

Bromate is a disinfection by-product that is formed when Ozone reacts with naturally occurring Bromide in drinking water. Bromate is a known animal carcinogen and has also been listed as a Group 2B toxin: probable human carcinogen. The U.S.EPA Method 300.1 employs conductivity as the means of detection which works well for most anions. However, the method is non-specific and coeluting interferences cannot be identified. The more recent U.S.EPA Method 317.0 utilizes a Bromate-specific reagent in a post-column reaction. This allows for a very specific and sensitive assay for Bromate in complex matrices.

Method

Equipment

- LC with a binary pump
- UV/VIS detector
- Pickering Laboratories Vector PCX or Onyx PCX
- Thermo Scientific Ion Pac™ AS9-HC Column Catalog No. 051786

Chemicals

- 9.0 mM Sodium carbonate
- Conc. Nitric acid (70 %)
- Potassium bromide
- o-Dianisidine
- Methanol

LC Conditions

LC Column Temperature: 42 °C

Sample Injection Volume: 250 µL

LC Flow Rate: 1.3 mL/min

Mobile Phase: 9 mM Na₂CO₃

Post-column Conditions

Post-column system: Pinnacle PCX

Reactor Volume: 0.5 mL

Reactor Temperature: 60 °C

Reagent: o-Dianisidine dihydrochloride (Add 40 mL of 70 % HNO₃ to 300mL deionized water in a 500mL volumetric flask. Dissolve 2.5g KBr in this solution. Dissolve 250 mg of o-Dianisidine dihydrochloride in 100 mL of Methanol and add to the Nitric acid/KBr solution and dilute to volume.)

Flow Rate: 0.7 mL/min

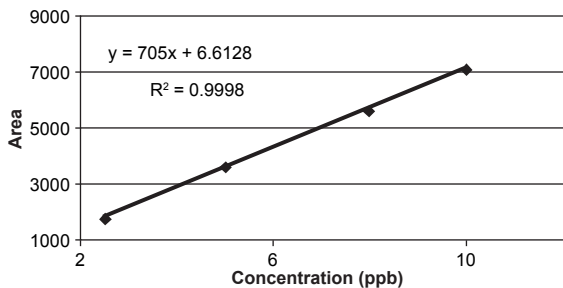
Detection: UV/VIS detector, λ max = 450 nm

References

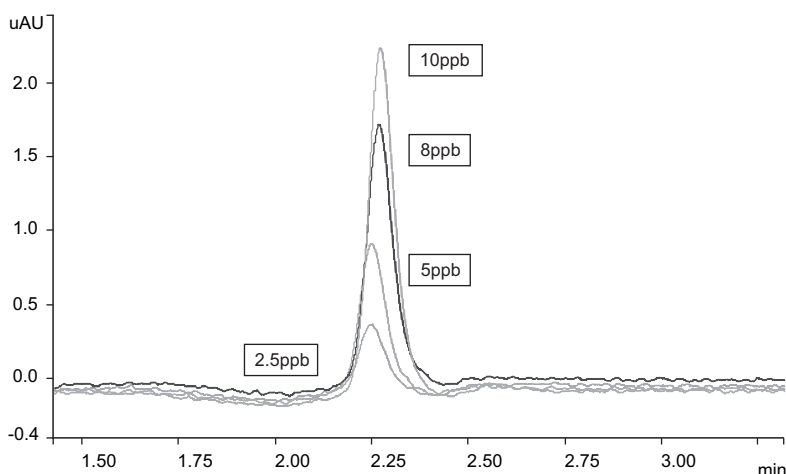
U.S.EPA Method 317.0. Determination of inorganic oxyhalide disinfection by-products in drinking water using ion chromatography with the addition of a post-column reagent for trace bromate analysis.

H.P.Wagner, B.V.Pepich, D.P.Hautman and D.J.Munch, J.Chromatography A, 882 (2000) 309 – 319.

C.R.Warner, D.H.Daniels, F.L.Joe and G.W.Diachenko, Food Additives and Contaminants, vol. 13, No.6 (1996) 633 – 638.



Calibration Curve



Overlaid chromatograms of Bromate standards