

Experiment 4: Standardization of Sodium Thiosulfate Solution

Introduction

In the first experiment, we performed a gravimetric analysis experiment by measuring the mass of a precipitate. In this experiment, we will be performing a volumetric analysis in which we will determine the amount of a constituent by measuring the volume of a reagent. In a volumetric analysis, it is necessary to have a solution of known concentration (also known as standard solution) reacting with a sample of unknown concentration to determine the unknown concentration. Such a technique is called titration.

A standard solution may be prepared by the simple procedure of taking a known amount of solid and diluting it to make a definite volume of the solution; in this case, the term primary standard solution is applied. Alternatively, it is very often the case that a direct measurement of the amount of material cannot be made, or is very difficult to make accurately. Such examples could be if the sample is a gas, a volatile liquid, a solid that is hygroscopic (has a tendency to absorb water and dissolve) or a solid that is efflorescent (has a tendency to lose water from its molecular structure). In this case, a solution must be made up with approximately the required concentration and the actual concentration must be determined by titration with a primary standard solution. The term secondary standard solution is applied in this latter instance. Hence:

- A primary standard solution is prepared by direct measurements of the mass of solute and the volume of solution.
- A secondary standard solution is a solution whose concentration cannot be determined directly from the weight of solute and volume of solution; the concentration must be determined by analysis of the solution itself.

Sodium thiosulfate crystals have the formula $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$ when freshly crystallized, but the salt tends to effloresce (dehydrate) some of its water of crystallization (a property that is increased in very dry areas). Since the true formula for the crystals changes over time, we cannot weigh the sample and divide by the molar mass to determine moles present. This is why sodium thiosulfate cannot be used as a primary standard. A solution of thiosulfate is prepared with approximately the desired concentration and then standardized with a primary standard solution such as potassium iodate. The process of determining the concentration of the secondary standard solution by titration is called 'standardization'.

Thiosulfate Standardization Chemistry Lab

Tao Wei



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Chemistry in the Laboratory James M. Postma, Julian L. Robert, J. Leland Hollenberg, 2004-03-12 This clearly written class tested manual has long given students hands on experience covering all the essential topics in general chemistry Stand alone experiments provide all the background introduction necessary to work with any general chemistry text This revised edition offers new experiments and expanded information on applications to real world situations *Laboratory Manual in Quantitative Chemical Analysis*, **Chemistry in Context - Laboratory Manual** Graham Hill, John Stranger Holman, John Holman, 2001 The laboratory manual and study guide supports your teaching with a broad range of practicals emphasising safety and risk assessment It is an essential companion to Chemistry in Context and can also be used alongside other Advanced Chemistry books It offers practicals with detailed instructions for opened investigations and opportunities for assessed practical work in the four skill areas of planning implementing analysing and evaluating *Environmental Laboratory Exercises for Instrumental Analysis and Environmental Chemistry* Frank M. Dunnivant, 2004-11-26 A comprehensive set of real world environmental laboratory experiments This complete summary of laboratory work presents a richly detailed set of classroom tested experiments along with background information safety and hazard notes a list of chemicals and solutions needed data collection sheets and blank pages for compiling results and findings This useful resource also Focuses on environmental i.e. dirty samples Stresses critical concepts like analysis techniques and documentation Includes water air and sediment experiments Includes an interactive software package for pollutant fate and transport modeling exercises Functions as a student portfolio of documentation abilities Offers instructors actual samples of student work for troubleshooting notes on each procedure and procedures for solutions preparation *Fundamentals of Chemistry: Laboratory Studies* Frank Brescia, 2012-12-02 Fundamentals of Chemistry Laboratory Studies Third Edition is a manual that provides instruction on techniques of chemical laboratory operations Each experiment is discussed in terms of the major objective the experimental approach to the objective the measurements or observations to be made and the calculation and interpretation of results Topics covered include manipulation weights and measures molecular weight acids and bases gravimetric and volumetric stoichiometry and thermochemistry This book is comprised of 43 chapters divided into 14 sections and begins by presenting general information on metric and other units common laboratory equipment and chemical laboratory methods The first chapter introduces the reader to the Bunsen burner and the principles of glass working followed by a discussion on mass and volume measurements including the determination of density The following chapters focus on states of matter molecular weight stoichiometry and intermolecular forces Preparations and syntheses are also considered along with chemical equilibrium and electrochemistry The final section is devoted to qualitative analysis particularly of cations and anions This monograph is intended primarily for students of chemistry *Laboratory Manual for Principles of General Chemistry* Jo Allan Beran, 2010-11-01 This new edition of the Beran lab manual emphasizes chemical principles as

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thank the publishers designers and printers who graciously worked hard to publish this manual in time We hope that this manual will assist students in understanding concepts principles and performing procedures We wish you all the best

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