

Standardization of Iodine Titrant for Ripper Titration of Wines

Water Analysis Instruments, Thermo Fisher Scientific

Key Words

Wine analysis, iodine titrant, Ripper titration, standardization workflow, sulfur dioxide titration, SO_2 titration.

Goal

The following application note explains how to determine the true concentration of the iodine titrant used for Ripper titration of wine by standardizing with a Thermo Scientific™ Orion™ 9770BNWP Platinum and Iodide Electrode or a Thermo Scientific Orion ORP electrode (e.g. 9778BNWP or 9678BNWP) and a standard solution of sodium thiosulfate.

Introduction

Since the concentration of the iodine titrant changes over time, for best accuracy, determine the true concentration of the iodine titrant by standardizing with a standard solution of sodium thiosulfate. Typically it is best to standardize daily or weekly.

Basic Standardization Workflow

Fill buret with titrant

Prepare standard in beaker

Insert electrode and stir

Titrate to endpoint

Calculate true titrant normality



Required Reagents and Solutions

Purchased or prepared Iodine (I_2) standard titrant solution, 0.01 M (0.02 N); deionized or distilled water (DI); standard sodium thiosulfate ($\text{Na}_2\text{S}_2\text{O}_3$) solution, 0.01 M (0.01 N). Optional: sodium sulfite (Na_2SO_3) or potassium metabisulfite (KMBS).

Meter and Titration Setup for Standardization

Prepare according to the SO_2 in Wine by Enhanced Manual Ripper Titration (Application Note 017) or Manual Ripper Titration (Application Note 018) method.

Standard Titration

Add 5.0 mL of 0.01 N sodium thiosulfate solution to 50 mL DI in a 100 mL beaker. Rinse the electrode and stirrer with DI. Immerse the electrode and stirrer at least one inch below the liquid level in the beaker. Turn on the stirrer. Tap to release air bubbles trapped on the surface of the electrode.

Watching the mV reading, titrate at moderate speed with the iodine titrant. The mV values will not rise quickly until near the endpoint (EP). The EP is considered the point where the largest mV change is observed per volume addition of titrant. Depending on the ORP electrode, generally look for the EP to occur between 325 to 425 mV when standardizing with sodium thiosulfate and the Orion platinum ORP electrode (e.g., Cat. No. 9778BNWP or Cat. No. 9678BNWP). Expect the EP to occur near 595 mV (± 20 mV) when standardizing with sodium thiosulfate and an Orion platinum and iodide electrode (Cat. No. 9770BNWP).

At the EP, one drop of titrant will generally cause a mV change of >10 mV, while a mV change of >5 mV per drop generally means the EP is quickly approaching or has just been passed. If another drop of titrant causes a smaller change than the last drop, the EP has passed, but if a larger change is observed, the EP is still approaching. Record the volume of titrant used (V_1) at the EP. When using the Orion platinum and iodide electrode, record also the mV value at the EP.

Repeat the standardization procedure if required by your protocol. When using the Orion platinum and iodide electrode, simply titrate to the EP mV value found for the

first titration. When using the Orion platinum ORP electrode, titrate to the largest mV change. Calculate the normal concentration of iodine titrant (N_1) for each portion of standard titrated, as follows:

$$N_1 = N_s \times 5 \div V_1$$

N_1 = Normality of the iodine titrant (certified or standardized value)

N_s = Normality of the standard thiosulfate solution

V_1 = Volume of iodine titrant used at the endpoint of the titration (mL)

Use the average N_1 result determined here when titrating wine samples.

Optional QC Sample – SO₂ Standard

Option 1 - Weigh 0.2956 g sodium sulfite (Na_2SO_3) and ~1.0 g citric acid into a 1 L volumetric flask. Dissolve and fill to the mark with DI water. This is equivalent to 150 mg/L total SO₂ stock solution. Pipette 10 mL of the SO₂ stock solution into a beaker and add 50 mL of DI water. This is equivalent to 60 mg/L SO₂ in a 25 mL wine sample.

Option 2 - Dissolve 3 KMBS (Campden) tablets in 2L of DI water for 426 mg/L SO₂ solution. Pipette 4 mL of the SO₂ solution into a beaker and add 50 mL of DI water. This is equivalent to 68 mg/L SO₂ in a 25 mL wine sample.

To purchase Orion meter, electrodes and solutions, please contact your local equipment distributor and reference the part numbers listed below:

Product	Description	Part Number
Meters	Thermo Scientific™ Orion™ Versa Star™ pH Benchtop Meter	VSTAR10
	Thermo Scientific™ Orion Star™ A211 pH Benchtop Meter	STARA2110
	Thermo Scientific Orion Star A214 pH/ISE Benchtop Meter	STARA2140
Electrodes	Thermo Scientific Orion Redox/ORP Electrode, Glass Body	9778BNWP
	Thermo Scientific Orion Platinum and Iodide Electrode (Residual Chlorine ISE)	9770BNWP
	Thermo Scientific™ Orion™ Sure-Flow™ Redox/ORP Electrode, Epoxy Body	9678BNWP
Accessories	Electrode Storage Sleeve and Bottle	810017
	Stirrer Probe	927007MD
	Swing Arm Stand	090043

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