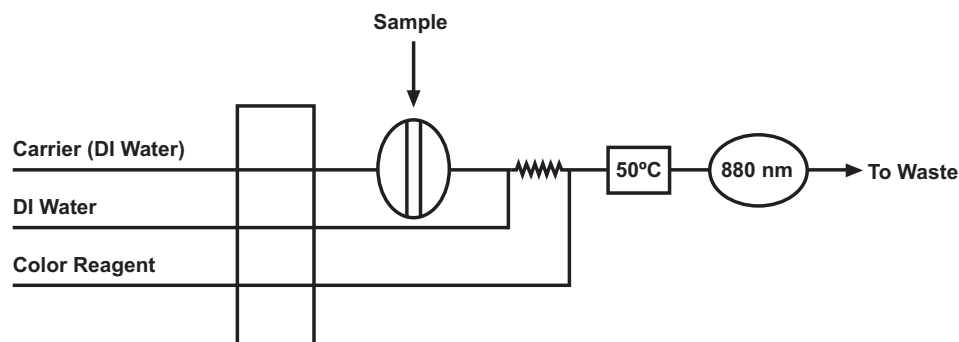


## Method Abstract

<b>Scope</b>	This method is used for determining orthophosphate in drinking, surface, as well as in domestic and industrial wastes according to USEPA Method 365.1 and Standard Method 4500–P G. Additionally, this method enables orthophosphate analysis according to ISO Method 15681-1. This method can also be used for the determination of orthophosphate in potassium chloride (KCl) extracts of soils and plants.
<b>Summary</b>	Orthophosphate reacts with molybdenum (VI) and antimony (III) in an acid medium to form an antimony-phosphomolybdate complex. This complex is subsequently reduced with ascorbic acid to form a blue color, and the absorbance is measured at 880 nm.
<b>Interferences</b>	Ferric iron up to 50 mg/L, copper up to 10 mg/L, and silica up to 10 mg/L do not interfere. Samples with background absorbance at the analytical wavelength may interfere.
<b>Performance Specifications</b>	<p>Range: 0.01–5.0 mg/L P</p> <p>Throughput: 60 samples/hour</p> <p>Precision (at 0.10 mg/L): &lt;1% RSD</p> <p>(at 0.50 mg/L): &lt;0.5% RSD</p> <p>Method Detection Limit (MDL): 0.001 mg/L</p>
<b>Chemicals</b>	<p>Ammonium Molybdate, <math>(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}</math></p> <p>Antimony Potassium Tartrate, <math>\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6 \cdot \frac{1}{2}\text{H}_2\text{O}</math></p> <p>Ascorbic Acid, <math>\text{C}_6\text{H}_8\text{O}_6</math></p> <p>Deionized (DI) Water, ASTM Type I or II</p> <p>Potassium Dihydrogen Phosphate, <math>\text{KH}_2\text{PO}_4</math></p> <p>Sulfuric Acid, concentrated, <math>\text{H}_2\text{SO}_4</math></p>

### Basic Flow Diagram



**Note** This method complies with USEPA Method 365.1.

### Selected References

*Methods for Chemical Analysis of Water and Wastewater*; EPA-600/4-79-020; U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory: Cincinnati, OH, 1984; Method 365.1.

*Standard Methods for the Examination of Water and Wastewater*, 21st ed.; American Public Health Association: Washington, D.C., 2005

Water Quality–Determination of Orthophosphate and Total Phosphorous Contents by Flow Analysis (FIA and CFA)–Part 1: Method by Flow Injection Analysis (FIA), *International Standard*; ISO 15681-1:2003(E); 1st ed.; Geneva, Switzerland, 2003

## Figures

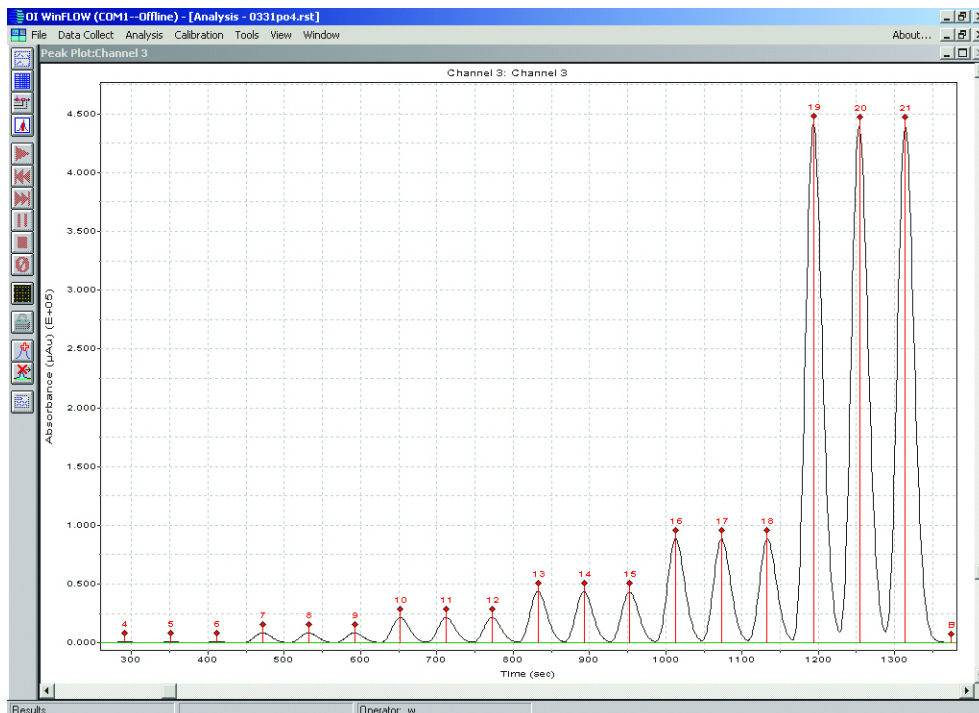


Figure 1. Orthophosphate Calibration (0.01–5.00 mg/L)

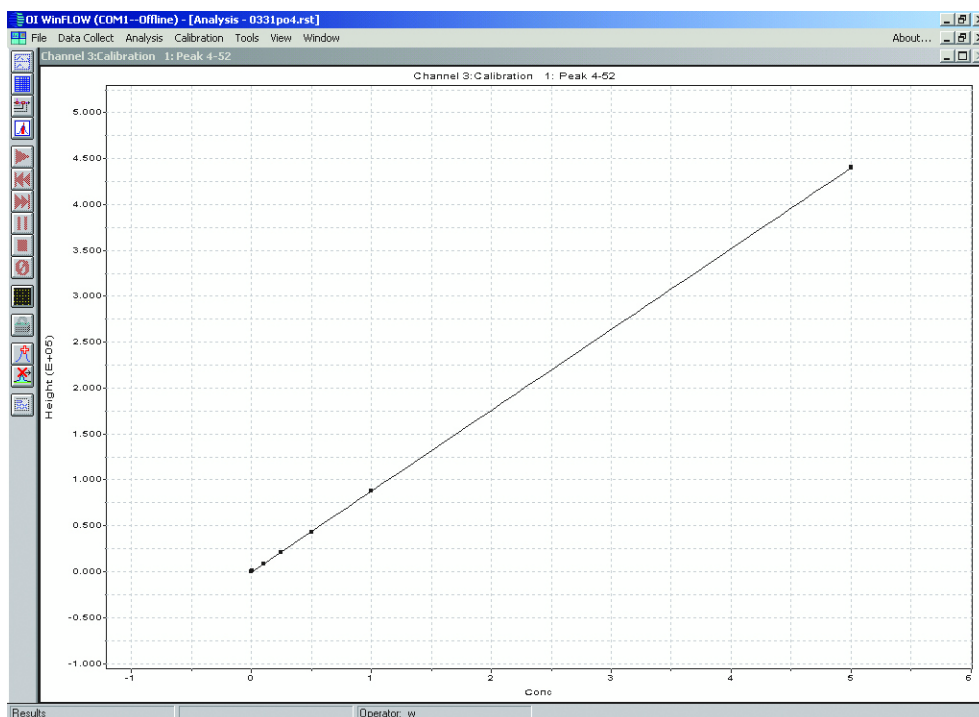


Figure 2. Orthophosphate Calibration Curve

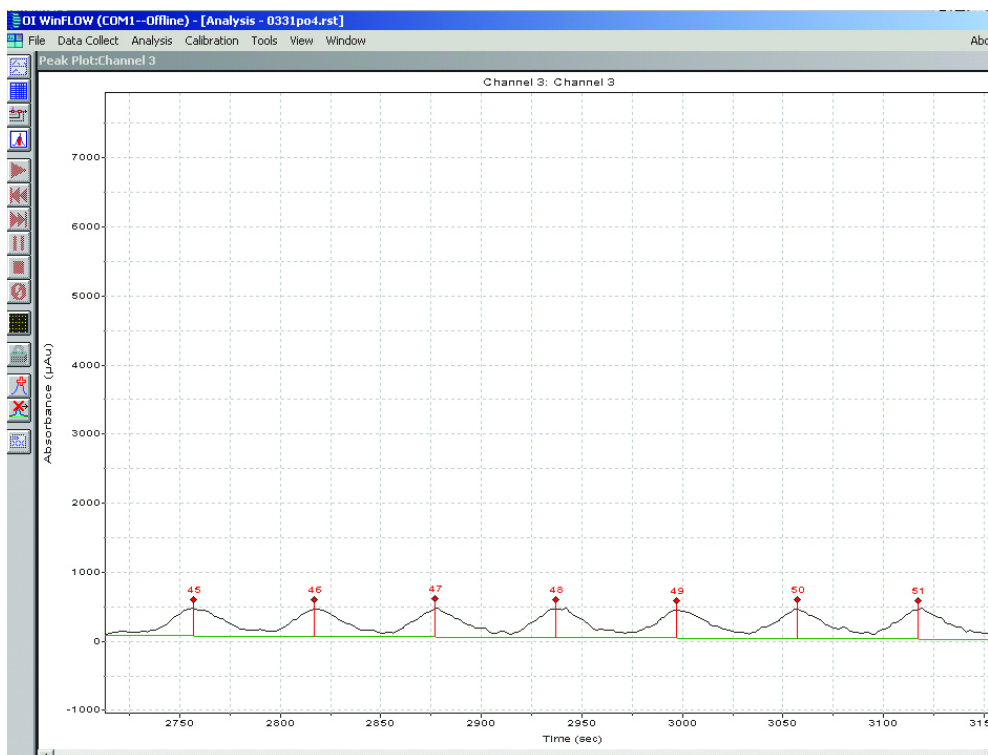


Figure 3. Orthophosphate Method Detection Limit (at 0.005 ppm)

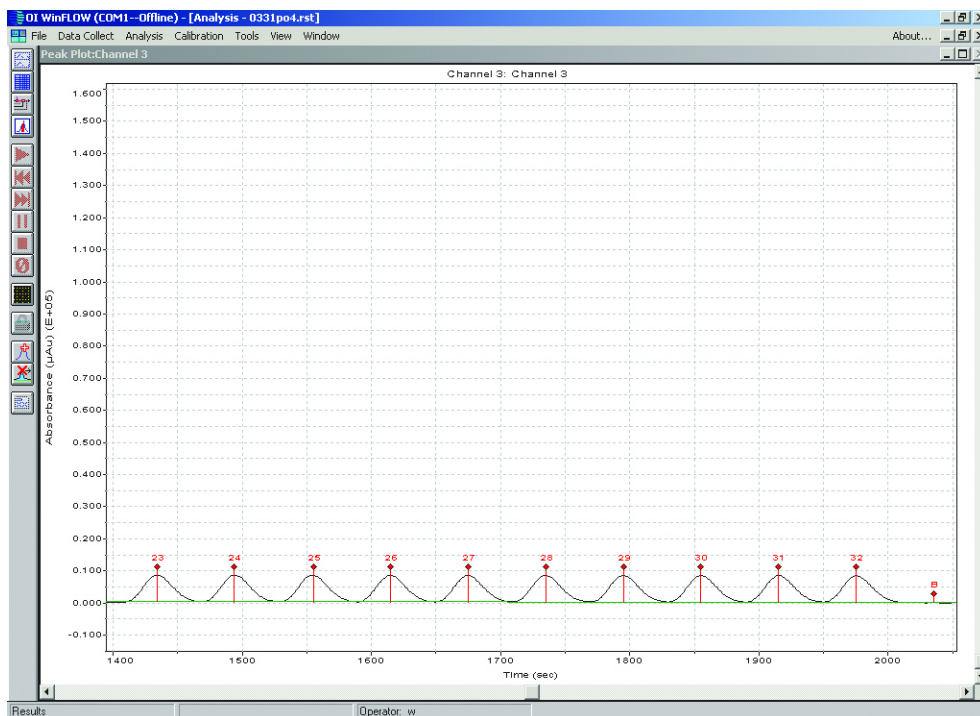


Figure 4. Orthophosphate Precision (at 0.10 ppm)

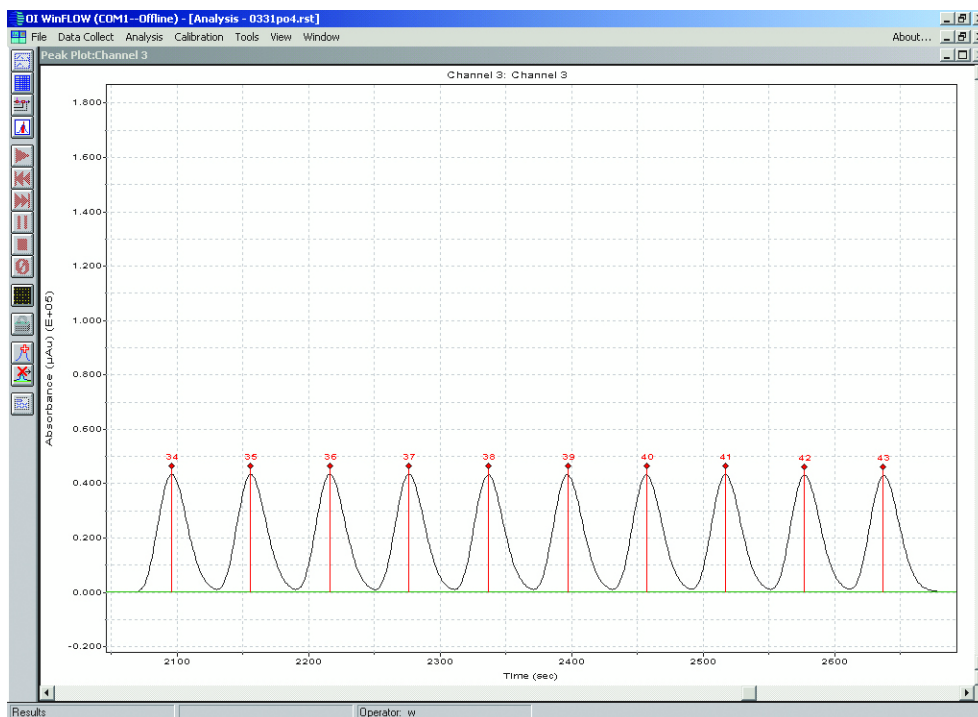


Figure 5. Orthophosphate Precision (at 0.50 ppm)

Channel 3: Calibration 1: Peak 4-52

	Name	Conc	Height
*	cal 0.01 ppm	0.010000	906.436584
*	cal 0.01 ppm	0.010000	867.135498
*	cal 0.01 ppm	0.010000	879.765991
*	cal 0.10 ppm	0.100000	8476.93554
*	cal 0.10 ppm	0.100000	8467.09082
*	cal 0.10 ppm	0.100000	8406.04687
*	cal 0.25 ppm	0.250000	21428.8691
*	cal 0.25 ppm	0.250000	21427.4277
*	cal 0.25 ppm	0.250000	21357.0703
*	cal 0.50 ppm	0.500000	43295.1018
*	cal 0.50 ppm	0.500000	43201.6914
*	cal 0.50 ppm	0.500000	43019.3124
*	cal 1.00 ppm	1.000000	88347.9218
*	cal 1.00 ppm	1.000000	88036.2500
*	cal 1.00 ppm	1.000000	88105.5000
*	cal 5.00 ppm	5.000000	440625.062
*	cal 5.00 ppm	5.000000	439518.000
*	cal 5.00 ppm	5.000000	439687.718
Calib Coef:			
y=bx+a			
a: (intercept)		-3.2460e+02	
b:		8.8057e+04	
Corr Coef:		0.999997	
Carryover:		0.0244	
No Drift Peaks			

Figure 6. Orthophosphate Calibration Results

## Method Abstract

Table 1. Phosphate Phosphorus Precision Calculations

	0.500 mg P/L	0.100 mg P/L	0.010 mg P/L
Replicate 1	0.496	0.0978	0.0081
Replicate 2	0.496	0.0983	0.0081
Replicate 3	0.496	0.0983	0.0084
Replicate 4	0.496	0.0981	0.0083
Replicate 5	0.493	0.0981	0.0082
Replicate 6	0.495	0.0987	0.0085
Replicate 7	0.495	0.0986	0.0084
Replicate 8	0.495	0.0989	—
Replicate 9	0.493	0.0992	—
Replicate 10	0.492	0.0989	—
Mean	0.494	0.0985	0.0083
Standard Deviation	0.001536	0.00043	0.000162
% RSD	0.31	0.44	1.95
% Recovery	98.8	98.5	83
MDL	—	—	0.0005