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Standard Test Methods for TOTAL RECOVERABLE PHOSPHORUS AND ORGANIC PHOSPHORUS IN SEDIMENTS¹

This standard is issued under the fixed designation D 4183; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These methods cover the determination of total recoverable phosphorus and organic phosphorus in sediments. These methods are applicable to all forms of phosphorus except polyphosphates and minerals containing tightly bound phosphorus such as manozite and xenotime (1).² The majority of sediments do not contain significant amounts of the above forms of phosphorus and hence the contribution from these forms is considered to be negligible. The analytical range is from 100 to 2000 $\mu\text{g P/g}$. The range of sample size for analysis is 0.1 to 0.5 g. When concentration of total phosphorus exceeds 2000 $\mu\text{g P/g}$ the range may be extended by appropriate dilution of the sample solution using reagent water. The following methods are included:

Method A—Manual Colorimetric Sections Sample Preparation 6 to 10 Ascorbic Acid Reduction Method—Method A, Section 8 to 16 of Method D 515

Methods B₁ and B₂—Automated Colorimetric Methods Utilizing Reduction Product of Molybdophosphoric Acid (2) 12 to 18

2. Applicable Documents

2.1 ASTM Standards:

D 515 Test Methods for Phosphorus In Water³

D 1129 Definitions of Terms Relating to Water³

D 1193 Specification for Reagent Water³

D 3975 Practice for Preparation of Samples For Collaborative Testing of Methods for Analysis of Sediments³

E 60 Recommended Practice for Photometric Methods for Chemical Analysis of Metals⁴

E 275 Recommended Practice for Describing Measuring Performance of Spectrophotometers⁵

3. Summary of Methods

3.1 Dry sediments are ignited at 550°C for 2 h and the residue after ignition is digested over night at room temperature with 1.0 M hydrochloric acid prior to determination of the resultant orthophosphate. The orthophosphate concentration measured in this acid extract is a measure of the total phosphorus (3,4) content in the sediment. The inorganic phosphorus content is determined by digesting of the sediment with 1.0 M hydrochloric acid without ignition. The organic phosphorus is estimated by taking the difference between total phosphorus and inorganic phosphorus.

3.2 The methods for quantitative estimation of orthophosphate are based on the reaction of ammonium molybdate with orthophosphate to form a molybdophosphate complex. The complex is reduced with ascorbic acid to form a blue molybdenum complex. The color intensity is proportional to the phosphorus content. In Method B₂, antimony tartrate is added to facilitate the color formation.

4. Significance and Use

4.1 Phosphorus and its compounds are widely distributed throughout the environment.

¹ These methods are under the jurisdiction of ASTM Committee D-19 on Water and are the direct responsibility of Subcommittee D19.07 on Methods of Testing of Water-Formed Deposits and the Properties of Water.

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² The boldface numbers in parentheses refer to the list of references at the end of this standard.

³ 1983 Annual Book of ASTM Standards, Vol 11.01.

⁴ 1982 Annual Book of ASTM Standards, Part 12.

⁵ 1982 Annual Book of ASTM Standards, Part 42.