Supelco®
Analytical Products

Application Note

Determination of pH-Value in Cooling Lubricants

Reflectometric determination with a chemically bound pH indicator on a test strip

Introduction

Cooling lubricants are multi-component mixtures used during the processing of materials. They are used to dissipate the heat generated when processing workpieces (cooling) and to reduce the friction that occurs (lubricating). Another aspect is the removal of filings and solids that occur during processing of the material (rinsing).[1]

Since the properties of the cooling lubricants can change through contact with the workpieces and the working environment, manufacturers and regulations recommend regularly checking various properties and parameters of the cooling lubricants to ensure their functionality and to avoid a health risk for the employees.

In this context, an important parameter is the pH value. The pH value indicates whether an aqueous solution is acidic, alkaline or neutral. The pH value of ready-to-use fresh cooling lubricants is usually in the range of pH 8.0 to 9.5.[2]

Changes in the pH value during use can have a negative effect on the desired properties of the cooling lubricant and also increase the health risk for employees.

A decreasing pH indicates an increase in germ load or a decrease in the effectiveness of additives. Concurrently, it promotes the formation of harmful nitrosamines. Conversely, higher pH values can enhance the skin-damaging effect of cooling lubricants.[2,3]

Experimental

This application note describes the reflectometric determination of the pH-value in aqueous cooling lubricants.

Method

The reaction zones of the test strip change color depending on the pH of the sample. The responsible indicator is chemically bound to the reaction zones and hence does not bleed. The resulting color is evaluated reflectometrically.

Measuring range

pH 7.0 – 10.0

Applicable Sample

Aqueous cooling-lubricant emulsions

Reagents, Instruments, and Materials

Test kit

- Reflectoquant® pH Test in cooling lubricants **(1.16898)**

Instrument

- Reflectometer RQflex® 20 **(1.17246)**

Other Reagents and Accessories

Products for AQA (optional)

- Buffer solution pH 8.00 Certipur® **(1.09460)**
- Buffer solution pH 9.00 Certipur® **(1.09461)**

Analytical Procedure

Sample Preparation

No sample preparation needed.

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Measurement

Please refer to the manual for instructions on how to use the reflectometer. The following applies to the pH test in cooling lubricants: Measurement procedure A

Stored reaction time: 15 sec

- Press the START button of the reflectometer and - this is imperative - at the same time immerse both reaction zones of the test strip in the measurement sample (15 - 25 °C) for 3 sec.
- Carefully allow excess liquid to run off via the long edge of the strip onto an absorbent paper towel.
- Immediately insert the strip all the way into the strip adapter with the reaction zones facing the display.
- After the end of the reaction time, read off the pH from the display. The result is automatically stored.

Notes on the measurement:

- The test strip can be directly immersed in the cooling-lubricant emulsion. Remove, if necessary, any film of oil.
- If another Reflectoquant® test was used before this determination, the strip adapter should first be cleansed thoroughly with distilled water or ethanol.
- If the test strip is inserted into the adapter after the reaction time has expired, pressing the START button again may produce a false result.

Analytical Quality Assurance

Analytical quality assurance (AQA) is recommended before each measurement series. Check the instrument using the RQcheck. If RQcheck failed, perform a recalibration using the recalibration set and repeat the RQcheck. For more details see RQflex 20 manual.

To check test strips, measurement device, and handling (recommended before each measurement series): Analyze buffer solution pH 8.00 or pH 9.00 (approx. 20 °C) as described in section “Measurement”.

Conclusion

The Reflectoquant® pH test strip for cooling lubricants is a **quick and easy way to analyze the pH-value** in aqueous cooling-lubricant emulsions.

References

1. IFA Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung, Praxishilfen, Kühlschmierstoffe. [accessed 2022 Jun 30] https://www.dguv.de/ifa/praxishilfen/kuehlschmierstoffe/kuehlschmierstoff/index.jsp
2. IFA Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung, Praxishilfen, Kühlschmierstoffe, Lexikon, pH-Wert. [accessed 2022 Jun 30] https://www.dguv.de/ifa/praxishilfen/kuehlschmierstoffe/lexikon/ph-wert/index.jsp
3. BAuA – Bundesanstalt für Arbeitsschutz und Arbeitsmedizin, Technische Regel für Gefahrstoffe - TRGS 611 Verwendungsbeschränkungen für wassermischbare bzw. wassergemischte Kühlschmierstoffe, bei deren Einsatz N-Nitrosamine auftreten können. [accessed 2022 Jun 30] https://www.baua.de/DE/Angebote/Rechtstexte-und-Technische-Regeln/Regelwerk/TRGS/TRGS-611.html

Featured Products

Product	Cat. No.
Reflectoquant® Instruments and Strips	
pH Test in cooling lubricants, reflectometric, pH range 7.0-10.0	**1.16898**
Reflectometer RQflex® 20, pkg of 1 unit, Reflectoquant®	**1.17246**
Products for AQA	
Recalibration Set for RQflex® 20 Reflectometer, 1 unit	**1.16954**
RQcheck Set for RQflex® 20 Reflectometer, 1 set	**1.17247**
Buffer solution, (boric acid/sodium hydroxide/hydrogen chloride), traceable to SRM from NIST and PTB pH 8.00 (20 °C) Certipur®	**1.09460**
Buffer solution, (boric acid/potassium chloride/sodium hydroxide), traceable to SRM from NIST and PTB pH 9.00 (20 °C) Certipur®	**1.09461**

For more information on

Reflectoquant® Test strips see **SigmaAldrich.com/test-strips**
Applications see **SigmaAldrich.com/wfa-applications**
Order/Customer Service see **SigmaAldrich.com/order**
Technical Service see **SigmaAldrich.com/techservice**

SigmaAldrich.com

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