

Orion Titration Techniques

Titration Techniques			
Analysis	Description	When Recommended	Advantage
Endpoint Analysis			
First Derivative (For Orion 960, and Orion 950)	Automated titration technique which calculates endpoints from the first derivative of the titration curve	<ul style="list-style-type: none"> Routine potentiometric titrations Determine poorly defined and multiple endpoints 	<ul style="list-style-type: none"> Precision No ambiguity in location of endpoints
Second Derivative (For Orion 960)	Similar to first derivative but, endpoints are calculated from second derivative	<ul style="list-style-type: none"> When required by industry standards Eliminates false endpoint detection 	<ul style="list-style-type: none"> Precision
Present Endpoint (For Orion 960,950)	Allows titration to proceed to one or two preset mV or pH values	<ul style="list-style-type: none"> P & M alkalinity of water and wastewater Titration with no clearly defined endpoint When required by industry standards 	<ul style="list-style-type: none"> No interference from color or turbidity
KAP™ Analysis			
Multiple Known Addition (For Orion 960, and Orion 930)	Performs calibration and calculates sample concentration by adding aliquots of standard to sample	<ul style="list-style-type: none"> Measure non-titratable species, i.e., Na^+, K^+, NO_3^-, NH_3 Complex sample matrix More precision required than Standard calibration 	<ul style="list-style-type: none"> No need for independent calibration or recalibration Matrix effects minutes Recovery test performed with every sample
Multiple Known Subtraction (For Orion 960)	Performs calibration and calculates sample concentration by adding aliquots of reagent which reacts with sample species	<ul style="list-style-type: none"> No stable standard solution for ion of interest, i.e., sulfide 	<ul style="list-style-type: none"> Faster than conventional titration Uses less reagent than conventional titration
Multiple Analate Addition (For Orion 960)	Performs calibration and calculates sample concentration by adding aliquots of sample to a standard solution	<ul style="list-style-type: none"> Use for direct read of ions (calibrate and read series of samples) Concentrated sample Viscous samples 	<ul style="list-style-type: none"> Sample automatically diluted as part of analysis Sample can be added from automatic pipet
Serial Calibration (For Orion 960, 930)	Generates calibration curve by adding aliquots of standard to a beaker of water and ISA	<ul style="list-style-type: none"> Low level measurements Checking electrode performance 	<ul style="list-style-type: none"> Defines non-linear portion of calibration curve Eliminates need to prepare standards
GAP™ Analysis			
Gran Function (For Orion 960)	Similar to first derivative but Gran Functions applied to determine equivalence points	<ul style="list-style-type: none"> Titration with poor endpoint Titration with two endpoints Titration with asymmetric curves 	<ul style="list-style-type: none"> Accuracy
Gran Predict (For Orion 960)	Similar to Gran Function but looks at data on one side of equivalence point only	<ul style="list-style-type: none"> Slow reactions Speed required Low level titrations, i.e., Cl^- 	<ul style="list-style-type: none"> Speed Less reagent consumption
Assist Analysis			
Standardize System (For Orion 960)	Standardizes entire system (electrodes, electronics, dispenser, titrant)	<ul style="list-style-type: none"> Highest system accuracy required 	<ul style="list-style-type: none"> One-step standardization of all system components
HELP Analysis (For Orion 960)	Recommends the best method by adding aliquots of reagent to sample and analyzing data	<ul style="list-style-type: none"> When unsure of what technique or measurement parameters to use 	<ul style="list-style-type: none"> Optimizes method
pH Read (For Orion 960)	For accurate pH measurements and direct ion read	<ul style="list-style-type: none"> Automation of pH or direct ion read can be used on autosampler 	Automation, accuracy

Electrodes and Solutions

Orion #	Description
Ammonia Analysis	
9512BN	Combination Ammonia Gas-sensing electrode with BNC connector. Complete with 2 pkgs of 20 loose membranes, cap for loose membranes, filling solution, & accessories
951204	Loose membranes for Orion 9512 Electrode, pkg of 20
951202	Internal Fill Solution, for Orion 9512 Ammonia Electrode, 60 mL bottle
951006	Ammonia Standard (0.1 M NH_4Cl), 475 mL bottle
951211	Ammonia pH adjusting ISA with color indicator, 475 mL bottle
Calcium Analysis	
9320BN	Liquid membrane Calcium electrode with two sensing modules and BNC connector. Use with Orion 900100 single junction reference electrode
9720BN	ionplus® Sure-Flow® Combination Calcium electrode with replaceable sensing module and BNC connector
972001	Replacement Sensing Module for Orion 97-20 ionplus Calcium electrode
932001	Replacement Sensing Module for Orion 93-20 Calcium Sensing Electrode
922006	Calcium Activity Standard (0.1 M $CaCl_2$), 475 mL bottle
932011	Calcium Ionic Strength Adjuster (ISA), 475 mL bottle
652012	Calcium/Magnesium Reagent, 475 mL bottle
900061	Optimum Results™ "A" Filling Solution for ionplus combination electrodes