



Application Note AN-T-213

Ozone in water

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.

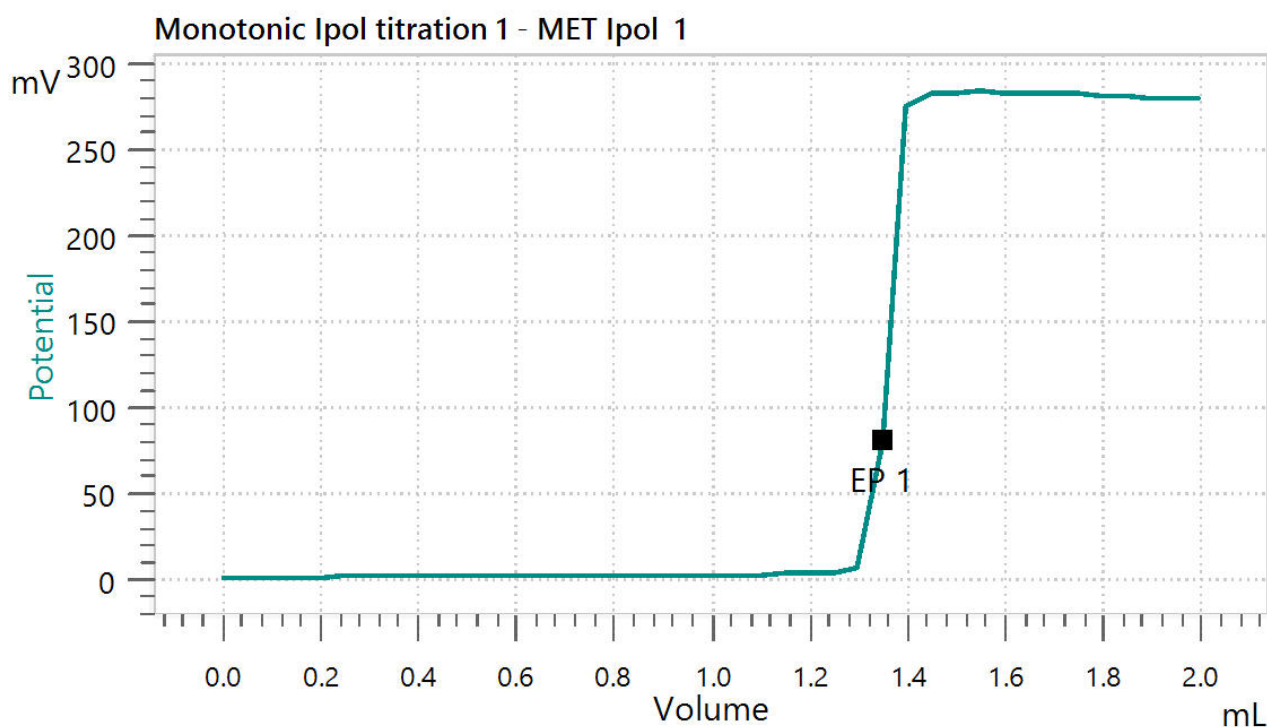


Figure 2. Example titration curve of the ozone determination in spiked groundwater.

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

メトロームジャパン株式会社
 143-0006 東京都大田区平和島6-1-1
 null 東京流通センター アネックス9階

metrohm.jp@metrohm.jp

CONFIGURATION



OMNIS Advanced

スタンドアローン稼働またはOMNIS滴定システムのメインパートとしての、革新的なモジュール式の終点滴定および当量点滴定（等量/変動）のためのOMNIS電位差滴定装置です。3Sリキッドアダプタテクノロジーにより、化学物質の取り扱いに関してはこれまでにないほどの安全性を誇ります。滴定装置は測定モジュールおよびシリンダーユニットによって自由にコンフィグレーションすることができ、必要に応じてプロペラスターラで拡張することも可能です。必要に応じてOMNIS Advanced滴定装置を、対応するソフトウェア機能ライセンスによって並行滴定用に装備することができます。

- パソコンまたはローカルネットワークを介した制御
- 他のアプリケーションまたは補助溶液のための他の滴定モジュールもしくはドージングモジュールが4つまで接続可
- プロペラスターラの接続可
- 様々なシリンダーサイズに対応: 5、10、20、50 mL
- 3Sテクノロジーによるリキッドアダプター: 化学物質の安全な取り扱い、メーカーのオリジナル試薬データの自動伝送

測定モードおよびソフトウェアオプション:

- 終点滴定: 機能ライセンス「Basic (ベーシック)」
- 終点滴定および当量点滴定 (等量/変動): 機能ライセンス「Advanced (アドバンスド)」
- 並行滴定を伴う終点滴定および当量点滴定 (等量/変動): 機能ライセンス「Professional (プロフェッショナル)」



Pt

酸化還元滴定のために分極化されるプラチナシート (0.15 x 8 x 8 mm) を2つ伴うガラスシャフト電極(バイボルタンメトリー滴定)。この電極は以下の用途に非常に良く適しています:

- ビタミンCの測定
- 窒素の電量測定
- 臭素指数
- ワインに含まれる亜硫酸 (SO_2)
- Winkler(ウィンクラー)法による酸素含有量