

ANALYSIS OF COMMERCIAL BLEACH

To determine the amount of **sodium hypochlorite** (NaClO) in commercial bleach by means of an oxidation-reduction "back-titration".

Some commercial products that contain oxidizing agents are bleaches, hair coloring agents, scouring powders, and toilet bowl cleaners. The most common oxidizing agent in bleaches is **NaClO** . Commercial bleach is made by bubbling **chlorine gas** into a **sodium hydroxide** solution. Some of the chlorine oxidizes to the **hypochlorite ion** ClO^- , and some reduces to the **chloride ion** Cl^- . The solution remains strongly basic. The **net ionic equation** for this process is:



The hypochlorite ion ClO^- contains the **chlorine atom** in the **+1** oxidation state. Since the **chloride ion** Cl^- is much more stable (less potential energy) than the Cl^{+1} atom in the hypochlorite ion, the Cl^{+1} readily reduces to Cl^- and thus serves to "oxidize" other substances during the bleaching process.

The amount of **hypochlorite ion** present in a bleach solution is determined by an oxidation-reduction titration called a "back-titration". While the ClO^- ion cannot be titrated directly, it easily oxidizes the iodide ion I^- in **KI** to form iodine I_2 which is then titrated with a standard solution of **sodium thiosulfate** $\text{Na}_2\text{S}_2\text{O}_3$.

The analysis takes place in a series of steps:

- 1) **Acidified iodide ion** is added to **hypochlorite ion** solution, and iodide oxidizes to iodine.



- 2) **Iodine**, only slightly soluble in water, dissolves very well in an aqueous solution of iodide ions, in which it forms a **colored complex ion** called the triiodide ion I_3^- . Triiodide ion is a combination of a neutral I_2 molecule with an I^- ion. The $\text{I}_3^-_{(aq)}$ ion is yellow in dilute solution, and dark red-brown when concentrated.



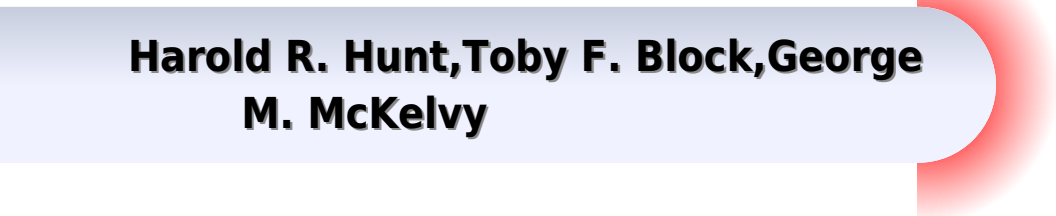
- 3) The **triiodide ion** is titrated with a standard solution of thiosulfate ions, which reduces the iodine back to the colorless iodide ions.



During the last reaction, the red-brown color of the triiodide ion fades to yellow and then to the colorless iodide ion. While it is possible to use the disappearance of the color of the $\text{I}_3^-_{(aq)}$ ion as the method of determining endpoint, this is not a very sensitive procedure. **Addition of starch to a solution containing iodine (or triiodide ion) forms a reversible blue complex**. The **disappearance of this blue complex** is a much more sensitive method of determining endpoint. However, if the starch is added to a great deal of iodine, the complex which forms may not be reversible. Therefore, the starch is not added until shortly before the endpoint is reached. The quantity of thiosulfate used in step (3) is directly related to the amount of hypochlorite initially present. The $\text{S}_4\text{O}_6^{2-}$ ion is called the tetrathionate ion.

Analysis Of Commercial Bleach Lab Answers

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M. McKelvy**



Analysis Of Commercial Bleach Lab Answers:

Laboratory Manual for Principles of General Chemistry J. A. Beran, Mark Lassiter, 2022-08-16 Laboratory Manual for Principles of General Chemistry 11th Edition covers two semesters of a general chemistry laboratory program The material focuses on the lab experiences that reinforce the concepts that not all experimental conclusions are the same and depend on identifying an appropriate experimental procedure selecting the proper apparatus employing the proper techniques systematically analyzing and interpreting the data and minimizing inherent variables As a result of good data a scientific and analytical conclusion is made which may or may not be right but is certainly consistent with the data Experiments write textbooks textbooks don't write experiments A student's scientific literacy grows when experiences and observations associated with the scientific method are encountered Further experimentation provides additional cause effect observations leading to an even better understanding of the experiment The 11th edition's experiments are informative and challenging while offering a solid foundation for technique safety and experimental procedure The reporting and analysis of the data and the pre and post lab questions focus on the intuitiveness of the experiment The experiments may accompany any general chemistry textbook and are compiled at the beginning of each curricular unit An Additional Notes column is included in each experiment's Report Sheet to provide a space for recording observations and data during the experiment Continued

emphasis on handling data is supported by the Data Analysis section **Laboratory Experiments for General Chemistry** Harold R. Hunt, Toby F. Block, George M. McKelvy, 1998 *Experiment Station Record* United States. Office of Experiment Stations, 1914 **Experiment Station Record** U.S. Office of Experiment Stations, United States. Agricultural Research Service, United States. Office of Experiment Stations, 1914 **Report summaries** United States. Environmental Protection Agency, 1983 American Dyestuff Reporter, 1960 Includes proceedings of American Association of Textile Chemists and Colorists

Fusion Energy Update, 1983 **Accessions of Unlimited Distribution Reports**, 1973-06-15 **Quality Assurance in the Pathology Laboratory** Maciej J. Bogusz, 2011-02-22 Quality refers to the amount of the unpriced attributes contained in each unit of the priced attribute Leffler 1982 Quality is neither mind nor matter but a third entity independent of the two even though Quality cannot be defined you know what it is Pirsig 2000 The continuous formulation of good practices and procedures across fields reflects t *Selected Water Resources Abstracts*, 1982 **EPA Publications Bibliography** United States. Environmental Protection Agency, 1985 Current Index to Journals in Education, 1987

British Chemical and Physiological Abstracts, 1944 *Experiment Station Record* United States. Office of Experiment Stations, 1914 **Government Reports Announcements & Index**, 1981-03 *Digest of Comments on the Pharmacopœia of the United States of America (Eighth Decennial Revision) and on the National Formulary (3d Ed.) for the Calendar Year Ending December 31* United States. Public Health Service, 1913 **British Abstracts**, 1945 **Energy Research Abstracts**, 1979 Molecular Diagnostics Wayne W. Grody, Robert M. Nakamura, Frederick L. Kiechle, Charles

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