

QUALITATIVE ANALYSIS of GROUP III CATIONS

The four group III cations are Cr^{3+} , Al^{3+} , Fe^{3+} , and Ni^{2+} . The first step in analysis involves separating the ions into two subgroups by treating the solution with NaOH and NaOCl . The hypochlorite ion oxidizes Cr(III) to a higher, more stable oxidation state (namely Cr(VI)) which is soluble:



In addition, Al^{3+} forms a soluble hydroxo-complex ion in the presence of excess hydroxide:



In contrast, Ni^{2+} and Fe^{3+} do not readily form hydroxo-complexes and are not oxidized by hypochlorite. They form insoluble hydroxides under these conditions:



To separate aluminum from chromium, the solution containing CrO_4^{2-} and Al(OH)_4^{-} is acidified to destroy the hydroxo-complex:



Treatment with aqueous ammonia gives a gelatinous **white** precipitate of aluminum hydroxide. The concentration of hydroxide in ammonia is too low to form the hydroxo-complex:



The chromate ion remains in solution. It can be tested and confirmed by precipitation as yellow BaCrO_4 :



The BaCrO_4 precipitate dissolves in acid. The solution is then treated with H_2O_2 to produce a **deep blue** color due to the presence of a peroxo-compound, probably CrO_5 :



The mixed precipitate of Ni(OH)_2 and Fe(OH)_3 can be dissolved by adding a strong acid. The Ni^{2+} and Fe^{3+} ions can be separated by adding ammonia. Ni^{2+} is converted to the deep-blue complex $\text{Ni(NH}_3)_6^{2+}$ which stays in solution. The Fe^{3+} ion does not readily form a complex and re-precipitates as Fe(OH)_3 :



Confirm the presence of Ni^{2+} by adding dimethylglyoxime (DMG), $\text{C}_4\text{H}_8\text{N}_2\text{O}_2$, to give a **deep rose** precipitate:



Confirm the presence of Fe^{3+} by dissolving Fe(OH)_3 in a strong acid and adding KSCN to form a **blood-red** FeSCN^{2+} complex ion:



Qualitative Analysis Of Group Iii Cations

G Thomas



Qualitative Analysis Of Group Iii Cations:

The Systematic Qualitative Analysis of the Group III Cations William Miller Jack, 1950 *Advanced Experimental Inorganic Chemistry* V.K. Ahluwalia, Sunita Dhingra, 2024-08-02 This book is divided into four parts Part I deals with Qualitative Inorganic Analysis Systematic procedures of anion and cation analysis alongwith their confirmatory tests and spot tests are given Detection of cations by flame photometry and atomic absorption spectroscopy are also incorporated Besides chromatographic separation and identification of cations are also discussed Part II deals with volumetric analysis The instrumental methods of volumetric analysis have also been incorporated Part III deals with gravimetric analysis Estimation of one or more than one constituent in a solution and instrumental methods of quantitative analysis are also incorporated Part IV describes many inorganic preparations These include simple salts double salts complex salts amalgams activated metals organometallics and some other miscellaneous inorganic preparations The uses of various compounds have also been mentioned Print edition not for sale in South Asia India Sri Lanka Nepal Bangladesh Pakistan or Bhutan **Qualitative Analysis** James Scott Long, Dale S. Chamberlin, Harold Victor Anderson, 1928 **Qualitative Analysis** Charles Joseph Brockman, 1930 **Qualitative Analysis and the Properties of Ions in Aqueous Solution** Emil J. Slowinski, William L. Masterton, 1990 This inexpensive qualitative analysis supplement offers maximum flexibility and can accompany general chemistry texts Works well with any general chemistry text where the instructor wants more qualitative analysis in conjunction with regular class work Semimicro Qualitative Analysis Hervey Hubbard Barber, Thomas Ivan Taylor, 1953 *Manual of Qualitative Analysis for Use in the Chemical Laboratory of Dartmouth College* Leon Burr Richardson, Andrew Jackson Scarlett, 1921 Essentials of Qualitative Chemical Analysis John Christie Ware, 1928 *Elementary Qualitative Analysis for College Students* John Henry Reedy, 1924 *A Laboratory Guide to the Study of Qualitative Analysis* Edgar Henry Summerfield Bailey, Hamilton Perkins Cady, 1901 **Structure-Bonding, Mathematical Concept and States of Matter** Dr. Rajesh Chandra Verma, 2023-09-28 Explore the comprehensive e book on Chemistry Structure Bonding Mathematical Concepts and States of Matter in English Edition tailored for B Sc First Semester Aligned with the syllabus of NEP 2020 for of University of Rajasthan Jaipur this book is designed for students pursuing three four year undergraduate programmes Published by Thakur Publication it serves as an essential resource for students to deepen their understanding and excel in their academic pursuits **Semimicro Qualitative Analysis** Alfred Benjamin Garrett, 1966 **A Laboratory Guide to the Study of Qualitative Analysis, Based Upon the Application of the Theory of Electrolytic Dissociation and the Law of Mass Action** Edgar Henry Summerfield Bailey, Hamilton Perkins Cady, 1910 **Semimicro Qualitative Analysis of Inorganic Materials** William Buell Meldrum, Earl William Flosdorf, Albert Frederick Daggett, 1939 *British Chemical Abstracts*, 1929 **A Systematic Qualitative Chemical Analysis** George Wallace Sears, 1922 **Journal of Analytical Chemistry of the USSR.**, 1968 *The Elements of Qualitative Chemical Analysis* Julius Stieglitz, 1917 **The**

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