

Workplace atmospheres — Protocol for evaluating the performance of diffusive samplers

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Summary of pages

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*Air des lieux de travail — Protocole pour l'évaluation de la performance des
dispositifs de prélèvement par diffusion*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 16107 was prepared by Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 2, *Workplace atmospheres*.

Introduction

Gas or vapour sampling is often accomplished by actively pumping air through a collection medium such as activated charcoal. Problems associated with a pump, such as inconvenience, inaccuracy and expense, are inextricable from this type of sampling. The alternative covered by this International Standard is to use diffusion for moving the compound of interest onto the collection medium. This approach to sampling is attractive because of the convenience of use and low total monitoring cost.

However, previous studies have found significant problems with the accuracy of some samplers. Therefore, although diffusive samplers may provide a plethora of data, inaccuracies and misuse of diffusive samplers may yet affect research studies. Furthermore, worker protection may be based on faulty assumptions. The aim of this practice is to counter the uncertainties in diffusive sampling through achieving a broadly accepted set of performance tests and acceptance criteria for proving the efficacy of any given diffusive sampler intended for use.

This International Standard is intended specifically for the large-scale evaluation of many diffusive sampler/analyte pairs of practical application and is complementary to EN 838.

Workplace atmospheres — Protocol for evaluating the performance of diffusive samplers

1 Scope

1.1 This International Standard covers the evaluation of the performance of diffusive samplers of gases and vapours for use over sampling periods from 4 h to 12 h. Sampling periods of such duration are the most common in workplace sampling. Given a suitable exposure chamber, this International Standard can be straightforwardly extended to cover samplers for use over other sampling periods as well. The aim is to provide a concise set of experiments for classifying samplers primarily according to a single numerical value representing sampler accuracy.

NOTE Accuracy estimates refer to conditions of sampler use which are normally expected in a workplace setting. These conditions may be characterized by the temperature, atmospheric pressure, humidity and ambient wind speed, none of which may be constant or accurately known. Furthermore, the accuracy accounts for difficulty in the estimation of time-weighted averages of concentrations which may not be constant in time.

In addition to accuracy determination, a method is provided to test the samplers for compliance with the manufacturer's stated limits on capacity, possibly in the presence of interfering compounds. A method is given for classification of samplers according to their capability to detect situations in which sampler capacity may be exceeded.

1.2 This International Standard is an extension of previous research on diffusive samplers [1-17] as well as EN 838. Essential advantages are the estimation of sampler accuracy under actual conditions of use and the reduction in cost of sampler evaluation.

NOTE Furthering the latter point, knowledge of similarity between analytes of interest can be used to expedite sampler evaluation. For example, interpolation of data characterizing the sampling of analytes at separated points of a homologous series of compounds is recommended. At present the procedure in [9] is suggested: Following evaluation of a sampler in use at a single homologous series member according to the present practice, higher molecular weight members would receive partial validations considering sampling rate, capacity, analytical recovery and interferences.

2 Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

EN 838: *Standard on workplace atmospheres — Diffusive samplers for the determination of gases or vapours — Requirements and test methods.*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in EN 838 as well as the following apply.