



Application Note AN-T-240

用电导滴定法计算总酸数

Determination of total acid number of petroleum products

The total acid number (TAN) measures the acidic components in a substance, typically in petroleum products like engine oils or lubricants. The TAN value indicates the quantity of acid in milligrams of potassium hydroxide (KOH) which is required to neutralize one gram of the sample. The TAN value is an important parameter for assessing the acidity of oils and fuels. Regular monitoring of total acidity is essential for many reasons. It helps ensure proper performance and longevity of lubricants or petroleum products.

Fresh, unused oils have a low TAN value, but a high TBN (total base number) value. Over the service life of the oil, the TAN value increases while the TBN value (a measure of the alkaline reserve to neutralize acids) decreases.

The total acid number is an important parameter to monitor in petroleum products because excessive acidity can lead to corrosion and impairment of equipment. This Application Note describes the determination of TAN in sliding track oil with conductometric titration.

SAMPLE

Sliding track oil

EXPERIMENTAL

The sample was titrated with potassium hydroxide in 2-propanol solution until after the

first equivalence point. The 5-ring conductivity measuring cell was used for this analysis.

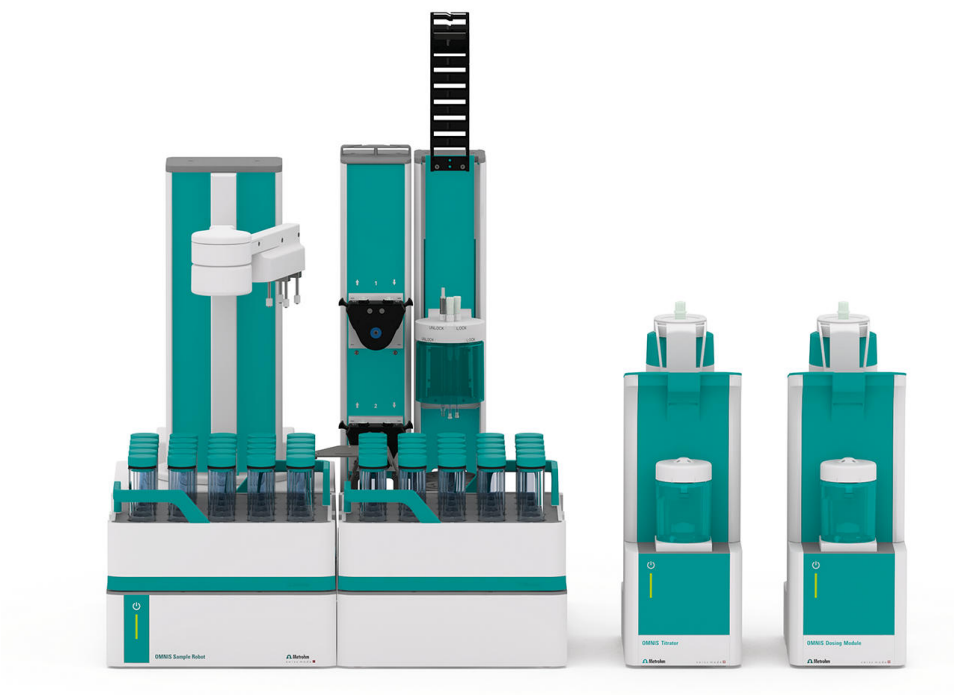


Figure 1. OMNIS Titrator with an OMNIS Dosing Module and OMNIS sample robot.

RESULTS

The determination of the TAN value (Table 1) gave accurate results. An example

determination is shown in Figure 2.

Table 1. Results of the sliding track oil determination by conductometric titration.

Sample	Result TAN	RSD in %
Sample (n=3)	0.40 mg KOH/g	1.1

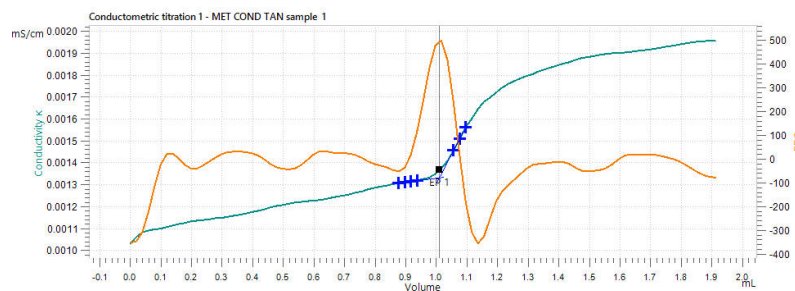


Figure 2. Example curve to determine the total acid number in sliding track oil.

CONCLUSION

This method does not require indicators or complicated instruments. Compared to other titration methods, it is extremely sensitive and delivers precise results. The measurement is easy to carry out. It can be used for a wide range of sample types, including solutions, suspensions, and slurries.

The robust design of the conductivity sensor

allows for easy cleaning. In contrast to potentiometric sensors, it does not require any rehydration period between the measurements. Conductivity titration can be used for highly diluted solutions, nonaqueous solutions, and titration of weak acids or bases. The endpoint of this titration method is sharp and precise compared to other titration methods.

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CONFIGURATION



OMNIS Titrator

创新型、模块式电位分析 OMNIS Titrator 滴定仪,适于独立运行或作为 OMNIS 滴定系统的核心元件运行。由于采用 3S 试剂瓶适配器技术,处理化学品很安全。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搅拌器。由于采用不同的软件功能许可证,因此可以有不同的测量模式和功能。

- 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四个滴定模块或加液模块
- 螺旋搅拌器的连接方式
- 可提供不同大小的计量管:5、10、20 或 50 mL
- 采用 3S 技术的试剂瓶适配器:安全处理化学品,自动传输生产商的原始试剂数据

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),包括平行滴定:“Professional” 功能许可证

OMNIS

A WHOLE NEW LEVEL OF PERFORMANCE

功能许可证“电导率滴定仪”,用于 OMNIS Titrator 包含功能模式

- MET COND
- MEAS U / T / pH / COND
- 灵快量化液体处理
- 仅使用一个 OMNIS Titrator 的内部滴定管进行滴定



OMNIS Titrator 或滴定模块的测量通道,用于连接电导电极。



5 $c = 0.7 \text{ cm}^{-1}$ Pt1000.65 m

带池常数的 5 环电导电极 $c = 0.7 \text{ cm}^{-1}$ (指导数值),集成有温度探针 Pt1000 和固定电缆 (0.65 m),用于连接到 OMNIS 电导率测量模块上。

该传感器适用于测量中等的电导率($5 \mu\text{S}/\text{cm}$ 至 $20 \text{ mS}/\text{cm}$),例如:

- 饮用水
- 地表水
- 废水