

Method Abstract

Summary

When dissolved in an acidic matrix, phosphorus pentoxide dissociates into free orthophosphate. Orthophosphate reacts with the molybdovanadate reagent to form a yellow-colored product. The amount produced is directly proportional to the original phosphorus pentoxide concentration. The absorbance is read at 420 nm.

Interferences

The following do not interfere: aluminum, ammonium, barium, beryllium, manganese(II), mercury(II), potassium, silver, sodium, strontium, tin(II), uranyl, zinc, zirconyl, acetate, arsenate (<100 ppm), benzoate, bromide, carbonate, chlorate, citrate, cyanide, formate, iodate, lactate, molybdate, nitrate, nitrite, oxalate, perchlorate, periodate, pyrophosphate, salicylate, selenate, silicate, sulfate, sulfite, tartrate, and tetraborate.

Copper(II) and nickel ions change the solution color. If absorbance measurements are made at 460 nm, as much as 1,000 ppm of these ions can be tolerated.

Concentrations greater than 100 ppm of iron(II), sulfide, thiosulfate, and thiocyanate can interfere by either reducing the molybdovanadate reagent or the excess molybdate to molybdenum blue.

Bismuth (>400 ppm), thorium, arsenate (>100 ppm), chloride (>500 ppm), and fluoride (<10 ppm) can inhibit color development. Cobalt(II) should not exceed 100 ppm. Chromium(III) should not exceed 10 ppm.

Iodide, dichromate, and permanganate interfere. Cerium(IV), tin(IV), and silver interfere because of precipitate formation or turbidity.

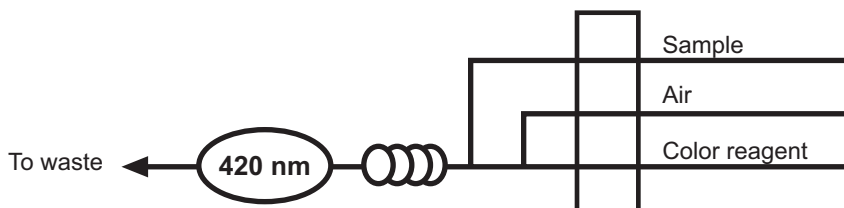
Performance Specifications

Range	20–450 mg/L
Throughput	40 samples/hour
Precision at 57 mg/L	0.46% RSD
114 mg/L	0.15% RSD
229 mg/L	0.48% RSD
Method Detection Limit (MDL)	NA

Chemicals

Ammonium metavanadate, NH_4VO_3	DOWFAX® 2A1 (OI Analytical PN A000080)
Ammonium molybdate tetrahydrate, $(NH_4)_6Mo_7O_{24} \cdot 4H_2O$	Potassium phosphate monobasic, KH_2PO_4

Basic Flow Diagram



Selected Reference

Phosphorus. *Official Methods of Analysis of AOAC International*; Horowitz, W., Ed.; AOAC International, Gaithersburg, MD, 2000; Chapter 2, Subchapter 3.

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