NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB/T 39560.1-2020

Determination of certain substances in electrical and electronic products - Part 1: Introduction and overview

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1 Scope

This Part of GB/T 39560 refers to the sample as the object to be processed and measured. The nature of the sample and the manner in which it is acquired is defined by the entity carrying out the tests.

It is noted that the selection of the sample may affect the interpretation of the test results.

While this standard provides guidance on the disassembly procedure employed for obtaining a sample, it does not determine or specify:

- the level of the disassembly procedure required for obtaining a sample;

- the definition of a "unit" or "homogenous material" as the sample;

- conformity assessment procedures.

NOTE: Further guidance on assessment procedures of the conformity may be found in GB/Z 30374-2013[2].

2 Normative References

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this document.

ISO 78-2:1999 Chemistry - Layouts for Standards - Part 2: Methods of Chemical Analysis

ISO/IEC 17025 General Requirements for the Competence of Testing and Calibration Laboratories Closeness of agreement between independent test results obtained under stipulated conditions.

3.1.7 Reference material

Material, sufficiently homogeneous and stable with reference to specified properties, which has been established to be fit for its intended use in measurement or in examination of nominal properties.

3.1.8 Repeatability

Precision under repeatability conditions.

[GB/T 6379.1-2004, definition 3.13] [1]

3.1.9 Reproducibility

Precision under reproducibility conditions.

[GB/T 6379.1-2004, definition 3.17] [1]

3.1.10 Screening

Analytical procedure to determine the presence or absence of substances in the representative part or section of a product, relative to the value or values chosen as the criterion for presence, absence or further testing.

NOTE: If the screening method produces values that are not conclusive, then additional analysis or other follow-up actions may be necessary to make a final presence/absence decision.

3.2 Abbreviations

The following abbreviations are applicable to this Document.

AAS: Atomic Absorption Spectrometry;

C-IC: Combustion - Ion Chromatography;

CV-AAS: Cold Vapour Atomic Absorption Spectrometry;

CV-AFS: Cold Vapour Atomic Fluorescence Spectroscopy;

EPA: Environmental Protection Agency;

FRU: Field Replaceable Unit;

GC-MS: Gas Chromatography - Mass Spectrometry;

GLP: Good Laboratory Practice;

HPLC-UV: High-Performance Liquid Chromatography - Ultraviolet;

IC: Ion Chromatography;

IAMS: Ion Attached Mass Spectrometry;

ICP-MS: Inductively Coupled Plasma Mass Spectrometry;

ICP-OES: Inductively Coupled Plasma Optical Emission Spectrometry;

IS: Internal Standard;

IUPAC: International Union of Pure and Applied Chemistry;

LOD: Limit of Detection;

LOQ: Limit of Quantification;

MDL: Method Detection Limit;

PBB: Polybrominated Biphenyl;

PBDE: Polybrominated Diphenyl Ether;

PBMS: Performance-Based Measurement System;

PWB: Printed Wiring Board;

QC: Quality Control;

UV-VIS: Ultraviolet-Visible Spectroscopy;

XRF: X-Ray Fluorescence Spectroscopy.

4.1 Field of application

The contents of the test methods to determine the levels of certain substances are grouped into important steps:

a) analytical test methods;

b) laboratory implementation.

Analytical test methods were developed and validated to ensure their suitability to the task. The structure of each of the test methods are generally aligned in accordance with ISO 78-2:1999 where applicable, i.e.:

hexavalent chromium, etc.) in electrical and electronic equipment is widely used in reference to analytical testing methods. Screening methods provide the analyst a convenient approach to evaluate for the presence or quantity of certain substance(s) in samples. Screening may employ qualitative or semi-quantitative methods. In some cases, a quantitative method may be used for screening purposes if the actual targeted substance(s) are difficult to analyze directly (e.g., hexavalent Cr).

Depending on the screening results however, additional analysis methods may need to be employed to definitively verify the presence or quantity of certain substances. These definitive analysis methods are referred to as verification methods.

While X-ray fluorescence spectrometry (XRF) is the tool most commonly associated with the screening approach, it is not limited to this analytical measurement technique. Users of this family of standards will understand that multiple measurement techniques can be employed for the purpose of "screening".

Screening for hexavalent chromium [Cr(VI)] for example, can be accomplished by a total chromium measurement using a non-destructive XRF analysis method. Similarly, total chromium analysis could be performed by a destructive analysis using an inductively coupled plasma measurement method. Either measurement can be effectively employed to evaluate for the presence or quantity of hexavalent chromium since the concentration of the hexavalent species can be no greater than the total chromium concentration value.

Likewise, a total bromine measurement using a non-destructive XRF analysis method or C-IC method can be used in the same fashion. Either measurement can be effectively employed to evaluate for the presence or quantity (PBBs) or (PBDEs) in a sample when relating the total bromine content to the composition of these compounds.

In both examples however, the detection of elevated total element levels requires additional verification method analysis (e.g., UV-VIS or GC-MS techniques) to confirm the potential presence or quantity of hexavalent chromium [Cr (IV)] or PBB/PBDE compound species.

It can therefore be seen that the prudent analyst can effectively employ different screening procedures to achieve the same result.

The screening procedure may be carried out either by directly measuring the sample (nondestructive sample preparation) or by destroying the sample to make it uniform (mechanical sample preparation). This decision shall be made by judging the uniformity of