
**Petroleum and related products —
Determination of pH of fire-resistant
fluids within categories HFAE, HFAS and
HFC**

*Pétrole et produits connexes — Détermination du pH des fluides
difficilement inflammables de catégories HFAE, HFAS ou HFC*



Reference number
ISO 20843:2011(E)

© ISO 2011

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 20843 was prepared by Technical Committee ISO/TC 28, *Petroleum products and lubricants*.

This second edition cancels and replaces the first edition (ISO 20843:2003), of which it constitutes a minor revision.

Introduction

HFAE, HFAS and HFC fluids are used in hydraulic systems where the running conditions require fire-resistant fluids. The determination of the pH of aqueous hydraulic fluids is useful to monitor the product in service. Any important variation can be the sign of bacterial proliferation and can have an impact on the corrosion-protection properties.

Petroleum and related products — Determination of pH of fire-resistant fluids within categories HFAE, HFAS and HFC

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 test method to determine the pH value of fire-resistant fluids within categories HFAE, HFAS and HFC, as classified in ISO 6743-4.

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 3170:2004, *Petroleum liquids — Manual sampling*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

3 Principle

The pH value is established using a pH meter, which measures the potential difference between two electrodes immersed in the fluid being tested. One of the electrodes should be of glass and the other should be of calomel.

NOTE A grouped electrode device can also be used.

The pH measurement is carried out at 20 °C.

The measurement should be carried out as soon as possible after sampling, less than 48 h if possible, to avoid errors due to possible oil release and/or pH changing.

4 Reagents and materials

4.1 Water, conforming to Grade 2 of ISO 3696.

4.2 Standard solutions to calibrate the pH meter.

4.2.1 Buffer solution, pH 7,00 at 20 °C.

ISO 20843:2011(E)

Dissolve 3,800 g of potassium dihydrogen orthophosphate (KH_2PO_4) and 3,415 g of disodium hydrogen phosphate (Na_2HPO_4) in water (4.1) and dilute to 1 000 ml at 20 °C.

Before use, the potassium dihydrogen orthophosphate shall be dried for 2 h at a temperature between 110 °C and 120 °C.

4.2.2 Buffer solution, pH 9,22 at 20 °C.

Dissolve 3,80 g of disodium tetraborate decahydrate ($\text{Na}_2\text{B}_4\text{O}_7 \cdot 10\text{H}_2\text{O}$) in water (4.1) and dilute to 1 000 ml at 20 °C.

4.2.3 Buffer solution, pH 11,72 at 20 °C.

Dissolve 1,42 g of disodium hydrogen phosphate (Na_2HPO_4) in a 100 ml solution of carbonate-free sodium hydroxide (NaOH) (0,1 mol/l) and dilute to 1 000 ml at 20 °C with water (4.1).

NOTE Ready mixed buffer solutions available on the market can be used in place of the buffer solutions listed in 4.2.1 to 4.2.3. It is intended that the buffer solutions be used within the period indicated on the bottle (in the case of a ready mixed buffer) or within a period of three months after preparation.

4.3 Cleaning reagents

4.3.1 Toluene (C_7H_8), of analytical quality.

4.3.2 Propan-2-ol ($\text{C}_3\text{H}_8\text{O}$), of analytical quality.

5 Apparatus

5.1 pH meter.

5.2 Glass electrode and reference electrode or a grouped electrode device.

5.3 Thermometer, with a range from 0 °C to 100 °C graduated in 1 °C.

5.4 Analytical balance, capable of weighing to the nearest 0,1 mg.

6 Sampling

Unless otherwise specified, samples shall be obtained by the procedures described in ISO 3170.

7 Procedure

7.1 Calibration of pH meter

Calibrate the pH meter (5.1) at 20 °C in accordance with the manufacturer's instructions, preferably using the buffer solutions specified in 4.2.

The pH value of these solutions should lie on either side of the expected pH value of the fluid being tested.

7.2 Measurement of pH

The pH measurement should be carried out as soon as possible after sampling (see Clause 6), less than 48 h if possible, to avoid errors due to possible oil release and/or pH changing.

Pour the fluid being tested into a glass beaker and adjust to a temperature of $20\text{ °C} \pm 1\text{ °C}$. Carefully clean the electrodes in water (4.1), immerse them in the fluid under test, and read off the pH value from the meter (5.1) after a stabilization time of approximately 1 min. If there is an oil separation on the surface of the fluid, avoid any oil deposit on the measuring part of the glass electrode which could modify the contact potential and give rise to measurement errors.

After the test, clean the electrodes with toluene (4.3.1) followed by propan-2-ol (4.3.2).

8 Expression of results

Report the pH value to the nearest 0,1 unit of pH.

9 Precision

9.1 General

The precision of this test method has been estimated.

9.2 Repeatability, r

The difference between two test results obtained by the same operator with the same apparatus under constant operating conditions on identical test material would, in the long run, in the normal and correct operation of the test method, exceed the following value in only one case in twenty.

HFAE, HFAS and HFC fluids, $r = 0,2$

9.3 Reproducibility, R

The difference between two single and independent test results obtained by different operators working in different laboratories on identical test material would, in the long run, in the normal and correct operation of the test method, exceed the following value in only one case in twenty.

HFAE and HFAS fluids: $R = 0,6$

HFC fluids: $R = 0,3$

10 Test report

The test report shall contain at least the following information:

- a) a reference to this International Standard, i.e. ISO 20843:2010;
- b) the type and complete identification of the product tested, including, for HFAE and HFAS fluids, the water type and percentage of concentrate used to make up the fluid;
- c) the result of the test (see Clause 8);
- d) any deviation, by agreement or otherwise, from the procedures specified;
- e) the date of the test.

Bibliography

- [1] ISO 6743-4, *Lubricants, industrial oils and related products (class L) — Classification — Part 4: Family H (Hydraulic systems)*

www.iso.org

ICS 75.120

Price based on 4 pages