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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 21395-2024

Replacing GB/T 21395-2008

Dimethyl sulfoxide

二甲基亚砜

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Foreword

SAC/TC 63 is in charge of this English translation. In case of any doubt about the contents of the English translation, the Chinese original shall be considered authoritative.

The document is drafted in accordance with the rules given in GB/T 1.1-2020 Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents. It replaces GB/T 21395-2008 Dimethyl sulfoxide in whole.

Besides a number of editorial changes, the foreword lists five technical deviations from the 2008 edition: the scope has been modified; a new product classification has been added at Clause 4; the previous product classifications have been deleted and the technical requirements updated; the item concerning the mass fraction of impurities and its associated test methods has been deleted; and new items and test methods relating to dimethyl sulfoxide content, colour, density and content of metal ions have been added.

Attention is drawn to the possibility that some elements of the document may be the subject of patent rights; the issuing body is not to be held responsible for identifying them.

The document was proposed by the China Petroleum and Chemical Industry Association and prepared by SAC/TC 63, Technical Committee 63 on Chemistry of the Standardization Administration of China. It was first issued in 2008; this is the first revised edition. It was issued on 24 July 2024 and has been in force since 1 February 2025.

1 Scope

China's national product standard for dimethyl sulfoxide, the colourless, almost odourless solvent usually shortened to DMSO. It dissolves an unusual range of substances, polar and non-polar alike, and it passes readily through skin, which is why it turns up in three quite

different industries at once: as the reaction solvent in which carbon fibre precursor is spun and as a high-purity cleaning agent in electronics, as a raw material and carrier for drugs in the pharmaceutical industry, and as a general-purpose solvent and reaction reagent everywhere else. Those three uses want very different things from the same molecule - the electronics and carbon fibre trade cares about trace metals measured in micrograms per kilogram, the pharmaceutical buyer about purity and residual moisture - and this edition answers that by classifying the product into three types by usage and setting a separate index for each. The technical requirements cover appearance, dimethyl sulfoxide content, moisture, acid value, crystallizing point, transmittance at 400 nm, refractive index, colour on the Hazen platinum-cobalt scale and density, with the content ranging from not less than 99.90 per cent for the general grade up to not less than 99.98 per cent for the electronics and carbon fibre grade; twelve metal ions are additionally limited for that top grade. The document also specifies the test methods, inspection rules, marking, accompanying document, packaging, transport and storage. It applies to dimethyl sulfoxide made by pure oxygen oxidation of dimethyl sulfide, itself synthesized from methanol and carbon disulfide or hydrogen sulfide, and to material recovered by distillation and purification from spent electronic cleaning solution. It replaces the 2008 edition in whole, adding the type classification and new items for content, colour, density and metal ions while dropping the old impurity mass fraction requirement.

The document specifies the product classification, technical requirement, test method, inspection rules, marking, accompanying document, packaging, transport and storage of dimethyl sulfoxide.

It is applicable to dimethyl sulfoxide obtained from pure oxygen oxidation of dimethyl sulfide which is synthesized from methanol and carbon disulfide or hydrogen sulfide, or from the recovery solution of dimethyl sulfoxide as electronic cleaning agent through distillation and purification.

A note records the molecular formula C2H6OS and a relative molecular mass of 78.13, according to the international relative atomic mass of 2022.

2 Normative references

The documents referred to in the text in such a way that some or all of their content constitutes requirements of this document are listed in this clause. For dated references only the edition cited applies; for undated references the latest edition, including any amendments, applies.

Fifteen documents are cited, covering reagent and titration solution preparation (GB/T 601, GB/T 603), density (GB/T 611, GB/T 4472), colour (GB/T 3143), water content by Karl Fischer titration (GB/T 6283), refractive index (GB/T 6488), sampling (GB/T 6678, GB/T 6680), laboratory and ultra pure water (GB/T 6682, GB/T 33087), crystallizing point (GB/T 7533), rounding off of numerical values (GB/T 8170), and the general rules for

spectrophotometry and gas chromatography (GB/T 9721, GB/T 9722). The full titles are listed among the normative references of this record.

3 Terms and definitions

There are no terms and definitions in this document.

4 Product classification

The product is classified into three types based on its usage. Type I is the reaction solvent for carbon fiber synthesis and the cleaning agent used in the electronic industry. Type II is the raw material and carrier of drugs used in the pharmaceutical industry. Type III is the solvent and reaction reagent for various other industries.

5 Technical requirement

The technical requirements for dimethyl sulfoxide shall comply with the provisions of Table 1.

Table 1 sets, for each of the three types, an index for appearance, dimethyl sulfoxide content, moisture, acid value, crystallizing point, transmittance at 400 nm, refractive index, colour on the platinum-cobalt Hazen scale, density at 25 degrees C, and, for Type I only, the content of twelve metal ions. The product of every type is a colourless transparent liquid or crystal. The dimethyl sulfoxide content is not less than 99.98 per cent by mass for Type I, 99.96 per cent for Type II and 99.90 per cent for Type III, and the colour is limited to 10 Hazen units for all three. Each of the twelve metals limited for Type I - sodium, magnesium, aluminium, potassium, calcium, chromium, manganese, iron, nickel, copper, zinc and lead - is capped at 10 micrograms per kilogram; no metal ion limit is set for Types II and III. The remaining figures are given in the table itself.

6.1 General

Unless otherwise specified, only reagents confirmed as analytical pure and grade III water as specified in GB/T 6682 shall be used in the analysis. The reference titration solution and the reagent solutions used in the analysis shall both be prepared as specified in GB/T 601 and GB/T 603 unless otherwise specified.

6.2 Determination of appearance

Take an appropriate amount of liquid sample into a 50 mL colorimetric tube with a stopper and observe it against a white background. If the sample is a crystal or contains crystals, heat the sample properly until it melts.