

Determination of Anions in an Amine Solution Using the IONUS Ion Chromatograph



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Introduction

Amine solutions are vital in capturing carbon dioxide (CO₂) from industrial flue gases. This captured CO₂ can be utilized for various purposes, contributing to a more sustainable future. However, the efficiency of Amine-based CO₂ capture can be significantly impacted by the presence of anion contaminants.

These anionic impurities, such as chloride and sulfate, can originate from the makeup water used in the capture process or from the degradation of the Amine itself. The presence of these anions can lead to several detrimental effects, including:

- Reduced CO₂ absorption capacity of the Amine solution, hindering the overall capture efficiency.
- Formation of heat-stable salts that cause equipment corrosion, fouling of heat exchangers, and foaming issues within the capture unit.
- Increased environmental concerns associated with the degradation products of the amine, which may contain harmful compounds.

Therefore, monitoring and analyzing the concentration of anions in Amine solutions is crucial for maintaining optimal performance and ensuring the environmental sustainability of CO₂ capture process.

Why Analyze for Anions in Amine Solutions?

Regular analysis of anions in Amine solutions provides valuable information for optimizing CO₂ capture processes and ensuring their long-term effectiveness. Here's why monitoring anion concentration is critical:

Maintaining Optimal CO₂ Capture Efficiency:

The presence of anions in the amine solution can hinder its ability to absorb CO₂. By monitoring anion levels, operators can ensure the solution remains within optimal concentration ranges for efficient CO₂ capture.

Preventing Equipment Corrosion and Fouling:

Anions like chloride can contribute to the formation of heat-stable salts within the capture unit. These salts can lead to corrosion of pipes and equipment, as well as fouling of heat exchangers, ultimately hindering smooth operation and increasing maintenance costs. Early detection of rising anion levels allows for timely intervention, such as replacing the Amine solution or implementing cleaning procedures, to prevent these issues.

Optimizing the Amine Regeneration Processes:

Techniques like electrodialysis (ED) are employed to remove impurities and regenerate spent Amine solutions. Analyzing the anion content before and after regeneration helps assess the effectiveness of the ED process and allows for adjustments to optimize its performance. This ensures the regenerated amine solution remains free of harmful anions for continued efficient CO₂ capture.

Common Anions Found in Amine Solutions

The presence of various anions in Amine solutions can negatively impact CO₂ capture processes. Here's a breakdown of some

Determination Of Anions

W John Williams



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Anion Determination W John Williams,2013-10-22 Handbook of Anion Determination is a guidebook that details various methods that can be employed in determining anions The book is comprised of 62 chapters that are organized into four parts The text first covers general anions which include fluorosilicate perruthenate and vanadate The second part deals with halogen anions such as perchlorate perbromate and iodide Part III presents phosphorus oxyanions including orthophosphate monofluorophosphate and hexafluorophosphate The last part covers sulfur anions which include peroxodisulfate polysulfide and polythionates The book will be of great use to scientists from a wide range of scientific disciplines including biology physics metallurgy and engineering *Determination of Selected Anions in Water by Ion Chromatography* Marvin J.

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Determination of Anions in Natural and Treated Waters Thomas Roy Crompton, *Determination of Anions by Ion Chromatography*, 1980 Mixtures of various anions were separated on low capacity anion exchange resins with solutions of potassium benzoate potassium hydrogen phthalate or potassium citrate as eluents The separated anions in the effluent were detected by conductivity measurement A noticeable feature of this study was the use of a strongly acidic cation exchange column that served to convert simple ion salts to their acids with little or no effect on the background conductivity of the eluent This resulted in considerable enhancement of the sensitivity of detection and allowed the determination of anions in low concentrations ie from a few micrograms to nanograms per millilitre The technique was tentatively applied to the determination of anions in tap water and tungstic oxides

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The Assessment of Pellicular Anion-exchange Resins for the Determination of Anions by Ion Chromatography Elwyn Van Wyk, Kenneth Dixon, 1983 *Qualitative Anion-cation Analysis* Emil J. Margolis, 1962 *The Separation and Determination of Anions by Ion Chromatography* Christel Pohlandt, 1980 **Determination of Anions in Biological Samples by Ion Chromatography** Ratadej Chanwirat, Mahāwitthayālai Kasētsāt. Department of Chemistry, 2005 *The Determination of Anions in the Elektrolytic Way*

Joel Henry Hildebrand, 1906 **Anion Characterization of Florida Phosphate Rock Mining Materials and U.S. Cement Kiln Dust by Ion Chromatography** Gary W. Kramer, Benjamin W. Haynes, 1982 **Chemical Analysis of the Environment and Other Modern Techniques** Sut Ahuja, 2012-12-06

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