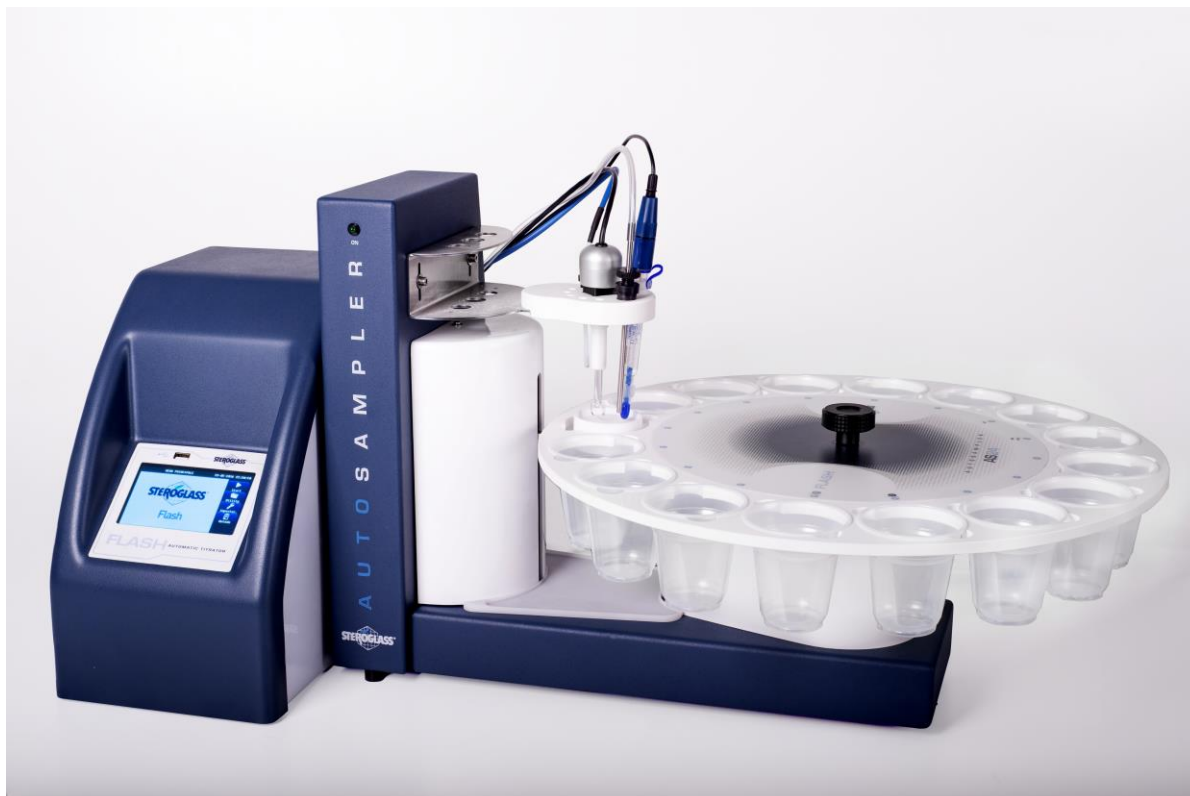


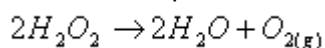


FLASH TITRATOR Hydrogen Peroxide Titer



PRINCIPLE

Hydrogen peroxide is commercially available in the form of an aqueous solution. The concentration of hydrogen peroxide is described in terms of “volumes,” which indicate the number of liters of oxygen that can be developed under normal conditions from one liter of H_2O_2 solution, according to the reaction:



For example, one liter of 5-volume H_2O_2 solution can develop 5 liters of oxygen, and corresponds to a concentration of 1.46% by weight.

The indication of the “volumes” of a certain dilution of hydrogen peroxide is different from the concentration in percentage, and the use of these two different measurement methods sometimes causes errors. Chemical analysis laboratories generally indicate the percentage concentration of hydrogen peroxide, while manufacturers of products for domestic use indicate “volumes.” The list below compares the two measurement systems:

- Hydrogen peroxide **3%** corresponds to **10** volumes
- Hydrogen peroxide **3.6%** corresponds to **12** volumes
- Hydrogen peroxide **10%** corresponds to **34** volumes
- Hydrogen peroxide **30%** corresponds to **111** volumes

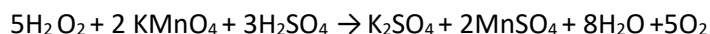


The titer of hydrogen peroxide is determined using potassium permanganate in an acid medium.

Permanganatometry is a redox titration that uses potassium permanganate as a reagent.

KMnO₄ is widely used in analysis for its strong oxidizing power, for the strong color of its oxidized form, and for the fairly low cost of the commercial product.

Hydrogen peroxide reacts with the potassium permanganate according to the reaction:



INSTRUMENT AND ACCESSORIES

- Flash Titrator with at least one burette and one peristaltic pump;
- Single-position stand or AS24 Automatic Sampler;
- Combined redox electrode with Pt ring;
-

REAGENTS

- Titrating solution: Potassium Permanganate KMnO₄ 0.02M
- Sulfuric Acid 25% w/v (to be dosed by peristaltic pump)
(To prepare 1 liter of solution, start from 250 grams or 140 ml of concentrated H₂SO₄ and bring to volume with distilled H₂O.)

NOTES:

To prepare 250 ml of 0.02 M solution of Potassium Permanganate KMnO₄ (158.03 g/mol) weigh exactly 0.7902 g of permanganate powder and bring to volume with distilled water in a 250 ml flask. It is advisable to prepare only the quantity of titrant necessary, given that the permanganate solution quickly loses its titer.

SAMPLE PREPARATION

If the sample is in liquid form, such as commercially-available hydrogen peroxide, it is possible to work with the sample as is, by weight or by volume.

If instead the sample consists of a cream or a very viscous product, it should be diluted.

For example, if you need to determine the titer of an oxidizing cream, weigh about 2-3 grams of cream, write down the exact weight and bring to volume with distilled water in a 1 liter flask.

Take 25 ml and titrate it directly with the Flash, entering the exact weight of the sample.

The machine factor 8.5 in this case must be multiplied by the dilution factor 40 to obtain the exact concentration percentage.

Because we are working by weight, the SAMPLE VOLUME in the method is set to 0; thus the Flash will ask you to enter the weight of the sample before starting the analysis.

PRELIMINARY OPERATIONS

- 1) Go to METHODS from the main menu and select the H₂O₂ TITRATION method;
- 2) If connected to the autosampler, enter the number of samples present, e.g. "3", and place the beakers in the sampler;
- 3) If you want to give a name to the samples, enter the name in SAMPLE DESCRIPTION and enter the weight in grams of each sample;
- 4) Press START to start the analysis.



Method Type	<i>Inflection</i>
Method Name	<i>TITER H2O2 WEIGHT</i>
Descript./Sample no.	<i>Sample</i>
Degassing sec:	<i>0</i>
Pump A N:	<i>1</i>
Pump A sec:	<i>10</i>
Pump B N:	<i>0</i>
Pump B sec:	<i>0</i>
Pump C N:	<i>0</i>
Pump C sec:	<i>0</i>
Stirrer speed	<i>8</i>
Pre-stirring time	<i>5</i>
Measurement type	<i>mv</i>
Initial auto-stability (mv)	<i>5</i>
Initial auto-stability time (s)	<i>2</i>
Initial addition	<i>0.8 (minimum 0.5)</i>
Initial stirring	<i>5</i>
Titration burette	<i>1</i>
Addition type	<i>Constant</i>
Addition (ml)	<i>0.10</i>
Limit volume (ml)	<i>15.0</i>
Polarization value	<i>NA</i>
Auto-stability (mv)	<i>5</i>
Auto-stability time (s)	<i>2</i>
Max. stability time (s)	<i>60</i>
Factor	<i>8.5</i>
Concentration (mol/l)	<i>0.02</i>
Sample volume (ml)	<i>0.0</i>
Result unit	<i>%</i>
Number decimals	<i>1</i>
Approaching factor	<i>50</i>
Blank (ml)	<i>0.000</i>
Washing type	<i>Washing position</i>
Washing time (s)	<i>5</i>
Reagent standardization	<i>NO</i>
Equation type	<i>DEFAULT</i>
Titration direction	<i>Increasing</i>
Minimum derivative	<i>10</i>

The titer of the hydrogen peroxide is expressed here in % by weight

For viscous products, the procedure is to weigh 2-3 grams, bring to a volume of 1 liter with water and analyze 25 ml directly in the titration beaker. The factor 8.5 must be multiplied by the dilution factor 40, and therefore the factor to be inserted in the method will be **8.5 x 40 = 340**.

For liquids (commercial hydrogen peroxide at 3%), it is also possible to by volume, entering the value in the method, e.g. 1 ml of sample and adding about 30 ml of distilled water.

The initial addition cannot be less than 0.5 ml, because at the beginning of the titration there is a momentary potential change (with evident pink coloring in the titration beaker) for a few seconds, which would otherwise be interpreted by the Flash as an end of titration inflection point.

NOTE:

Some parameters of the program shown here have been compiled as an indication: they can be optimized according to the operating conditions and the samples analyzed, in order to improve the accuracy and/or speed of the analysis.

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