



BSI Standards Publication

**Nanotechnologies — Characterization of
volatile components in single-wall carbon
nanotube samples using evolved gas analysis/
gas chromatograph-mass spectrometry**

National foreword

This Published Document is the UK implementation of ISO/TS 11251:2019. It supersedes DD ISO/TS 11251:2010, which is withdrawn.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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**Nanotechnologies — Characterization
of volatile components in single-
wall carbon nanotube samples
using evolved gas analysis/gas
chromatograph-mass spectrometry**

Nanotechnologies — Caractérisation des composés volatils dans les nanotubes de carbone à simple paroi (SWCNT) utilisant l'analyse des gaz émis par chromatographie en phase gazeuse couplée à la spectrométrie de masse





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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.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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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 229, *Nanotechnologies*.

This second edition cancels and replaces the first edition (ISO/TS 11251:2010), which has been technically revised.

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.

Nanotechnologies — Characterization of volatile components in single-wall carbon nanotube samples using evolved gas analysis/gas chromatograph-mass spectrometry

1 Scope

This document specifies a method for the characterization of evolved gas components in single-wall carbon nanotube (SWCNT) samples using evolved gas analysis/gas chromatograph mass spectrometry (EGA/GCMS).

NOTE Some difference could appear between qualitative and quantitative results of emitted gas and gas content in the sample due to the heating and the possible presence of catalysts.

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.

ISO/TS 80004-3, *Nanotechnologies — Vocabulary — Part 3: Carbon nano-objects*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TS 80004-3 and the following 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

single-wall carbon nanotube SWCNT

carbon nanotube consisting of cylindrical graphene layer

3.2

evolved gas analysis

EGA

technique in which the nature and/or amount of evolved gas product(s) released by a sample subjected to a controlled temperature program is(are) determined

Note 1 to entry: The method of analysis should always be clearly stated (Reference [1] in the Bibliography).

3.3

EGA/MS

evolved gas analysis/mass spectrometry

technique using mass spectrometry to analyse gaseous components evolved from a sample as a function of temperature

Note 1 to entry: Although the gases evolved at any particular temperature are detected simultaneously, it might not be possible to uniquely identify the different components using MS alone.