



Application Note AN-T-234

OMNIS奥秘一代和Titrando电位滴定仪对混合酸和TMAH的直接比较

Comparative titration with OMNIS Titrator and 888 Titrando

Ever since its introduction, the OMNIS platform has been compared to other high-quality Metrohm devices and software. Understandably, OMNIS has had to demonstrate its superior performance over these established systems. One satisfied customer from Taiwan did exactly that and found that the results obtained with OMNIS are even more accurate than with the well-proven Titrando system.

The OMNIS buret with a 100,000 step resolution is superior to the Titrando, with a resolution of either 20,000 steps (Exchange unit) or 10,000

steps (Dosing unit). Furthermore, improved performance of the dTodes with faster signal transfer and reduced signal noise ensures better results than when using analog electrodes.

This Application Note highlights customer-provided results of determinations of nitric acid, phosphoric acid, and acetic acid in an aluminum etching bath, as well as the determination of tetramethylammonium hydroxide (TMAH). Comparisons were made by using an OMNIS Titrator and an 888 Titrando with identical analysis parameters.

SAMPLES AND SAMPLE PREPARATION

This application is demonstrated on aluminum etching bath and tetramethylammonium hydroxide (TMAH) samples. The sample

preparation is subject to a confidentiality agreement with the customer.

EXPERIMENTAL

The determinations are carried out on an OMNIS Professional Titrator equipped with a dEcotrode Plus (**Figure 1**) and an 888 Titrande equipped with an Ecotrode Plus. All selected parameters were identical.

The precise determination, the exact parameters, the chemicals used, and the titrant are subject to customer confidentiality.



Figure 1. OMNIS Professional Titrator equipped with a dEcotrode Plus.

RESULTS

A summary of results for the comparison of OMNIS and Titrande for aluminum etching bath samples is shown in **Table 1**. The full results for

each set of determinations are displayed in **Tables 2–4**.

Table 1. Overview of the results of nitric, phosphoric, and acetic acid determination in aluminum etching bath samples with an OMNIS Titrator and an 888 Titrande.

Device	HNO ₃ (%)	H ₃ PO ₄ (%)	HAc (%)
OMNIS SD(rel)	4.89	70.16	9.78
	0.37	0.06	0.70
Titrande SD(rel)	4.97	70.07	9.73
	0.28	0.14	1.56

Table 2. Results of nitric, phosphoric, and acetic acid determination in aluminum etching bath samples on different days with an 888 Titrand.

Day	HNO ₃ (%)	H ₃ PO ₄ (%)	HAc (%)
1	4.96	69.99	9.86
	4.97	69.94	9.99
2	4.96	70.15	9.69
	4.96	70.14	9.67
3	4.97	70.14	9.66
	4.98	70.21	9.52
4	4.97	70.10	9.64
	4.95	69.99	9.80
5	5.00	70.13	9.59
	4.97	69.92	9.92
Mean	4.97	70.07	9.73
SD(abs)	0.01	0.10	0.15
SD(rel)	0.28	0.14	1.56

Table 3. Results of nitric, phosphoric, and acetic acid determination in aluminum etching bath samples on different days with an OMNIS Titrator.

Day	HNO ₃ (%)	H ₃ PO ₄ (%)	HAc (%)
1	4.87	70.13	9.87
	4.87	70.12	9.84
2	4.88	70.16	9.73
	4.87	70.17	9.77
3	4.89	70.26	9.70
	4.91	70.14	9.78
4	4.90	70.16	9.69
	4.90	70.14	9.78
5	4.92	70.13	9.72
	4.90	70.18	9.88
Mean	4.89	70.16	9.78
SD(abs)	0.02	0.04	0.07
SD(rel)	0.37	0.06	0.70

Table 4. Results of tetramethylammonium hydroxide (TMAH) determination in β (TMAH) = 2.380% samples on different days with an 888 Titrand and an OMNIS Titrator.

	888 Titrand	OMNIS Titrator
Day	Result (%)	Result (%)
1	2.3820	2.3788
	2.3814	2.3794
	2.3813	2.3786
2	2.3818	2.3785
	2.3810	2.3780
	2.3816	2.3781
3	2.3792	2.3776
	2.3799	2.3779
	2.3803	2.3780
Mean	2.3809	2.3783
SD(abs)	0.0009	0.0006
SD(rel)	0.040	0.023

CONCLUSION

In addition to manufacturing high-quality analytical instruments, customer satisfaction is extremely important to Metrohm. The data collected and shared in this Application Note from a satisfied customer in Taiwan clearly shows the outstanding performance of

Metrohm titrators.

Aside from improving the precision and speed of the determinations, OMNIS delivers results on par or even better than with other established titration systems.

CONTACT

瑞士万通中国
北京市海淀区上地东路1号
院1号楼7层702
100085 北京

marketing@metrohm.com.cn

CONFIGURATION



OMNIS Professional Titrator

创新型、模块式电位分析 OMNIS Titrator,适于独立运行或作为 OMNIS 滴定系统的核心元件运行,用于终点和等当点滴定(单一/动态)。由于采用 3S OMNIS Liquid Adapter 技术,处理化学品从未像现在一样安全。可以使用测量模块和计量管单元自由配置滴定仪,并在需要时扩展一台棒式搅拌器。包括用于使用其他滴定或加液模块平行滴定的“Professional”功能许可证。

- 通过计算机或本地网络控制
- 可以为其他应用或辅助溶液另外连接最多四个滴定模块或加液模块
- 棒式搅拌器的连接方式
- 可提供不同大小的计量管:5、10、20 或 50 mL
- 采用 3S 技术的 OMNIS Liquid Adapter:安全处理化学品,自动传输生产厂家的原始试剂数据

测量模式和软件选项:

- 终点设定滴定:“Basic” 功能许可证
- 终点和等当点滴定(单一/动态):“Advanced” 功能许可证
- 终点和等当点滴定(单一/动态),包括 5 路平行滴定:“Professional” 功能许可证