



Application Note AN-T-178

Hydroxyl number in polyethylene glycol

Pyridine-free, fully automated determination according to ASTM E1899, EN 15168, and DIN 53240-3

The hydroxyl number (HN) is an important sum parameter for quantifying the presence of hydroxyl groups. As a key quality parameter, it is regularly determined in resins, paints, polyesterols, fats, and solvents. Unlike other standards, ASTM E1899 is free from pyridine and does not require refluxing samples at high temperatures for extended periods. It is performed at room temperature, requires only a small sample size, is applicable to extremely low HN, and can be performed fully automatically. This Application Note describes the

potentiometric determination of HN in 1-octanol and polyethylene glycol according to ASTM E1899, EN 15168, and DIN 53240-3. Using the OMNIS Dis-Cover technique, all sample preparation steps can be fully automated. Moreover, the use of an OMNIS Sample Robot allows parallel analysis of multiple samples, reducing the time per analysis for one sample from approximately 24 min to 12 min, and increasing productivity in the laboratory considerably.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on 1-octanol (theoretical HN of 430.08 mg KOH/g) and

polyethylene glycol (PEG) 3000. No sample preparation is required.

EXPERIMENTAL

The determinations are performed on an automated system consisting of an OMNIS Sample Robot S equipped with Dis-cover, an OMNIS Professional Titrator equipped with two dSolvotrodes, and multiple OMNIS Dosing Modules for the addition of the auxiliary solutions.

An appropriate amount of sample is weighed into the titration beaker, acetonitrile is added, and the beaker is capped with the Dis-Cover lid. After dissolution of the sample, TSI solution is added, the beaker is covered and solution is stirred for the stipulated time. Then deionized water is added, and after stirring shortly, acetonitrile is added. The solution is titrated until after the second equivalence point with standardized tetrabutylammonium hydroxide in isopropanol.

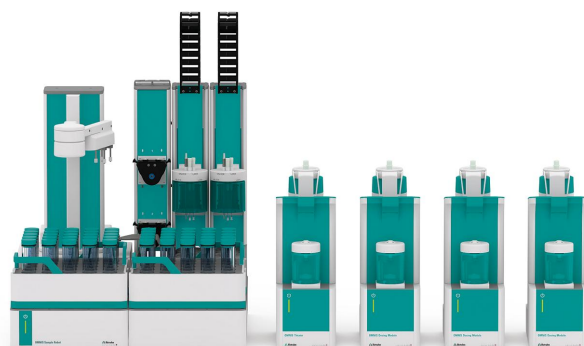


Figure 2. Sample Robot S with Dis-cover, OMNIS Dosing Modules and OMNIS Titrator Professional equipped with two dSolvotrodes.

RESULTS

Well-defined titration curves are obtained for the tested samples. The result for 1-octanol is well within the acceptable limit for the standard with a low standard deviation. For PEG 3000, which is analyzed on both work stations in

parallel, acceptable results with low standard deviations are obtained. Results are summarized in **Table 1**. An example titration curve is displayed in **Figure 2**.

Table 1. Results for the hydroxyl number determination according to ASTM E1899 on a fully automated OMNIS system equipped for the parallel analysis on two workstations.

Hydroxyl number (n = 6)	Mean in mg KOH/g sample	SD(rel) in %
1-Octanol	435.63	0.3
PEG 3000 (WS 1)	36.56	0.3
PEG 3000 (WS 2)	36.22	0.5

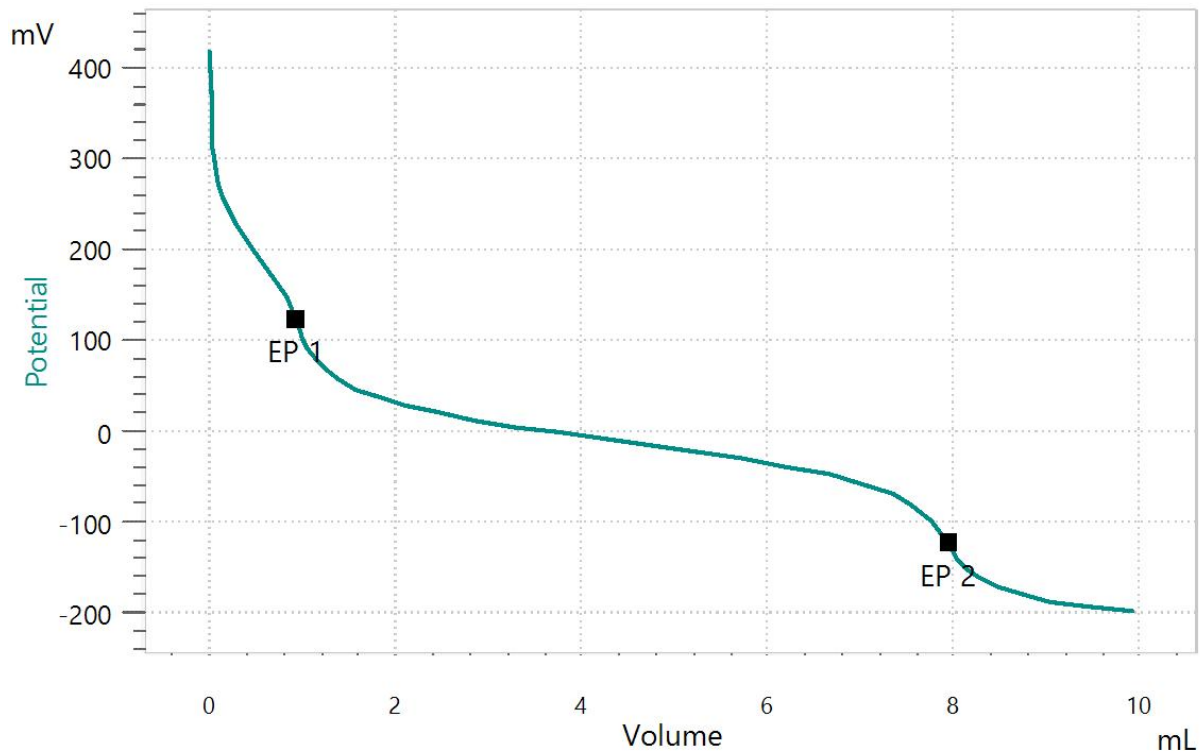


Figure 2. Titration curve of the determination of the hydroxyl number of 1-octanol.

CONCLUSION

Precise and reliable determination of the hydroxyl number according to **ASTM E1899**, **EN 15168**, and **DIN 53240-3** can be achieved using a fully automated OMNIS system. With the option to analyze up to four samples simultaneously,

the productivity of a laboratory can be significantly improved. Furthermore, the OMNIS system can be customized according to your needs and expanded for other titration applications required for quality control.

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CONFIGURATION



OMNIS Professional Titrator

新型、模式位分析 OMNIS Titrator 滴定,用于行点和等当点滴定(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,并在需要展一台拌器。包括用于使用其他滴定或加液模平行滴定的“Professional”功能可。

- 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
- 可以展磁力拌器和/或螺旋拌器
- 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



OMNIS Dosing Module

用于与 OMNIS Titrator 滴定相的加液模,以展外用于滴定/加液的滴定管。可以展磁力拌器和/或螺旋拌器,以作独的滴定台使用。可自由 5、10、20 或 50 mL 量管元。



Pick and Place S

用于建 S 格款型 OMNIS Sample Robot Pick&Place 的主模。模包括模支架和品架。已配了主升降台和爪。若要展功能就的 Sample Robot 除了品和抓取指之外需要工作台,例如 Pick&Place 取放模或模。些部件的可通用程序来完成。



Pick and Place

用于安装到 OMNIS Sample Robots Pick&Place 模支架中的模。工作台可置放分析用的品杯。内置的磁力拌器可将在外部磁力拌装置上准好的品直接在 Sample Robot 上行分析,无事先取下磁力拌棒。次分析之会将所使用的传感器在 Pick&Place 模存杯中行清或置放。



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用于安装到 OMNIS Sample Robots Pick&Place 模支架中的模。此工作站配一台冲洗和抽液。可用于清 Pick&Place 模中的传感器并在分析完成之后、重新将品杯放回品之前将其清空。



dSolvotrode

用于所有非水性酸/滴定的 OMNIS 数字合式 pH。玻璃膜性差的溶液行了化,并且由于活的磨口隔膜,也用于非常的品。

此可与非水参比解(化或四乙基化)一起使用。
存在相的参比解中。

dTrodes 可在 OMNIS Titratoren 上使用。