

Phosphate in effluents

Photometric determination using the Phosphorus molybdenum blue method

Introduction

Phosphorous is a key nutrient that must be kept within certain limits in the environment. In excess, it can upset aquatic ecosystems by encouraging excessive growth of algae and plants in a process termed eutrophication.¹ As a result, testing phosphorous in effluents is critical from an environmental perspective. In this application note, we describe a determination of one form of phosphorous, phosphate, using photometry and Spectroquant® Phosphate Test Kits.

Experimental

Method

In sulfuric solution orthophosphate ions react with molybdate ions to form molybdophosphoric acid. Ascorbic acid reduces this to phosphomolybdenum blue (PMB) that is determined photometrically. The method is analogous to EPA 365.2+3, APHA 4500-P E, and DIN EN ISO 6878.

Reagents and Instruments

Cat. No.	Product Description
Test Kits	
1.14543	Phosphate Cell Test (o-phosphate and total phosphorous) Method: photometric, PMB 0.05 - 5.00 mg/l PO ₄ -P; 0.2 - 15.3 mg/l PO ₄ ³⁻ ; 0.11 - 11.46 mg/l P ₂ O ₅ Spectroquant® or
1.14729	Phosphate Cell Test (o-phosphate and total phosphorous) Method: photometric, PMB 0.5 - 25.0 mg/l PO ₄ -P; 1.5 - 76.7 mg/l PO ₄ ³⁻ ; 1.1 - 57.3 mg/l P ₂ O ₅ Spectroquant® or
1.14848	Phosphate Test (o-phosphate) Method: photometric, PMB 0.0025 - 5.00 mg/l PO ₄ -P; 0.0077 - 15.3 mg/l PO ₄ ³⁻ ; 0.0057 - 11.46 mg/l P ₂ O ₅ Spectroquant®

Reagents and Instruments (continued)

Cat. No.	Product Description
Instruments	
1.73026	Spectroquant® VIS Spectrophotometer Prove 100 plus or
1.73027	Spectroquant® UV/VIS Spectrophotometer Prove 300 plus or
1.73028	Spectroquant® UV/VIS Spectrophotometer Prove 600 plus or
1.09748	Spectroquant® Photometer NOVA 30 or
1.09751	Spectroquant® Photometer NOVA 60 or
1.09752	Spectroquant® Photometer NOVA 60A or
1.73632	Spectroquant® Colorimeter Move 100
Materials	
1.14946	Rectangular cells 10 mm and/ or
1.14947	Rectangular cells 20 mm and/ or
1.14944	Rectangular cells 50 mm

Also first generation Prove instruments are compatible and preprogrammed with this method.

Analytical Approach

Sample preparation

Cloudy samples must be filtered before determination.

Analysis

Determine with the above mentioned test kits.

Determination

Phosphate content in mg/l PO₄-P = analysis value in mg/l PO₄-P

References

- European Environment Agency. Eutrophication. Updated 2016. Accessed Oct 18, 2021. eea.europa.eu/publications/signals-2000/page014.html