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Luftkvalitet – Bestämning av deposition av bens[a]antracenen, bens[b]fluoranten, bens[j]fluoranten, bens[k]fluoranten, bens[a]pyren, dibens[a,h]antracenen and indeno[1,2,3-cd]pyren.

Air quality – Determination of the deposition of benz[a]anthracene, benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene and indeno[1,2,3-cd]pyrene

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EUROPEAN STANDARD

EN 15980

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2011

ICS 13.040.01

English Version

**Air quality - Determination of the deposition of
benz[a]anthracene, benzo[b]fluoranthene, benzo[j]fluoranthene,
benzo[k]fluoranthene, benzo[a]pyrene, dibenz[a,h]anthracene
and indeno[1,2,3-cd]pyrene**

Qualité de l'air - Détermination du benzo[a]anthracène,
benzo[b]fluoranthène, benzo[j]fluoranthène,
benzo[k]fluoranthène, benzo[a]pyrène,
dibenz[a,h]anthracène et indeno[1,2,3-cd]pyrène dans les
dépôts atmosphériques

Luftqualität - Bestimmung der Deposition von
Benz[a]anthracen, Benzo[b]fluoranthen,
Benzo[j]fluoranthen, Benzo[k]fluoranthen, Benzo[a]pyren,
Dibenz[a,h]anthracen und Indeno[1,2,3-cd]pyren

This European Standard was approved by CEN on 21 April 2011.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 15980:2011) has been prepared by Technical Committee CEN/TC 264 "Air quality", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

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Introduction

Directive 2004/107/EC [2] requires the measurement of the "total or bulk deposition" of benz[*a*]anthracene (BaA), benzo[*b*]fluoranthene (BbF), benzo[*j*]fluoranthene (BjF), benzo[*k*]fluoranthene (BkF), benzo[*a*]pyrene (BaP), dibenz[*a,h*]anthracene (DBahA) and indeno[1,2,3-*cd*]pyrene (INP) at background sites, one every 100 000 km². Wet-only sampling may be used instead of bulk sampling if it can be shown that the difference between their results is within 10 %. Where appropriate, monitoring shall be coordinated with the European Monitoring and Evaluation Programme (EMEP).

The Directive uses "total deposition" and "bulk deposition" as synonyms and defines it as the total mass of pollutants which is transferred from the atmosphere to surfaces (e.g. soil, vegetation, water, buildings) in a given area within a given time. The considered polycyclic aromatic hydrocarbons (PAH) are predominantly bound to particles. The mass of PAH bound to non sedimenting particles is thought to be low compared to the mass of the compounds bound to sedimenting wet and dry particles. Consequently the sum of the deposition of sedimenting wet and dry particles (defined as "bulk deposition" in this European Standard) and total deposition has been considered as substantially equivalent for the purposes of this document. At sites far enough from obstacles like buildings and trees the influence of specific surface characteristics on the deposition of PAH can be neglected.

This document describes the measurement of the deposition of PAH using collectors designed for bulk and wet-only deposition. The validation field test demonstrated that the funnel-bottle bulk collector provided the most reliable and robust results. Therefore this collector type has been chosen as standard collector.

1 Scope

This document specifies a method for the determination of the bulk deposition of benz[*a*]anthracene (BaA), benzo[*b*]fluoranthene (BbF), benzo[*j*]fluoranthene (BjF), benzo[*k*]fluoranthene (BkF), benzo[*a*]pyrene (BaP), dibenz[*a,h*]anthracene (DBahA) and indeno[1,2,3-*cd*]pyrene (INP), which can be used in the framework of Directive 2004/107/EC. This European Standard specifies performance requirements with which the method has to comply in order to meet the data quality objectives given in this Directive.

This document specifies methods for sampling, sample preparation and analysis using gas chromatography with mass spectroscopic detection (GC/MS) or high performance liquid chromatography with fluorescence detection (HPLC/FLD). The funnel-bottle bulk collector is used as the standard collector.

The method is applicable for deposition measurements in

- rural and remote areas,
- industrial areas,
- urban areas.

The standard is applicable in the range from a few ng/(m²·d) to a few hundred ng/(m²·d).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15549:2008, *Air quality — Standard method for the measurement of the concentration of benzo[*a*]pyrene in ambient air*

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1

analysis

all operations carried out after sample preparation to determine the amount or concentration of the polycyclic aromatic hydrocarbons of interest present in the sample

3.2

bulk collector

equipment to collect bulk deposition, permanently open to the atmosphere

NOTE In this document, two types of bulk collectors are described: a funnel-bottle bulk collector and a cylindrical gauge (Bergerhoff collector).

3.3

bulk deposition

sum of the deposition of sedimenting wet and dry particles

NOTE Bulk deposition does not contain gases and non-sedimenting particles. The bulk deposition of the polycyclic aromatic hydrocarbons is considered as substantially equivalent to total deposition.

3.4

detection limit

lowest deposition rate of an analyte detectable using the specified procedure

3.5

expanded uncertainty

quantity defining an interval about the result of a measurement that can be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurand

[ISO/IEC Guide 98-3:2008 [9]]

3.6

field blank

artificial sample (e.g. distilled water) transported to the sampling site, mounted in the sampling unit, but not left exposed to ambient air, returned to the laboratory and worked up in the same way as the deposition sample

3.7

laboratory blank

artificial sample (e.g. distilled water) worked up in the same way as the deposition sample in the laboratory

3.8

precipitation

rain, snow, sleet, graupel, hail and dew

3.9

sample extraction

sample dissolution process to obtain a solution containing the analyte of interest in an organic solvent

3.10

sample preparation

all operations carried out on a sample, after transportation and storage, to prepare it for analysis

NOTE Such operations are, e.g. extraction, purification, evaporation, solvent exchange.

3.11

standard uncertainty

uncertainty of the results of measurements expressed as a standard deviation

[ISO/IEC Guide 98-3:2008 [9]]

3.12

uncertainty (of measurement)

measurement uncertainty

parameter associated with the result of a measurement that characterises the dispersion of the values that could reasonably be attributed to the measurement

[ISO/IEC Guide 98-3:2008 [9]]

3.13

wet-only collector

equipment to collect wet deposition, consisting of a funnel-bottle combination, open to the atmosphere only during precipitation events

4 Symbols and abbreviations

4.1 Symbols

A	area of the cross-section of the collector opening;
\bar{c}	mean value of the concentration of a compound in a solution;
\bar{c}_i	mean value of the concentration of a compound, obtained by laboratory i ;
c_j	concentration of a compound in the solution j ;
$d_{(1,j)}$	deposition in collector 1;
$d_{(2,j)}$	deposition in collector 2;
D_a	deposition rate of compound a ;
$D_{L,a}$	detection limit of compound a ;
$D_{M,a}$	minimal detectable mass of compound a ;
k	coverage factor;
m_a	mass of compound a ;
$m_{a,d}$	detected mass of compound a ;
\bar{m}_a	mean of laboratory blank value;
$m_{a,i}$	individual laboratory blank value for compound a ;
n	number of measurements;
r_{SS}	residual sum of squares from the fit;
s_i	within-laboratory standard deviation;
s_L	between-laboratory standard deviation;
s_d	between-collector standard deviation;
s_R	reproducibility standard deviation;
s_{ri}	standard deviation of repeated measurements of laboratory i ;
S_m	mass of surrogate standard, added to the sample;
S_d	mass of surrogate standard detected in the sample extract;
$S_{lb,a}$	standard deviation of laboratory blank value for compound a ;
t	sampling duration;
$t_{n-1;0,95}$	Student factor for n measurements and a 95 % confidence interval;