



Application Note AN-T-187

石油馏分中的溴数

Ecological determination according to ASTM D1159 with toluene as solvent

The bromine number indicates the degree of unsaturation and relies on the simple addition of bromine to the double bond of alkenes. One mole of bromine is consumed for each mole of carbon-carbon double ($C=C$) bond present in a substance. In petroleum products, the bromine number corresponds to the olefin content. Normally, chlorinated solvents are used for the determination of the bromine number. In this

Application Note they have been replaced by toluene. This makes the determination more ecological. The titration is performed automatically on an OMNIS system in combination with a double Pt-wire electrode. With this setup, a fast and accurate determination by potentiometric titration can be realized.

SAMPLE AND SAMPLE PREPARATION

The analysis is demonstrated on petroleum distillate.

According to the expected bromine number, an

appropriate amount of sample is dissolved in toluene.

EXPERIMENTAL

The analysis is carried out on an OMNIS system consisting of an OMNIS Advanced Titrator, an OMNIS Dosing Module, and a double Pt-wire electrode.

Sample and titration solvent (consisting of toluene, methanol, sulfuric acid, and glacial acetic acid) are pipetted into a thermostated vessel. While stirring, the solution is cooled to between 0–5 ° C. After reaching this temperature, the solution is titrated with standardized bromine until after the equivalence point is reached.



Figure 1. OMNIS system consisting of an OMNIS Advanced Titrator and an OMNIS Dosing Module equipped with a double Pt-wire electrode for indication.

RESULTS

Steep and smooth curves are achieved with this setup. The results are very reproducible with relative standard deviations < 0.2 %.

With the presented analysis, a bromine number of 10.80 g bromine/100 g petroleum distillate ($n = 5$; $SD(\text{rel}) = 0.19\%$) is obtained.

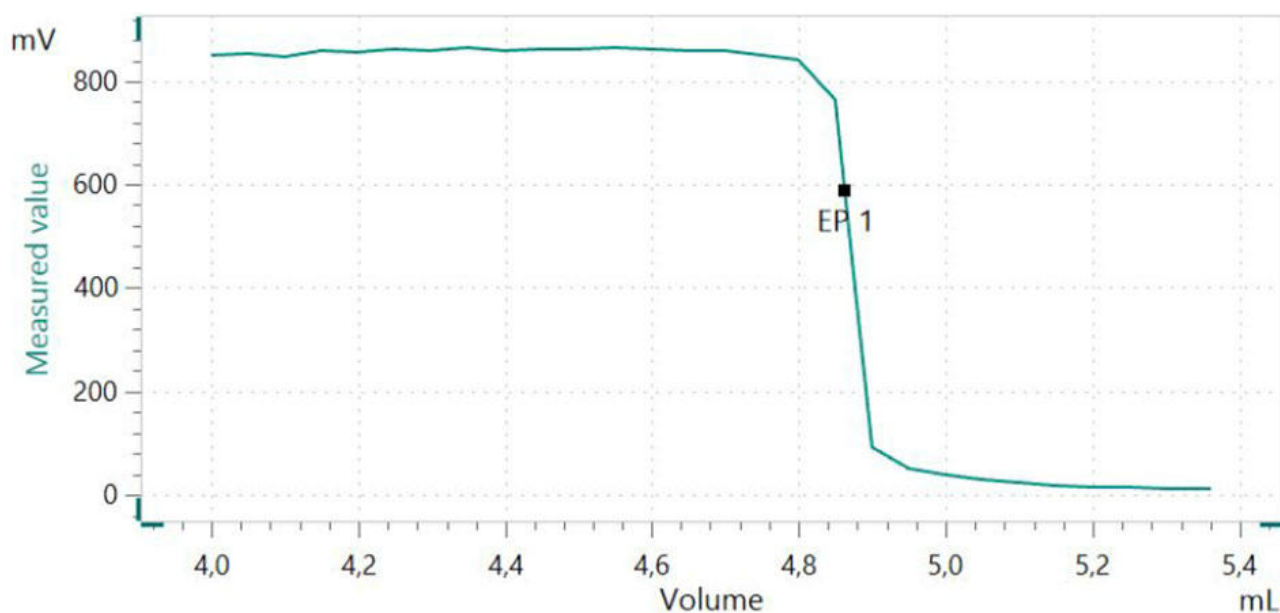


Figure 2. Titration curve of the determination of the bromine number of a petroleum distillate sample.

CONCLUSION

After reaching the temperature of 0–5 ° C, the titration is automatically started. There is therefore no further need to observe the temperature. The titration curves are steep and easy to evaluate. Due to this point, the reproducibility is very good and the criteria of

ASTM D1159 regarding reproducibility is fulfilled.

Additionally, the exchange of chlorinated solvents by toluene leads to a more environmentally friendly application with a comparable precision.

Internal reference: AW TI CH1 1245-122017

CONTACT

Metrohm Taiwan Ltd.
開封街二段 46 號 5 樓
108 台北市

info@metrohm.com.tw

CONFIGURATION



OMNIS Advanced 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,用于使用 OMNIS Sample Robot 进行终点和等当点滴定(单一/动态)。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螺旋搅拌器。在需要时可以通过相应的软件功能许可证为平行滴定升级 OMNIS Advanced Titrator。

- 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 Dosing Module

用于与 OMNIS Titrator 滴定仪相连的加液模块,以扩展额外用于滴定/加液的滴定管。可以扩展磁力搅拌器和/或螺旋搅拌器,以作为单独的滴定台使用。可自由选择 5、10、20 或 50 mL 计量管单元。



指示电极,用于库仑法卡尔费休滴定。



Pt1000 12.5 cm

玻璃材质 Pt1000 温度传感器(B 级)。

物品编号为 6.1110.110 的 Pt1000 温度传感器也有 17.8 cm 安装长度的版本可供选购。