APPLICATION NOTE

Standardization of iodine titrant for ripper titration of wines

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

1. Fill buret with titrant
2. Prepare standard in beaker
3. Insert electrode and stir
4. Titrate to endpoint
5. 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 ($Na_2S_2O_3$) 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 (Vt) 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 (NI) for each portion of standard titrated, as follows:

$N_I = N_S \times 5 \div V_I$

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

N_S = Normality of the standard thiosulfate solution

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

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

Optional QC Sample – SO_2 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 SO_2 stock solution. Pipette 10 mL of the SO_2 stock solution into a beaker and add 50 mL of DI water. This is equivalent to 60 mg/L SO_2 in a 25 mL wine sample.

Option 2

Dissolve 3 KMBS (Campden) tablets in 2L of DI water for 426 mg/L SO_2 solution. Pipette 4 mL of the SO_2 solution into a beaker and add 50 mL of DI water. This is equivalent to 68 mg/L SO_2 in a 25 mL wine sample.

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

Depending on your sample throughput needs and budget, we have developed application notes for both our electrochemistry meters for manual titrations and potentiometric titrators for automated titrations. Our automated titrators can help improve your titrations by simplifying your process and helping to deliver consistently reliable results. Just program it once and the titrator takes care of the rest - including addition of titrant, endpoint determination, results calculation, and data logging. Please visit **thermofisher.com/titrator** for more information.

Ordering Information

Product	Cat. No.
Meters	
Thermo Scientific™ Orion™ Versa Star Pro™ 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	096019
Swing Arm Stand	090043

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