



## Bromate in water and drinking water - ultra low range - Hint

Photometric determination with 3,3'-dimethylnaphthidine and iodide after sample enrichment

### Information for the application of Bromate using our Spectroquant® Prove Spectrophotometers.

Dear user,

We offer for customers which are interested in measuring Bromate an application which allows analyzing Bromate ultra low in the following measuring ranges:

0.5 – 20 µg/l BrO<sub>3</sub><sup>-</sup> by using a 100-mm rectangular cell.

1.0 – 40 µg/l BrO<sub>3</sub><sup>-</sup> by using a 50-mm rectangular cell.

For more details please see below. For the analysis the following reagents and accessories are required:

#### Reagents:

Cat. No. 103122	3,3'-Dimethylnaphthidine
Cat. No. 100063	Acetic acid 100% for analysis
Cat. No. 100983	Ethanol abs. for analysis
Cat. No. 105043	Potassium iodide for analysis
Cat. No. 100519	Perchloric acid 70 - 72 % for analysis
Cat. No. 116754	Water for analysis

#### Accessories:

Cat. No. 174011	Rectangular cell 100-mm or
Cat. No. 114944	Rectangular cells 50-mm
Cat. No. SLAP02550	Syringe filter glass fiber
Cat. No. SLLGM25NS	Syringe filter 0.20 µm
Cat. No. 114901	Flat-bottomed long tubes with screw caps, for measurements in 100-mm cell; or
Cat. No. 114724	Empty cells with screw caps 16 mm, for measurements in 50-mm cell

#### Photometer:

Cat. No. 173018	Spectroquant® Prove 600 Spectrophotometer or
Cat. No. 173017	Spectroquant® Prove 300 Spectrophotometer or
Cat. No. 173016	Spectroquant® Prove 100 Spectrophotometer

#### Measuring ranges and confidence interval (P = 95%):

The measurement in the 100-mm cell is only possible at the Prove 600!

100-mm rectangular cell: 0.5 – 20.0 µg/l BrO<sub>3</sub><sup>-</sup> (Confidence interval ± 0.5 µg/l)

50-mm rectangular cell: 1.0 – 40.0 µg/l BrO<sub>3</sub><sup>-</sup> (Confidence interval ± 1.0 µg/l)

In the application it is described how the reagents have to be prepared and what sample preparation must be done before analyzing. The detection itself is very easy too. Users, which are interested to get the detail application, should send an E-mail with your detailed address incl. phone and E-mail and the serial no. of the photometer to the following E-mail [gunter.decker@merckgroup.com](mailto:gunter.decker@merckgroup.com). You will receive the application at your earliest convenience.



# Application

---

**Please understand that we supply this application only to our customers' on request having our instruments or buying an instrument from us.**

## **Notes:**

The vessels used must be clean and free from surfactant residues or similar substances. Pre-treat with a mixture of isopropyl alcohol and hydrochloric acid, if necessary. Subsequently, rinse thoroughly with distilled water. Prepare the isopropyl alcohol/hydrochloric acid mixture by placing 3 parts isopropyl alcohol in a glass beaker and slowly adding 1 part of hydrochloric acid 25%. Follow the respective safety regulations!

Due to the low bromate concentration, which is accepted as the limit for drinking water (according to WHO and EU Direktive 10 µg/l), we recommend with each new batch of 3,3'-dimethylnaphthidine to check the recovery rate by means of a bromate standard in the area of the application concentration and to recalibrate the method, if necessary. An instruction for the recalibration can be obtained separately.

## **1. Preparing the reagents**

Preparation of an acetic acid / ethanol mixture

Reagent 1

Reagent 2

Reagent 2 has to be prepared freshly on each workday and must be prepared and stored protected from light in closed containers. A storing in the refrigerator does not improve the shelf-life.

## **2. Sample preparation**

In a 400-mL glass beaker evaporate 250 mL of sample solution slowly on a hot plate until almost dry. Transfer the residue with a small amount of water for analysis into a 25-mL volumetric flask and make up to the mark. The solution must be clear.

If necessary, filter through a fluted filter first and subsequently through a 0.20 µm syringe filter (Cat. No. SLLGM25NS).

## **3. Analysis**

Select method 307 (Bromate ultra low range) from the concentration mode of the photometer. Analyze the sample against a reagent blank value.

Preparation using the 100-mm rectangular cell:

Reagent blank and measuring sample can be prepared at the same time.

Flat-bottomed long tubes with screw caps or glass beakers are suitable as mixing vessels. To 20 ml of water for analysis (reagent blank) or 20 ml of pre-treated sample add 0.2 ml reagent 1 and mix, then add 0.4 ml reagent 2 and mix, subsequently add 0.4 ml perchloric acid 70 - 72 % for analysis and mix. Leave to stand for 30 minutes at room temperature. Filter all test samples through a 0.20 µm syringe filter, Cat. No. SLLGM25NS, prior to measurement.

The measurement is conducted in a 100-mm rectangular cell. Measure the preparation with water as reagent blank.

Preparation using the 50-mm rectangular cell:

Reagent blank and measuring sample can be prepared at the same time.

16-mm cells with screw caps or glass beakers are suitable as mixing vessels.

To 10 ml of water for analysis (reagent blank) or 10 ml of pre-treated sample add 0.1 ml reagent 1 and mix, then add 0.2 ml reagent 2 and mix, subsequently add 0.2 ml perchloric acid 70 - 72 % for analysis and mix. Leave to stand for 30 minutes at room temperature. Filter all test samples through a 0.20 µm syringe filter, Cat. No. SLLGM25NS, prior to measurement.

The measurement is conducted in a 50-mm rectangular cell. Measure the preparation with water as reagent blank.

#### **4. Interfering substances:**

Up to the concentration of foreign substances indicated in the table, the determination is not disturbed yet:

Parameter	Tolerance without interference [mg/l]
Ca <sup>2+</sup>	450
Mg <sup>2+</sup>	300
NO <sub>2</sub> <sup>-</sup>	0.02
Na <sup>+</sup>	350
SO <sub>4</sub> <sup>2-</sup>	15
ClO <sub>3</sub> <sup>-</sup>	1000
IO <sub>3</sub> <sup>-</sup>	1
Cl <sup>-</sup>	1000
Cl <sub>2</sub>	no interference
OCl <sup>-</sup>	no interference
Fe <sup>3+</sup>	0.1
Mn <sup>2+</sup>	100



## Ordering Information

Product	Catalog No.
3,3'-Dimethylnaphthidine	103122
Acetic acid (glacial) 100% anhydrous for analysis EMSURE® ACS,ISO,Reag. Ph Eur	100063
Ethanol absolute for analysis EMSURE® ACS,ISO,Reag. Ph Eur	100983
Potassium iodide for analysis EMSURE® ISO,Reag. Ph Eur	105043
Perchloric acid 70-72% for analysis EMSURE® ACS,ISO,Reag. Ph Eur	100519
Water for analysis EMSURE®	116754
Rectangular cell 100 mm for Prove 600 Spectroquant®	174011
Rectangular cells 50 mm Spectroquant®	114944
Millex-AP Syringe Filter Unit, AP20	SLAP02550
Millex-HPF LCR Filter, 0.20 µm, PTFE, with glass fiber prefilter, 25 mm, non-sterile	SLLGM25NS
Flat-bottomed long tubes with screw caps for MColorTest™ with color card comparator	114901
Empty cells 16 mm with screw caps Spectroquant®	114724
Prove 600 UV/VIS spectrophotometer 1,8 nm spectral bandwidth Spectroquant®	173018
Prove 300 UV/VIS spectrophotometer 4 nm spectral bandwidth Spectroquant®	173017
Prove 100 VIS Spectrophotometer 4 nm spectral bandwidth Spectroquant®	173016