



Parameter

Nitrate

Sample Type

Drinking Water

Introduction

The ion-selective electrode method is an EPA-compliant test procedure to directly read nitrate in drinking water. Laboratory productivity is improved with quick, uncomplicated determination. Use of Nitrate Interference Suppressor Solution frees the ISE method from most interferences.

References

1. Method 4500-NO₃⁻ D. Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. APHA, AWWA, & WEF, Washington, D.C. www.standardmethods.org
2. Standard Method of Test for Nitrate in Drinking Water, July 1994, Orion Technical Bulletin 601.

Result Statistics

# Trials	Average	%CV
5	0.7 mg/L	2.0 %

Recommended Equipment

5-Star Benchtop pH/ISE/Cond/DO meter (Orion 1119000) or other Orion ISE meter; ionplus® nitrate electrode (Orion 9707BNWP); benchtop stirrer (Orion 096019). Optional: ATC probe (Orion 927005MD); printer (Orion 1010006); Star Navigator Software (Orion 1010007).

Required Solutions

Nitrate Standard, 100ppm as N (Orion 930707); Nitrate Interference Suppressor Solution (NISS) (Orion 930710); ISA (Ionic Strength Adjuster) for Nitrate electrode (Orion 930711); Reference Filling Solution, Optimum Results™ F (Orion 900046); deionized water (DI).

Solutions Preparation

1. Prepare 50 ppm (mg/L) nitrate standard by pipetting 50 mL of 100 ppm standard into a 100 mL volumetric flask and diluting to the mark with deionized water.
2. Prepare 10 ppm (mg/L) nitrate standard by pipetting 10 mL of 100 ppm standard into a 100 mL volumetric flask and diluting to the mark with deionized water.
3. Prepare 1 ppm (mg/L) nitrate standard by pipetting 1 mL of 100 ppm standard into a 100 mL volumetric flask and diluting to the mark with deionized water.
4. Pipette 20 mL of each of the three standards into a respective beaker, add an equal volume of NISS to each beaker.

Meter Setup

Connect the electrode, stirrer and ATC probe to the Star Meter. Set measurement mode to ISE. In Setup mode, set resolution to 3, turn off the auto blank correction, set the range to low, select mg/L as the unit, and set read type to continuous. If all steps were followed correctly, the meter display will show three digits in the top line and "ISE: mg/L" to the right of the top line. The

temperature will also be displayed in the top left of the screen (if ATC is used). For other Orion ISE meters, see meter instruction manual.

Electrode Setup

See the electrode manual for preparation of the electrode.

Electrode Performance Check

Check slope at least daily according to the electrode manual. See troubleshooting section of manual if slope or drift problems.

Electrode Storage, Soaking, and Rinsing

See electrode manual for storage 1) between measurements, 2) for short period of time (2-3 days), and 3) for long periods of time. Between measurements, rinse the electrode with DI water and dry outer sleeve of electrode or shake to remove drops before measuring the next sample. Do not wipe or rub the sensing element of the electrode.

Sample Preservation

No preservation required. Store samples at ≤ 6 °C. Analyze within 48 hours.

Sample Preparation

Pipette 20 mL of sample into a beaker, add an equal volume of NISS. All standards and samples should be measured at the same temperature, preferably at room temperature.

Calibration

Perform a three point calibration using 1mg/L, 10 mg/L, and 50 mg/L nitrate standards. The calibration slope should be between -50 and -56 mv/decade. It will be lower than the slope check value due to the 1 mg/L low calibration point. Read a fresh portion of a standard to verify calibration. If reading is not acceptable, see troubleshooting section of electrode manual.

Analysis

Rinse electrode, ATC probe and stirrer with DI water and shake electrode to dry sensing element. Place all probes in sample, turn on stirrer and measure. The concentration of the sample will be displayed. When a stable reading is achieved, the "ISE:mg/L" icon will stop flashing.

Quality Control (QC)

Recommended QC procedures include: calibration and calibration verification, initial demonstration of laboratory capability and method detection limit determination, laboratory control samples (LCS), method blanks, matrix spikes (MS), sample duplicates, and independent reference materials. See Reference 1 above for details.



Nitrate Drinking Water	ppm (mg/L) Nitrate
Sample 1	0.690
Sample 2	0.723
Sample 3	0.690
Sample 4	0.699
Sample 5	0.706
Mean	0.702
Standard Deviation	0.014
%CV	1.96