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Water pipe tobacco — Determination of total collected matter and nicotine using a water pipe tobacco smoking machine

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 126, *Tobacco and tobacco products*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Tobacco smoke is a complex mixture consisting of many individual chemical constituents. These compounds exist as gases, vapours and condensed aerosol particles. Additionally, various rapid ageing processes, together with diffusional and intersolubility effects, start occurring immediately after the formation of the smoke which further complicates its composition. These processes and effects are particularly relevant to water pipe tobacco smoke where the smoke ages and passes through a water trap before it reaches the smoker.

Historically, when tobacco products are smoked in a laboratory setting, the particulate matter in smoke is collected on a glass fibre filter and this approach has been followed in this document for water pipe tobacco smoking.

The parameters used for "puffing" on the laboratory water pipe used in this document are based on published studies of human behaviour and data reported to the ISO/TC 126. It is convenient to use the term "puffing", however it is, in strict physiological terms, incorrect. Smokers of cigarettes and many other tobacco products use a two-step process to draw the smoke from the product into the mouth (the puff), followed usually by inhalation of ambient air into the lungs through either the nose or mouth. Smokers of water pipes use a one-step process to inhale smoke directly into the lungs.

It is important to note that no machine smoking regime can represent all human smoking behaviour:

— machine smoking testing is useful to characterize water pipe tobacco emissions for design and regulatory purposes, but communication of machine measurements to smokers can result in misunderstandings about differences in exposure and risk across brands;

— smoke emission data from machine measurements may be used as inputs for product hazard assessment, but they are not intended to be nor are they valid as measures of human exposure or risks. Communicating differences between products in machine measurements as differences in exposure or risk is a misuse of testing using ISO standards.

Water pipe tobacco — Determination of total collected matter and nicotine using a water pipe tobacco smoking machine

1 Scope

This document specifies methods for the determination of total collected matter and for the subsequent determination of nicotine present in the smoke from water pipe tobacco generated and collected using a water pipe tobacco smoking machine.

This document is only applicable for devices known as “arghile”, “hookah”, “nargile” or “shisha” in which tobacco is only heated, not combusted. Other types, such as “Chinese water pipe”, are not covered.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 3402, *Tobacco and tobacco products — Atmosphere for conditioning and testing*

ISO 10315, *Cigarettes — Determination of nicotine in smoke condensates — Gas-chromatographic method*

ISO 22486, *Water pipe tobacco smoking machine — Definitions and standard conditions*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
total collected matter
TCM
portion of the mainstream smoke which is trapped in the *smoke trap* (3.2), expressed as milligrams

3.2
smoke trap
device for collecting such parts of the smoke from a sample as is necessary for determination of specified smoke components

[SOURCE: ISO 3308:2012, 3.15]

3.3
smoking process
use of a smoking machine to smoke the water pipe tobacco from first to final puff

3.4
smoking run
specific *smoking process* (3.3) to produce such smoke from a sample of water pipe tobacco as is necessary for the determination of the smoke components

3.5
test portion
water pipe tobacco prepared for a single determination

4 Principle

The water pipe tobacco is sampled and then smoked on a water pipe tobacco smoking machine with collection of total collected matter in a glass fibre filter trap. The mass of the total collected matter so collected is determined gravimetrically. The total collected matter is extracted from the trap for determination of nicotine content by gas chromatography.

In laboratories that are not in a position to use gas-chromatographic methods, reference should be made to ISO 3400 for the determination of total nicotine alkaloids. In such cases, values obtained for nicotine in smoke condensate may be used with the addition of a note made in the expression of the result.

5 Apparatus

Normal laboratory apparatus and, in particular, the following items.

5.1 Routine analytical water pipe tobacco smoking machine, complying with the requirements of ISO 22486.

5.2 Soap bubble meter, graduated at 530 ml to an accuracy of ± 5 ml and with a resolution of 5 ml.

5.3 Apparatus for the determination of puff duration and frequency.

5.4 Analytical balance, suitable for measuring to the nearest 0,1 mg.

The weighing of filter holders may be affected by static electricity, necessitating the use of an antistatic device.

5.5 Conditioning enclosure, carefully maintained under the conditions specified in ISO 3402.

5.6 Smoke trap sealing device, end caps made from a non-hygroscopic and chemically inert material.

5.7 Gloves, made of cotton, or the non-talc surgical type.

6 Sampling

A representative 300 g sample shall be taken from the lot received by the laboratory for testing.

This representative sample will normally contain water pipe tobacco taken from different parts of the population. Make up the test portion (3.5) required for the test by randomly selecting the water pipe tobacco from the different parts of the population represented in the representative sample.

7 Determination of total collected matter

7.1 Preparation of the water pipe tobacco for smoking

7.1.1 General

Mix the representative sample until homogeneous before the test portions are taken. Fill a loose portion of the water pipe tobacco sample into the tobacco sample holder and ensure that the surface of the water pipe tobacco sample and the upper surface of the tobacco holder are equal without pressing the tobacco. Weigh the used water pipe tobacco and note the weight in the test report.

7.1.2 Replicate test portions

A minimum of three independent replicate determinations should be undertaken per water pipe tobacco.

However, the user should define the number of replicates based upon the final use of the data.

7.2 Storage and conditioning

Water pipe tobacco for testing should be conditioned for at least 12 h at a temperature of 22 °C ± 3 °C in vapour tight containers just large enough to contain the sample, until smoke run preparation.

Once opened, the tobacco should be stored at room temperature in vapour tight containers just large enough to contain the sample to avoid the loss of volatile constituents and prevent the building of mould.

The testing atmosphere in the laboratory where the smoking is to be carried out shall be in accordance with ISO 3402.

7.3 Preliminary measurement before smoking

Measuring the mass of the conditioned water pipe tobacco selected for the smoking operation (in grams per portion) is required before smoking by first taking the weight of the unfilled tobacco holder and calculate the weight in difference to the filled tobacco holder.

7.4 Smoking and collection of collected matter

7.4.1 Preparation of smoke traps

For all operations, the operator shall prevent contamination from the fingers by wearing gloves of a suitable material (5.7).

Insert glass fibre filter, which have been conditioned in the test atmosphere for at least 12 h into the holder, and assemble, placing the rough side of the glass fibre filter so that it will face the oncoming smoke. After assembly, examine the filter holders to ensure that the glass fibre filters have been properly fitted. Fit the sealing devices (end caps) (5.6). Weigh the assembled smoke traps to the nearest 0,1 mg.

If necessary, prepare a sample blank by treating an additional smoke trap (at least one per batch/session/day) in the same manner as that used for smoke collection by drawing 35 puffs without tobacco in the water pipe tobacco holder.

7.4.2 Setting up the smoking machine

7.4.2.1 General

If necessary, replace any protective filters on the machine. Switch on the machine and allow it to warm up on automatic cycling for at least 20 min.