Application Note AN-T-202

Reserve alkalinity of engine coolants

Straightforward determination according to ASTM D1121

Corrosion of metallic components is an inherent problem for engines, because metals naturally tend to oxidize in the presence of water and/or low pH value. The reserve alkalinity of engine coolants and antirusts is a measure of the buffering ability to absorb acidity. Such acids might by introduced by exhaust gas leakage, by residual acid cleaner, or by the oxidation of ethylene glycol or propylene glycol. The reserve alkalinity is frequently used for quality control during production and often listed in the specifications of the coolants. A fast and accurate determination is therefore important.

This Application Note describes the straightforward determination of reserve alkalinity according to ASTM D1121. Engine coolants or antirusts are dissolved in water. After a pH measurement, the determination is carried out by potentiometric titration.

Using a fully automated system allows an accurate and reliable determination due to the reduction of human errors. Furthermore, the operator is free to carry out other tasks increasing the efficiency of the laboratory.

SAMPLE AND SAMPLE PREPARATION

The method is demonstrated on engine coolant.

No sample preparation is necessary.

EXPERIMENTAL

The analysis is performed on an OMNIS system consisting of an OMNIS Sample Robot S and an OMNIS Advanced Titrator equipped with a Profitrode.

The Profitrode has to be calibrated before use.

Engine coolant is pipetted into the sample beaker. While stirring, deionized water is added using the integrated pumps. The pH value is measured until a stable drift is reached, then the solution is titrated with standardized hydrochloric acid to the endpoint at pH 5.5.

Afterwards, the solution is aspirated and the buret tips as well as the electrode are rinsed with deionized water. The glass membrane of the electrode alone is then conditioned for 2 minutes in deionized water.

Figure 1. OMNIS system consisting of an OMNIS Sample Robot S and an OMNIS Advanced Titrator equipped with a Profitrode for the determination of the reserve alkalinity in engine coolant.

RESULTS

The obtained results lay within the limits given by ASTM D1121 and are therefore acceptable.

An example titration curve can be seen in Figure 2 and the results are summarized in Table 1.

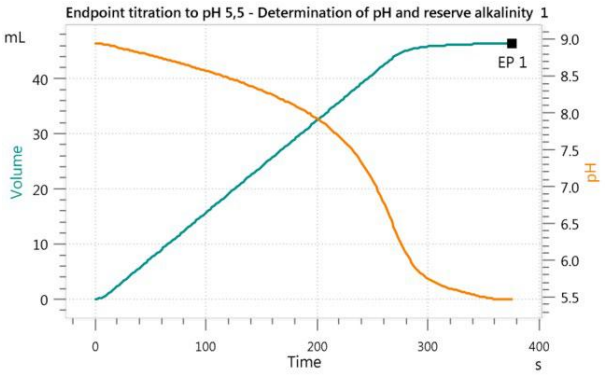

Figure 2. Titration curve of the reserve alkalinity of engine coolant.

Table 1. Results of the determination of the reserve alkalinity in engine coolant (n = 6).

	Mean	SD(abs)	SD(rel) / %
Initial pH	8.94	0.02	0.2
Reserve alkalinity / mL	46.56	0.12	0.3

CONCLUSION

The reserve alkalinity can precisely be determined according to ASTM D1121 by using the Profitrode for indication and a reliable titration system from Metrohm. By choosing an automated OMNIS system, the accuracy can be enhanced and the throughput maximized by the determination of samples in parallel.

Internal reference: AW TI CH1-1251-112018

CONTACT

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CONFIGURATION

OMNIS Advanced Titrator

新型、模式位分析 OMNIS Titrator 滴定,于独立行或作 OMNIS 滴定系的核心元件行,用于使用 OMNIS Sample Robot 行点和等当点滴定(一/)。由于采用 3S 瓶配器技,理化学品从未像在一安全。可以使用量模和量管元自由配置滴定,并在需要展一台螺旋拌器。在需要可以通相的件功能可平行滴定升 OMNIS Advanced Titrator。

- 通算机或本地网控制
- 可以其他用或助溶液外接最多四个滴定模或加液模
- 螺旋拌器的接方式
- 可提供不同大小的量管:5、10、20 或 50 mL
- 采用 3S 技的瓶配器:安全理化学品,自生商的原始数据

量模式和件:

- 点定滴定:"Basic" 功能可
- 点和等当点滴定(一/):"Advanced" 功能可
- 点和等当点滴定(一/),包括平行滴定:"Professional" 功能可

Profitrode 12.5 cm

双系的合 pH ,安装度 11.3 cm。此用于品的 pH 量/滴定,

- 染感器的参比系(例如,浴液、含硫化物的品)
- 其中化 c(KCl)= 3mol / L 不能用作参比解(例如,或化物与品的反)

此配了可以抵抗染的活磨口隔膜,如有必要可以更。
当使用 c(KCl) = 3 mol / L 作外参比液解,建在保存液中存。
中解可以用合的解(例如硝酸 $c(KNO_3)$ = 1 mol/L (6.2310.010))代替。存在用的解中。
以下物品号的 Profitrode 有更多度的版本可供:
- 6.0255.110:度 17.8 cm
- 6.0255.120:度 31.0 cm