



## Application Note AN-T-025

# Hydrogen peroxide content in aqueous solutions

Reliable and inexpensive determination according to ASTM D2180

Peroxides are often used for disinfection and water treatment purposes due to their antiseptic properties. Lower concentrations between 0.3–3% are used in households, while higher concentrations can be used for sterilization purposes.

Additionally, peroxides are utilized as oxidizing and bleaching agents. They are used for pulp and paper bleaching, as well as a mild whitener in laundry detergents and some cosmetic dental products.

Peroxides, perborates, and percarbonates can easily be determined by titration. This application note presents two titration methods for peroxide analysis. The first method is performed according to **ASTM D2180**, and is suitable for samples such as bleaching components or concentrated hydrogen peroxide solutions. The second method for the determination of traces of hydrogen peroxide is suitable for aqueous samples with concentrations as low as 0.4 mg/L.

## SAMPLE AND SAMPLE PREPARATION

This application study is demonstrated on aqueous solutions containing various hydrogen peroxide concentrations ranging from 0.4 mg/L to 32%.

Samples with traces of  $\text{H}_2\text{O}_2$  do not require any sample preparation. Samples with higher

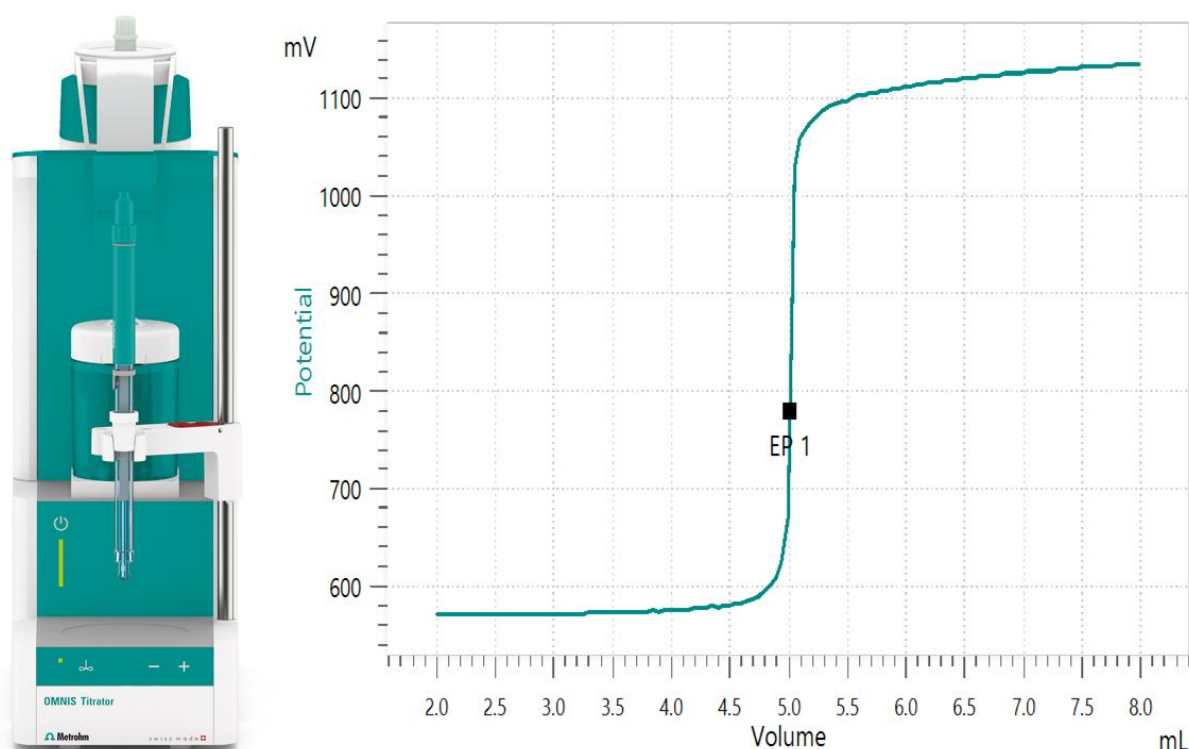
concentrations are diluted with deionized water. Both sample size and dilution factor should be chosen depending on the expected peroxide content. Ideally, an aliquot of the diluted sample results in an equivalence point of approximately 10 mL.

## EXPERIMENTAL

The analysis is performed on an OMNIS Advanced Titrator equipped with a combined Pt ring electrode according to **ASTM D2180**. Before titration, the sample is acidified with sulfuric acid. In case of trace amounts, the sulfuric acid is modified to contain manganese sulfate as a catalyst. This modification allows a lower

method detection limit.

Samples are titrated with potassium permanganate until after the equivalence point is reached. For samples with trace amounts of hydrogen peroxides, a lower titrant concentration is used.



**Figure 1.** OMNIS Advanced Titrator and an example titration curve. (Left) OMNIS Advanced Titrator equipped with a digital Pt ring electrode for the determination of peroxides in aqueous solutions. (Right) A titration curve is displayed of sample no. 2 (Table 1) titrated according to ASTM D2180.

## RESULTS

Sharp titration curves with a large potential difference are obtained for all tested samples

and with both methods. This results in reproducible results as displayed in **Table 1**.

**Table 1.** Results of the peroxide determination in various aqueous solutions. Samples 1 and 2 are determined according to ASTM D2180, while samples 3 and 4 are determined according the modified method for trace amounts of peroxides.

No	n	Mean value	SD(abs)	SD(rel)
1	8	32.14%	0.03%	0.09%
2	3	85.82 mg/L	0.83 mg/L	0.97%
3	3	4.27 mg/L	0.01 mg/L	0.23%
4	5	0.40 mg/L	0.01 mg/L	2.50%

## CONCLUSION

Titration is a fast and inexpensive method, allowing reliable determination of peroxides in aqueous solutions according to **ASTM D2180**. A modified method for trace concentrations permits accurate and reproducible peroxide determinations as low as 0.4 mg/L.

State-of-the-art OMNIS Titrators from Metrohm

provide a whole new level of titration. The modular design of OMNIS Titrators offers complete application flexibility. The system can be expanded whenever necessary, allowing growth over time. With a resolution of 100,000 steps, maximum dosing accuracy can be achieved, further improving reproducibility.

Internal references: AW TI CH1-1296-012020;

AW TI CH1-0350-0187

## CONTACT

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## CONFIGURATION



### OMNIS Advanced

スタントアローン稼働またはOMNIS滴定システムのメインハートとしての、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リキットアタフ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タ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かでき、必要に応じてフロヘ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かできます。

- ハン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トーシンクモジュールが4つまで接続可
- フロヘラスターラの接続可
- 様々なシリンターサイズに対応: 5、10、20、50 mL
- 3Sテクノロジーによるリキットアタフター: 化学物質の安全な取り扱い、メーカーのオリジナル試薬テータの自動伝送

#### 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 (アトハンスト)」
- 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)」



### dPt Titrode

参照電極としての、pH カラスメンフランを含む OMNIS 用テシタル複合白金リンク電極。

このメンテナンスフリーの電極は、例えば以下のような一定した pH 値での酸化還元滴定に適しています:

- ヨウ素滴定
- クロム酸滴定
- セリウム滴定
- 過マンガン酸塩滴定

この電極は蒸留水で保管されます。

dTrode は OMNIS Titrator にて使用できます。