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Dimethyl ether (DME) for fuels — Determination of water content — Karl Fischer titration method

Diméthylether (DME) pour carburants et combustibles — Détermination de la teneur en eau — Méthode par titrage Karl Fischer

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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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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 28, *Petroleum products and lubricants*, Subcommittee SC 4, *Classifications and specifications*.

Introduction

In general, large amounts of DME in international trade and domestic transportation can be executed using sea and/or various land transportations. Throughout loading and transportation, there is a risk of increasing the DME's water content.

DME is soluble in water and the amount of water contained in the DME gives significant detrimental influence when it is used as fuel.

Accordingly, water content in DME has to be analysed accurately using recognized procedures by the parties concerned.

In this International Standard, one of the most common practices to be applied to analysis of water content is standardized.

Dimethyl ether (DME) for fuels — Determination of water content — Karl Fischer titration method

WARNING — The use of this International Standard may involve hazardous materials, operations, and equipment. This International Standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This International Standard specifies a procedure of test for the amount of water content in DME used as fuel by the Karl Fischer titration method. This procedure is applicable to determine the amount of water up to the value specified in ISO 16861.

This test method is intended for use with commercially available coulometric (or volumetric) Karl Fischer reagents and for the determination of water in DME additives, lube oils, base oils, automatic transmission fluids, hydrocarbon solvents, and other petroleum products. By proper choice of the sample size, this test method can be used to determine water from mg/kg (ppm) to percent level concentrations.

NOTE The precision of this method has been studied for a limited set of samples and content levels by a limited amount of labs. It allows establishment of a quality specification of DME but cannot be considered as a full precision determination in line with the usual statistical methodology as in ISO 4259.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 29945, *Refrigerated non-petroleum-based liquefied gaseous fuels — Dimethylether (DME) — Method of manual sampling onshore terminals*

3 Principle

A gaseous sample of DME is bubbled into the titration vessel of a coulometric (or volumetric) Karl Fischer apparatus. The titration is then performed until all of the water has been titrated, the end point is detected by an electrometric end point detector, and the titration is terminated. Based on the stoichiometry of the reaction, 1,0 mol of iodine reacts with 1,0 mol of water; thus, the quantity of water is proportional to the quantity of Karl Fisher reagent used.

4 Reagents and materials

4.1 Sample solvent, reagent grade.

Use methanol (anhydrous) with minimum purity 99,9 mass % and maximum water content 0,1 mass % (and preferably less than 0,05 mass %).

This water content could be achieved by dissolving 24 g of magnesium metal turnings in 200 ml of methanol (the reaction could be vigorous). When the reaction is completed, add 3 l of methanol. Reflux for 5 h. Distill directly into the container in which the 99,9 mass % methanol is to be kept. Vent the system through a drying tube during the distillation.