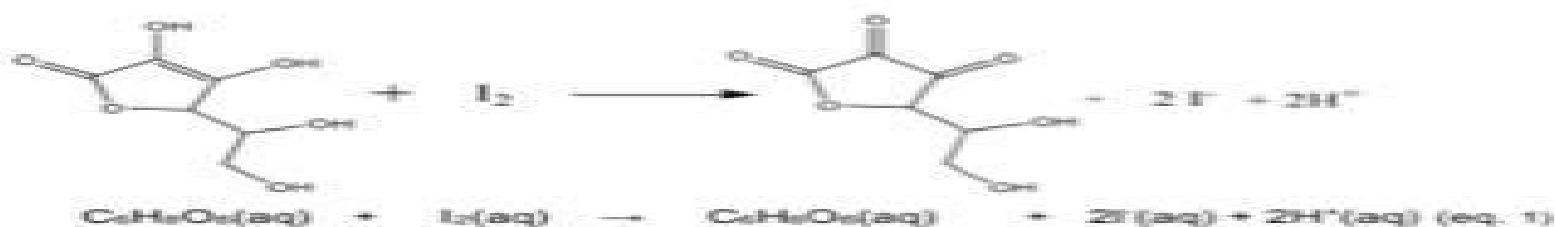


Volumetric Analysis for Vitamin C

The labelling and quantification of active ingredients in drugs is strictly controlled in Canada under the Food and Drugs Act. You can be fairly confident when you buy a prescription drug or over-the-counter medication that the listed ingredients are present in their indicated quantities. Vitamins and minerals are regulated as a sub-set of drugs and are governed by the Natural Health Products Regulation. While the regulations assure quality control, and require that companies report accurate and detailed information about the safety, quality, and efficacy of their products, the government does not have the resources to check quality control in the plethora of supplements on the market. During manufacture of large batches of pills, for example, problems may arise with ensuring a homogenous distribution of active ingredients. A recent study from the US (where regulations are more lax) found a wide variance in how much vitamin D was present in supplements compared to what was reported on the bottle.¹ A study such as this indicates the importance of analytical methods in determining how much of the active ingredient is truly present as compared to the label.

This experiment will quantitatively analyze an over-the-counter Vitamin C tablet for the mass of Vitamin C. Iodine reacts with Vitamin C by an oxidation process as indicated by the following reaction equation:



Note that one mole of iodine reacts with one mole of Vitamin C. In this experiment, a solution of Vitamin C (made from the tablet) is added to a solution containing excess iodine (with known concentration). Vitamin C is the limiting reactant; all of the Vitamin C reacts and leaves some iodine unreacted. The amount of iodine in excess is determined by titration with the standardized sodium thiosulfate from Lab D. Since the total (initial) amount of iodine was known, and the amount of excess iodine was determined in the titration, the amount of iodine that reacted with vitamin C can be determined by the difference. Thus, the amount of vitamin C can be determined.

The process of titrating an excess amount of a reactant not consumed in a reaction is called a 'back titration'. The related equations from Lab D are reproduced here for reference:



1. Leblanc, E.S.; Perrin, N.; Johnson, J.D. Over-the-Counter and Compounded Vitamin D: Is Potency What We Expect? *JAMA Intern Med.* **2013**, *173*, 585-586.

Analysis Of Vitamin C Lab Answers

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Table of Contents Analysis Of Vitamin C Lab Answers

1. Understanding the eBook Analysis Of Vitamin C Lab Answers
 - The Rise of Digital Reading Analysis Of Vitamin C Lab Answers
 - Advantages of eBooks Over Traditional Books
2. Identifying Analysis Of Vitamin C Lab Answers
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Analysis Of Vitamin C Lab Answers
 - User-Friendly Interface
4. Exploring eBook Recommendations from Analysis Of Vitamin C Lab Answers
 - Personalized Recommendations
 - Analysis Of Vitamin C Lab Answers User Reviews and Ratings
 - Analysis Of Vitamin C Lab Answers and Bestseller Lists
5. Accessing Analysis Of Vitamin C Lab Answers Free and Paid eBooks
 - Analysis Of Vitamin C Lab Answers Public Domain eBooks
 - Analysis Of Vitamin C Lab Answers eBook Subscription Services
 - Analysis Of Vitamin C Lab Answers Budget-Friendly Options
6. Navigating Analysis Of Vitamin C Lab Answers eBook Formats

- ePub, PDF, MOBI, and More
- Analysis Of Vitamin C Lab Answers Compatibility with Devices
- Analysis Of Vitamin C Lab Answers Enhanced eBook Features
- 7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Analysis Of Vitamin C Lab Answers
 - Highlighting and Note-Taking Analysis Of Vitamin C Lab Answers
 - Interactive Elements Analysis Of Vitamin C Lab Answers
- 8. Staying Engaged with Analysis Of Vitamin C Lab Answers
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Analysis Of Vitamin C Lab Answers
- 9. Balancing eBooks and Physical Books Analysis Of Vitamin C Lab Answers
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Analysis Of Vitamin C Lab Answers
- 10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
- 11. Cultivating a Reading Routine Analysis Of Vitamin C Lab Answers
 - Setting Reading Goals Analysis Of Vitamin C Lab Answers
 - Carving Out Dedicated Reading Time
- 12. Sourcing Reliable Information of Analysis Of Vitamin C Lab Answers
 - Fact-Checking eBook Content of Analysis Of Vitamin C Lab Answers
 - Distinguishing Credible Sources
- 13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
- 14. Embracing eBook Trends
 - Integration of Multimedia Elements
 - Interactive and Gamified eBooks

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