

ICS 27.075; 71.060.10

Liquid Organic Hydrogen Carrier (LOHC) auf Basis von Toluol – Bewertung, Prüfung und Sicherstellung der LOHC-Qualität; Text Englisch

Liquid Organic Hydrogen Carrier (LOHC) based on toluene –
Evaluation, testing and assurance of LOHC quality; Text in English

Liquides organiques porteurs d'hydrogène (LOHC) à base de toluène – Evaluation,
méthodes d'essai et assurance de qualité LOHC; Texte en anglais

Gesamtumfang 16 Seiten

Dieses Dokument wurde durch die im Vorwort genannten Verfasser erarbeitet und verabschiedet.

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Foreword

This DIN SPEC has been developed according to the PAS procedure. The development of a DIN SPEC according to the PAS procedure is carried out in DIN SPEC (PAS)-consortiums and does not require the participation of all stakeholders.

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Introduction

The transformation of the energy sector – from fossil energy vectors to renewable energy sources – requires efficient and long-term storage technologies. These technologies help to balance the fluctuating energy supply from renewable energies like wind and solar power. Hydrogen, that is produced via electrolysis from green energy, provides such a storage possibility. But on molecular basis hydrogen is very fugitive and has a very low storage capacity. Via the LOHC (**L**iquid **O**rganic **H**ydrogen **C**arrier) technology it is possible to store hydrogen save and with a high storage capacity using a reversible chemical process to bind hydrogen to a carrier fluid. This fluid can be stored and transported under ambient conditions.

Until now there are no general standards, rules or guidelines that assess the quality of LOHC-carriers on the basis of toluene. Therefore, the goals of this DIN SPEC are as follows:

- definition of the properties of the LOHC-carriers being fresh, hydrogen-loaded, hydrogen-unloaded and other intermediate states;
- definition of testing methods to determine the quality of the LOHC-carrier;
- definition of testing criteria to control the LOHC quality.

1 Scope

This document specifies requirements for the properties of toluene based LOHC carrier materials and appropriate testing procedures. In this document toluene, benzyltoluene and dibenzyltoluene are described.

This document is applicable to the use of toluene-based compounds serving as liquid organic hydrogen carriers for the purpose of storing and releasing hydrogen.

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.

DIN 51757, *Testing of mineral oils and related materials — Determination of density*

DIN 51777, *Petroleum products — Determination of water content using titration according to Karl Fischer*

DIN 53015, *Viscometry — Measurement of viscosity using the Hoesppler Falling-Ball Viscometer*

DIN 53019-1, *Viscometry — Measurement of viscosities and flow curves by means of rotational viscometers — Part 1: Principles and measuring geometry*

DIN EN ISO 12185, *Crude petroleum, petroleum products and related products — Determination of density — Laboratory density meter with an oscillating U tube sensor*

DIN EN ISO 20846, *Petroleum products — Determination of sulfur content of automotive fuels — Ultraviolet fluorescence method*

ASTM D4052, *Standard Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter*

ASTM D6304, *Standard Test Method for Determination of Water in Petroleum Products, Lubricating Oils, and Additives by Coulometric Karl Fischer Titration*

ASTM D7359, *Standard Test Method for Total Fluorine, Chlorine and Sulfur in Aromatic Hydrocarbons and Their Mixtures by Oxidative Pyrohydrolytic Combustion followed by Ion Chromatography Detection (Combustion Ion Chromatography-CIC)*

3 Terms and definitions

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

DIN and DKE maintain terminology databases for use in standardization at the following addresses:

- DIN-TERMinologieportal: available at <https://www.din.de/go/din-term/>
- DKE-IEV: available at <https://www.dke.de/DKE-IEV>

3.1

liquid organic hydrogen carrier

LOHC

liquid material that can store hydrogen reversibly via hydrogenation and dehydrogenation