Application Note AN-T-213

水中的臭氧

Easy determination of ozone in water

Water treatment with ozone (O_3) is a common procedure for the disinfection of swimming pools. To efficiently kill microbes, ozone concentrations from 0.1–7 mg min/L are needed. During this process, it is important that a sufficient but not excessive amount of O_3 is produced to disinfect the water. Otherwise, the remaining ozone which is not used to disinfect the water could enter the swimming water. This concentration should not exceed 0.04 mg/L. If the concentration is higher, the ozone could irritate the respiratory system or the skin of bathers.

Therefore, it is recommended to monitor the produced ozone concentration. In addition, the disinfection process with ozone is used in drinking and waste water treatment. This is due to the fact that ozone is significantly more effective than chlorine at inactivating or killing viruses and bacteria. Ozone is widely used in Europe to treat drinking water.

This application note describes a method to determine the ozone concentration in water by potentiometric titration according to DIN 38408-3.

SAMPLE AND SAMPLE PREPARATION

Due to the reactive nature of ozone, this application is demonstrated on spiked groundwater. Immediately after spiking the sample with ozone (produced by electrolysis), potassium iodide solution is added to the sample to stabilize the ozone.

EXPERIMENTAL

This analysis is performed on an OMNIS Advanced Titrator equipped with a double Pt sheet electrode.

Sulfuric acid is added to a prepared sample solution, and the iodine, generated by the reaction of ozone with potassium iodide, is back titrated with sodium thiosulfate until after the equivalence point.

It is important to determine the ozone content immediately after the sample is prepared, because the ozone is not stable.

Figure 1. OMNIS Advanced Titrator equipped with a double Pt sheet electrode for the determination of ozone in water samples.

RESULTS

A mean ozone content of 13.44 mg/L (n = 3, SD(abs) = 0.83 mg/L, SD(rel) = 6.18%) is obtained for the spiked groundwater sample. If ozone is not generated in-situ but continuously, it should be possible to obtain a lower standard deviation.

With the used setup and titration parameters, one sample could be measured in under 2.5 minutes with sharp curves and clear equivalence points.

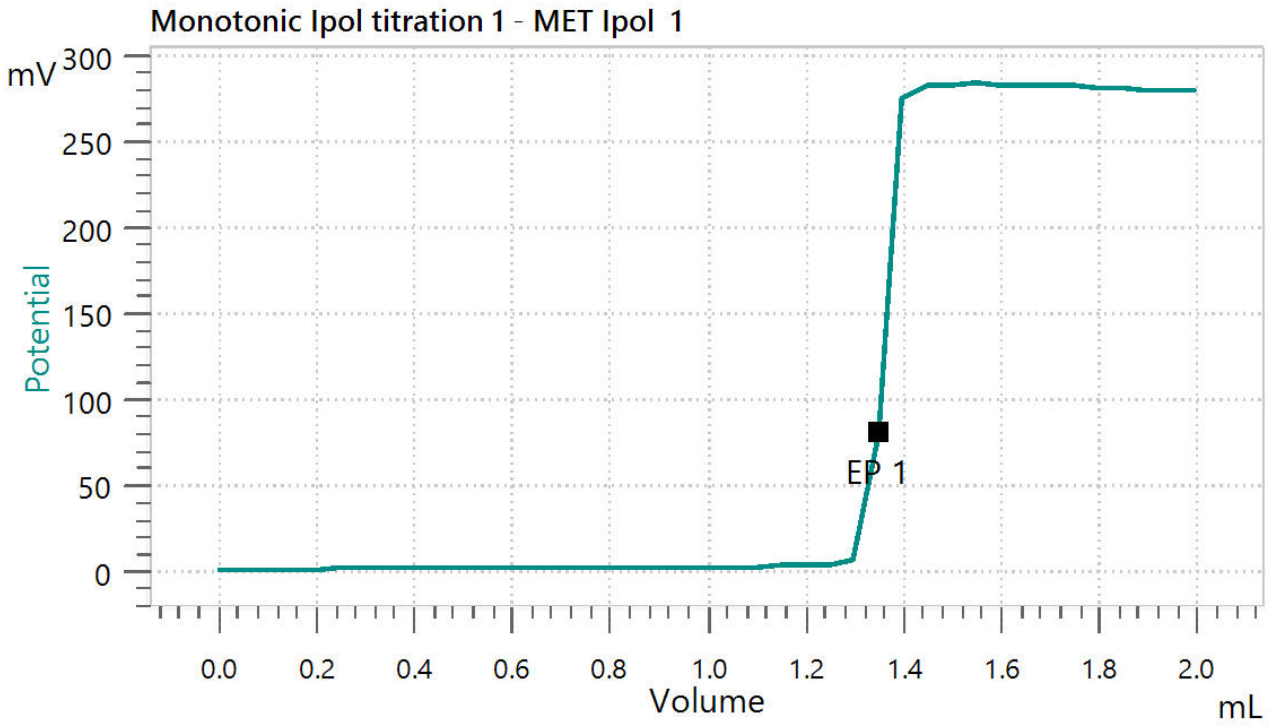

Figure 2. Example titration curve of the ozone determination in spiked groundwater.

CONCLUSION

Titration is an inexpensive method to determine ozone in water. With this method, it is possible to determine ozone contents as low as 0.1 mg/L. Using an OMNIS Titrator allows you to customize the system according to your application needs and to expand it for other titration applications required for the quality control of water.

Internal reference: AW TI CH1-1297-012020

CONTACT

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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

带两块铂板 (0.15 x 8 x 8 mm) 的玻璃鞘电极,两块铂板经极化,用于氧化还原滴定(双伏安滴定法)。该电极特别适用于

- 维生素 C 测定
- 电量的氮测定
- 溴指数
- 葡萄酒中的亚硫酸 (SO_2)
- 按照温克勒法的氧含量