METHOD #: 208.1	Approved for NPDES and SDWA (Issued 1974)
TITLE:	Barium (AA, Direct Aspiration)
ANALYTE:	CAS # Ba Barium 7440-39-3
INSTRUMENTATION:	AA
STORET NO.	Total 01007 Dissolved 01005 Suspended 01006
Optimum Concentration Range:	1-20 mg/L using a wavelength of 553.6 nm
Sensitivity:	0.4 mg/L
Detection Limit:	0.1 mg/L

1.0 Preparation of Standard Solution

1.1 Stock Solution: Dissolve 1.7787 g barium chloride ($BaCl_2 \cdot 2H_2O$, analytical reagent grade) in deionized distilled water and dilute to 1 liter. 1 mL = 1 mg Ba (1000 mg/L).

1.2 Potassium chloride solution: Dissolve 95 g potassium chloride, KCl, in deionized distilled water and make up to 1 liter.

1.3 Prepare dilutions of the stock barium solution to be used as calibration standards at the time of analysis. To each 100 mL of standard and sample alike add 2.0 mL potassium chloride solution. The calibration standards should be prepared using the same type of acid and the same concentration as will result in the sample to be analyzed either directly or after processing.

2.0 Sample Preservation

2.1 For sample handling and preservation, see part 4.1 of the Atomic Absorption Methods section of this manual.

3.0 Sample Preparation

3.1 The procedures for preparation of the sample as given in parts 4.1.1 through 4.1.4 of the Atomic Absorption Methods section of this manual have been found to be satisfactory.

4.0 Instrumental Parameters (General)

4.1 Barium hollow cathode lamp
4.2 Wavelength: 553.6 nm
4.3 Fuel: Acetylene
4.4 Oxidant: Nitrous oxide
4.5 Type of flame: Fuel rich

5.0 Analysis Procedure

5.1 For analysis procedure and calculation, see "Direct Aspiration", part 9.1 of the Atomic Absorption Methods section of this manual.

6.0 Interferences

6.1 The use of a nitrous oxide-acetylene flame virtually eliminates chemical interference; however, barium is easily ionized in this flame and potassium must be added (1000 mg/L) to standards and samples alike to control this effect.

6.2 If the nitrous oxide flame is not available and acetylene-air is used, phosphate, silicon and aluminum will severely depress the barium absorbance. This may be overcome by the addition of 2000 mg/L lanthanum.

7.0 Notes

7.1 Data to be entered into STORET must be reported as μg/L.

7.2 For concentrations of barium below 0.2 mg/L, the furnace procedure (Method 208.2) is recommended.

7.3 For quality control requirements and optional recommendations for use in drinking water analyses, see part 10 of the Atomic Absorption Methods section of this manual.

8.0 Precision and Accuracy

8.1 In a single laboratory (EMSL), using a mixed industrial-domestic waste effluent at concentrations of 0.40 and 2.0 mg Ba/L, the standard deviations were ± 0.043 and ± 0.13, respectively. Recoveries at these levels were 94% and 113%, respectively.

8.2 In a round-robin study reported by Standard Methods (13th Edition, p215,method 129A, 1971), three synthetic samples containing barium were analyzed by 13 laboratories. At concentrations of 500, 1000 and 5000 ug Ba/L,the reported standard deviations were ± 50, ± 89 and ±185 ug, respectively. The relative error at these concentrations was 8.6%, 2.7% and 1.4%, respectively.