has carried out odour analysis of samples collected by staff at Sorbeco AB (Sorbeco).

2 Background

In order to assess the function of an odour-reducing filter, odour samples were taken and odour analysis with dynamic olfactometry was performed according to standard SS-EN 13725/2006.

Sample-taking was performed by Sorbeco personnel before and after passing through a filter containing Sorbonite®.

3 Method

Collecting samples involves taking air samples in gastight bags at the source of the odour. These air samples are then analysed using sensory assessment at AFRY:s accredited laboratory within 30 hours from the time of sample collection.

3.1 Measuring scheme

The sampling procedure was was carried out according to instructions by Mårten Arbrandt, AFRY.

3.2 Description of sampling points

Samples were collected before and after the installed filter containing Sorbonite®.

A more detailed account of the sampling method performed by personnel from Sorbeco can be found in in appendix 3.

3.3 Sensory analysis

Within sensory odour analysis, the odour concentration in a sample is determined using a dilution instrument (olfactometer) and a panel consisting of at least four approved panel members. The odour concentration is measured in the unit odour units per cubic meter, l.e./m^3.

Initially, clean air is supplied to the panel, after which the concentration of the test air gradually increases. At a certain given dilution, odour from the sample air can be perceived, this level is recorded for each panel member.

The panel's common odour threshold value is calculated as the geometric mean of the individual odour thresholds of the panel members. This value corresponds to the concentration at which 50% of the population can sense odour.

The reported number of odour units in a sample corresponds to the number of times the sample must be diluted with odourless air before odourlessness is achieved.

For a description of the method used in sensory analysis, see appendix 2.

Table 2. Sensory analysis methodology.

Method	Principle of analysis	Measurement range	Measurement uncertainty, 95% confidence level
SS-EN 13725/2006 (including sampling) and AFRY:s method description for odour analysis	Olfactometry; sensory analysis	Dilution 10 to 10^7 times	Se appendix 2

For more information regarding the sensory analysis, see appendix 1.

3.4 Deviations from the standard

No deviations from the standard were recorded during the analysis at AFRY.

The sampling was carried out by Sorbeco.

4 Accreditation

AFRY: s odour laboratory is accredited for sampling and sensory assessment with a panel according to SS-EN 13725/2006. Accreditation number: 1993.

5 Measurement uncertainty

Before each analysis, each panellist's sense of smell are tested. For this purpose, a special substance (n-butanol) is used where the odour threshold is well documented. For approval, it is required that the panellist in question can smell n-butanol within a certain range around the known and well-documented odour threshold for the substance and with a certain standard deviation.

The measurement uncertainty for odour analysis is defined as the reproducibility of the above-mentioned n-butanol test that is performed before each odour analysis. Reproducibility refers to the ability of the panel to reproduce the same result on several occasions for one and the same test material under equivalent conditions.

Measurement uncertainty for analyses is reported as a factor around a given average value. If this factor is e.g., 2, this means that if the result from an analysis shows 1,000 l.e./m3, then the true value lies within the range of 500 and 2.000. The result then indicates that with 95% certainty (95% confidence interval) 50% of the population can perceive the smell within the range 500 to 2000 le/m^3.

When sampling is conducted with a ventilated hood, the analysis uncertainty factor is multiplied by a factor of 1.15 to represent the measurement uncertainty in the entire chain.

The factor of uncertainty for this specific analysis is reported in appendix 2.

Operating conditions during sampling are specified in appendix 2.

6 Results

The results from the odour analyses are reported below as the number of odour units per cubic meter.

Table 3. Results of odour analysis at AFRY January 26, 2023.

Sample point	Odour concentration (l.e/m^3)
IN	73200
UT	14578

Method description for sensory odour assessment

Below follows a brief description of the measurement methodology and the evaluation procedure for a sensory odour assessment. Sampling, analysis and evaluation follow the Swedish and European standard SS-EN 13725/2006 "Air quality - Determination of odour concentration with dynamic olfactometry".

Sampling

Samples are collected in airtight bags that are specifically adapted for the purpose. The air is then analysed using sensory analysis within 30 hours.

Odour assessment

The analysis is carried out using a "dilution unit", a so-called olfactometer, and a "detection unit" consisting of a trained panel. The panel consists of at least four panellists. The olfactometer used is of type ECOMA TO8.

In the olfactometer, sample gas is mixed with air to dilute the sample. The air consists of ambient air that is purified through carbon filters. For each sample, at least two dilution series are carried out, where the panel members determine at which dilution level the odour can be perceived. The dilution series is designed in such a way that the content of odourous substances gradually increases.

During the sampling, approx. 20% blank samples are carried out, i.e., the panellists are tested on purified air only, at about every fifth test. The null samples are conducted to test the accuracy of the panellists.

The olfactometer is controlled by a computer program which controls the dilution level and distributes the sample gas between the panel members. The starting order and the location of the blank samples are chosen randomly by the program. The evaluation of the results also takes place in the program.

Evaluation of results

The dilution level at which the panel members first sense odour corresponds to one (1) l.e./m3. The number of odour units thus corresponds to the number of times the sample must be diluted with odourless air before odourlessness is achieved. The panel's common odour threshold value is calculated as the geometric mean of the individual odour thresholds of the panel strips. This value corresponds to the concentration at which 50% of the population sense smell.

Raw Data

Equipment	Olfactometer TO8, serial number EO.8114
Last calibration of olfactometer	2022-07-28
Room temperature, start	21°C
Room temperature, end	21°C
Reference gas	n-butanol, 100 ppm
Date of sampling	2023-01-25
Date of analysis	2023-01-26
Analysis conducted by	Sofie Eckerman

Sample point	Time of sampling	Time of analysis	Pre-dilution	Odour concentration (l.e./m³)	Factor for measurement uncertainty
IN	-	14:06	120	73 320	2,7
UT 1	-	13:45	-	17 520	2,7
UT 2	-	13:52	-	12 130	2,7

Test Set up Sorbonite - EN13725

2023-01-25

230 g av Sorbonite® was used in a kitchen fan ”Cylinda Nova Trend R RF”. The Sorbonite® was placed where the active coal normally is placed in the filter to reduce cooking fumes. Before the fumes reach the Sorbonite® it passes through a grease filter. The total area of the filter is 4,2 dm^2 and the thickness is approximately 1 cm.

The fan was put in low effect to achieve a low flow through the filer.

Samples are named IN and OUT.

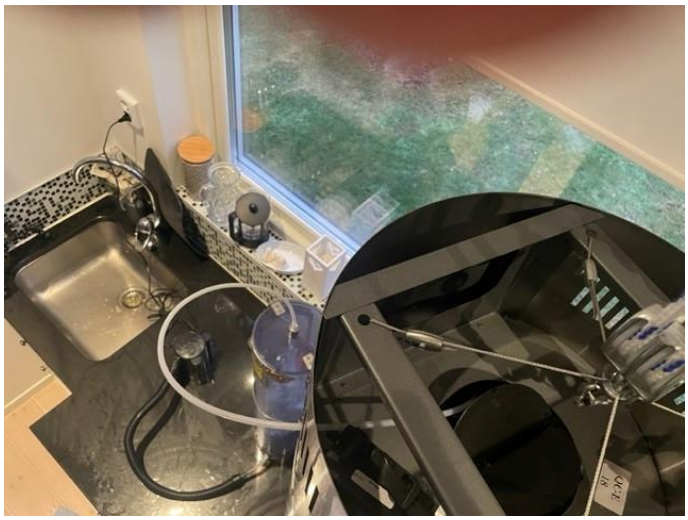
“IN” is sampled directly above the frying pan and “UT” is sampled after passing through the filter.

Figur 1 Sorbonite i filter

Figur 2 Sorbonite® approximately 1 cm layer

Figur 3 Grease filter

Figur 4 Sampling - IN



Figur 5 Sampling - UT