

## Flow Solution™ FS 3700 Automated Chemistry Analyzer

### Total Phosphorus by In-Line UV/Persulfate Digestion and Flow Injection Analysis (FIA)

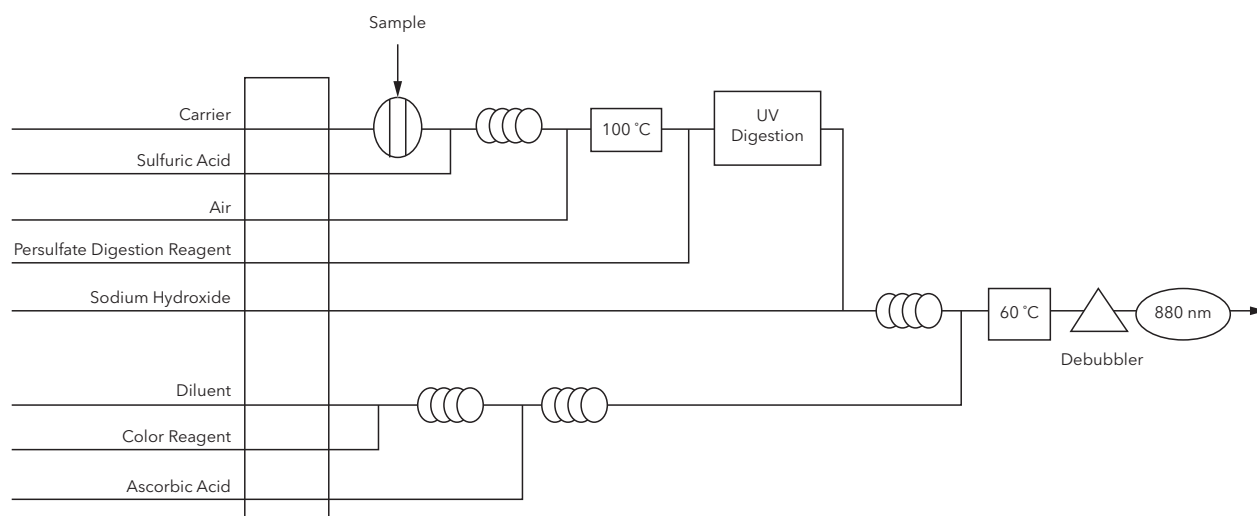
Cartridge Part Number 330958CT  
Channel Part Number 330959

#### Scope and Application

This method is used for the determination of total phosphorus (TP) in drinking water, surface water, and domestic and industrial wastes, according to **Standard Methods 4500-P-I**. Additionally, this method enables total phosphorus analysis following in-line digestion according to ISO Method 15681-1.<sup>5</sup>

#### Method Performance

<b>Range</b>	0.010 mg/L - 10 mg/L P
<b>Rate</b>	30 samples/hour
<b>Precision</b>	≤ 2 %RSD at mid-range
<b>Method Detection Limit (MDL)</b>	0.002 mg/L P



**Figure 1. General Flow Diagram for Total Phosphorus by In-Line UV/Persulfate Digestion**

## Reagents and Calibrants

Chemical Name	CAS#	Chemical Formula	Part Number
Ammonium molybdate tetrahydrate	12054-85-2	$(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$	
Potassium antimonyl tartrate trihydrate	28300-74-5	$\text{K}(\text{SbO})\text{C}_4\text{H}_4\text{O}_6 \cdot \frac{1}{2}\text{H}_2\text{O}$	
Ascorbic acid	50-81-7	$\text{C}_6\text{H}_8\text{O}_6$	
DOWFAX® 2A1	12626-49-2		328852
Hydrochloric acid, concentrated	7647-01-0	HCl	
Phenylphosphate disodium salt dihydrate	66788-08-3	$\text{C}_6\text{H}_5\text{OP}(\text{O})(\text{ONa})_2 \cdot 2\text{H}_2\text{O}$	
Potassium Persulfate	7727-21-1	$\text{K}_2\text{S}_2\text{O}_8$	
Potassium phosphate monobasic	7778-77-0	$\text{KH}_2\text{PO}_4$	
Sodium hydroxide	1310-73-2	NaOH	
Sodium pyrophosphate decahydrate	13472-36-1	$\text{Na}_4\text{O}_7\text{P}_2 \cdot 10\text{H}_2\text{O}$	
Sodium tripolyphosphate	7758-29-4	$\text{Na}_5\text{O}_{10}\text{P}_3$	
Sulfuric acid, concentrated	7664-93-9	$\text{H}_2\text{SO}_4$	
Trimethylphosphate	512-56-1	$(\text{CH}_3\text{O})_3\text{P}(\text{O})$	
Water, deionized, ASTM Type I or II		$\text{H}_2\text{O}$	

## Summary of USEPA Method 353.2<sup>1</sup>

### Method

Organic phosphorus is converted to orthophosphate by in-line UV/persulfate digestion. Inorganic polyphosphates are converted to orthophosphate by in-line sulfuric acid digestion. 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.<sup>2</sup>

### Interferences

- Filter turbid samples prior to analysis. Turbid samples may interfere with the photometric detector's ability to measure the true absorbance of the sample.
- Iron, copper, and other metals may interfere with the analysis by binding with orthophosphate and blocking the color formation reaction. The presence of less than 50 mg/L iron(III), less than 10 mg/L copper, or less than 10 mg/L silica does not interfere.<sup>2</sup>
- Samples with background absorbance at the analytical wavelength may interfere.

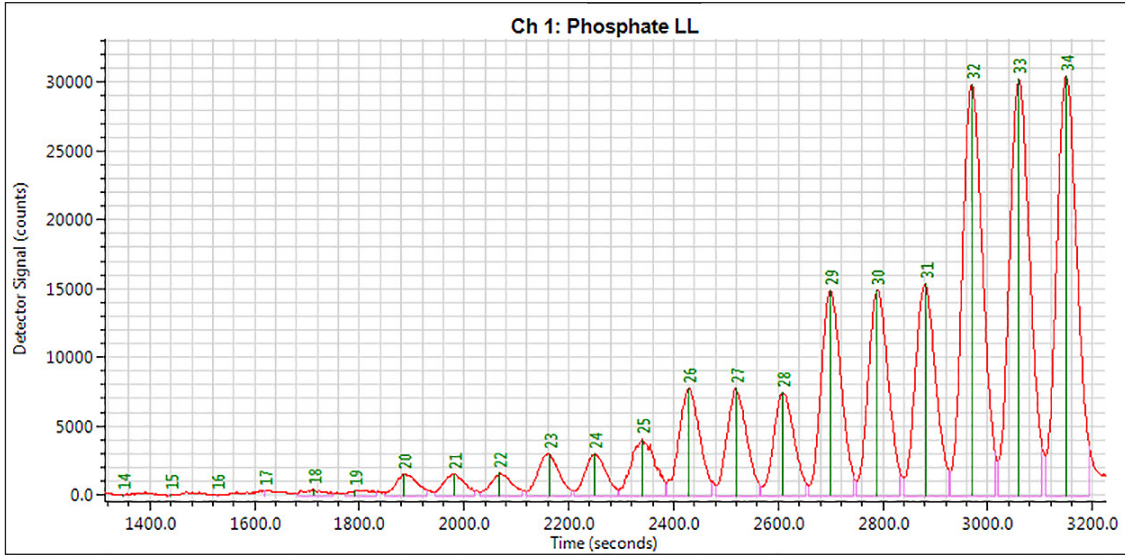


Figure 2. Total Phosphorus Calibration Series

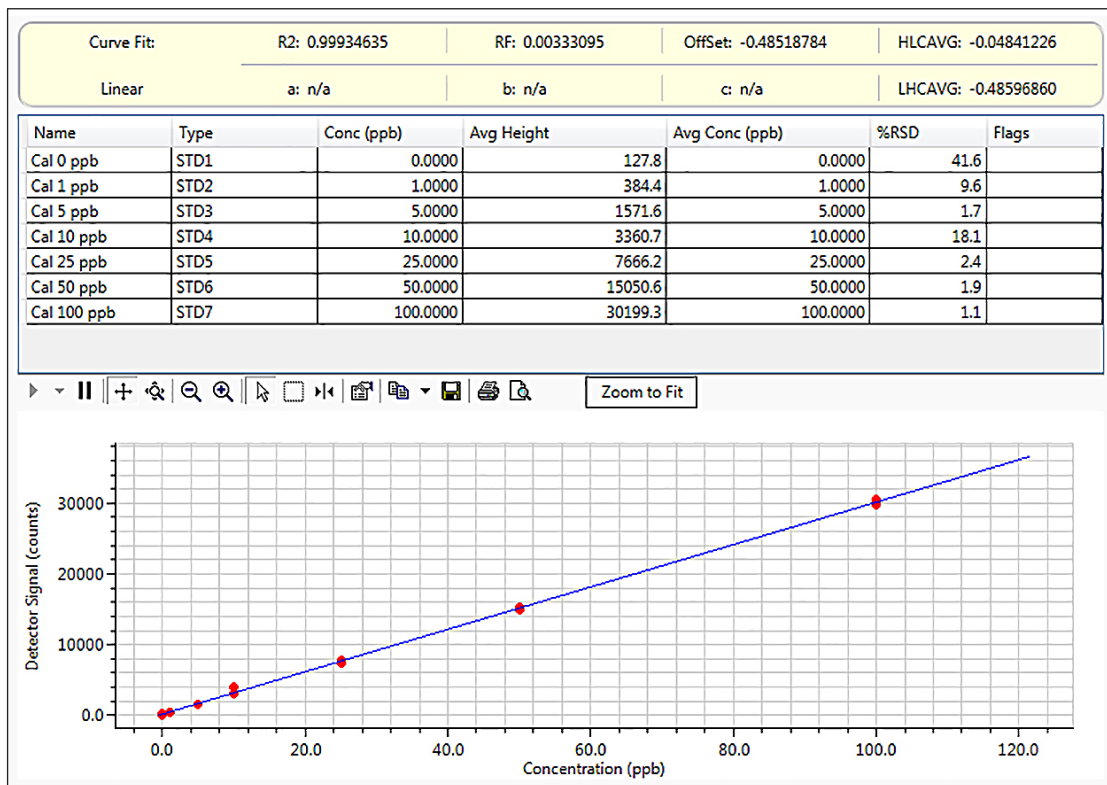


Figure 3. Calibration Curve and Statistics

OI Analytical® is registered trademark of Xylem Inc. or one of its subsidiaries.



151 Graham Road  
 P.O. Box 9010  
 College Station, Texas  
 77842-9010

(979) 690-1711  
 (800) 653-1711 USA/Canada  
 (979) 690-0440 Fax

www.oico.com  
 E-mail: oi-info@xylem-inc.com