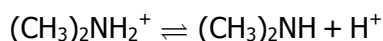


Abstracts

Pascale Bénézeth, Donald A. Palmer, and David J. Wesolowski Dissociation Quotients of Aqueous Dimethylammonium Ion

The acid dissociation equilibria involving aqueous dimethylammonium ion in the reaction



were measured potentiometrically with a hydrogen-electrode concentration cell from 0 °C to 290 °C in sodium trifluoromethanesulfonate (NaTr) solutions at ionic strengths of 0.1, 0.3 and 1 molal. The molal dissociation quotients and selected literature data at infinite dilution were fitted by an empirical equation involving six adjustable parameters involving functions of temperature, solvent density and ionic strength. This treatment yielded the following thermodynamic quantities at 25 °C and infinite dilution:

$$\begin{aligned} \log K_d &= -10.77 \pm 0.02, \\ \Delta H_d &= (50.8 \pm 0.7) \text{ kJ} \cdot \text{mol}^{-1}, \\ \Delta S_d &= (-35.8 \pm 2.5) \text{ J} \cdot \text{K}^{-1} \cdot \text{mol}^{-1}, \\ \Delta C_{pd} &= (116 \pm 11) \text{ J} \cdot \text{K}^{-1} \cdot \text{mol}^{-1}, \text{ and} \\ \Delta V_d &= (-4.3 \pm 2.5) \text{ cm}^3 \cdot \text{mol}^{-1}. \end{aligned}$$

George Lai

Performance of Automatic GMAW Overlays for Waterwall Protection in Coal Fired Boilers

The paper reviews the performance history of modern weld overlays applied by the automatic gas-metal-arc welding (GMAW) process in mitigating the severe wastage problems encountered for the waterwalls of coal-fired boilers. Commonly used overlay alloys of Type 309 stainless steel, Alloy 625 and Alloy 622 are discussed. Many boilers with overlaid water walls have accumulated service experience approaching 10 years with great success. Approximately 100 boilers with about 21 000 m² (227 000 ft²) of total waterwall area have been overlaid with the three overlay alloys. The weld overlay has been considered by the boiler owners/operators to be the most viable waterwall protection method for mitigating the severe waterwall wastage problems. Nevertheless, a couple of boilers of one boiler design have been found to show circumferential cracking for the 625 overlay. It has been found that this circumferential cracking was the result of preferential sulfidation attack due to overheating of the overlay surface layer to possibly 593 °C (1100 °F). Metallurgical issues on the overlay alloys are discussed. An alternate alloy for mitigating the preferential sulfidation attack due to overheating is recommended.

Michael H. Dorsey, George J. Licina, Brian J. Saldanha, and Richard C. Ebersole
Monitoring for Corrosion and Microbiological Activity in a Cooling Water System

Corrosion of heat exchanger tubes and carbon steel piping at a chemical processing plant had been attributed to a high level of microbiological activity in the cooling water. Two electrochemical biofilm activity sensors with integrated data acquisition and data analysis capabilities were installed in the plant's cooling system to augment the coupon-based corrosion monitoring activity. Those sensors provided the plant with an on-line measurement and early detection of biofilm activity on metallic surfaces. Sensor response was correlated with coupon examinations, determinations of biocide residuals, and determination of the numbers and types of microorganisms. Results from the plant monitoring activity are described. These results emphasize the necessity to integrate the various types of field and laboratory data to monitor and effectively control microbiologically influenced corrosion.

Jørgen Peter Jensen and Karol Daucik
Solubility of Sodium Sulfate and Sodium Hydroxide in Superheated Steam

The solubility of sodium sulfate in superheated steam was investigated in laboratory-scale experiments up to 25 MPa and 600 °C. These experiments were carried out using a dynamic method where deionized steam was passed through a packed bed of salt crystals in a 500 mL Hastelloy autoclave. The residence time of the steam in the salt bed was sufficient to saturate the steam with the salt. The steam samples were cooled and analyzed by ion chromatography.

A "density" model was selected to correlate the experimental data of the solubility of sodium sulfate in superheated steam. The density dependence is much stronger than the temperature dependence. By using this type of correlation, it is possible to estimate the solubility of salt in steam at lower densities than those used in the experiments.

Enthalpy-entropy diagrams are given that show the steam expansion line in turbines, including curves for constant concentration of sodium sulfate and sodium hydroxide solubility in steam. These can be used to analyze where in the steam cycle sodium sulfate and sodium hydroxide may deposit.

Albert Bursik
Boiler Tube Failures in Industrial Drum-Type Steam Generators
Part 3: Alternative Cycle Chemistry Treatments

Part 1 of this paper dealt with the major differences between steam generation in utility boilers and in industrial steam boilers and other steam generating apparatus (e.g., differences in design, material selection, and cycle contaminants) and treated some site-specific issues influencing cycle chemistry. Part 2 dealt with the applicability of internationally accepted boiler water treatments and with their influence on the occurrence of boiler tube failures.

This part (the third part of a four-part publication) discusses the applicability of amine-based plant cycle treatments which are covered neither by the VGB Guideline for Boiler Feedwater, Boiler Water, and Steam of Steam Generators with a Permissible Operating Pressure of > 6.8 MPa nor by the set of EPRI Cycle Chemistry Guidelines for Fossil Plants.

Kevin J. Shields und R. Barry Dooley

Die Rolle der chemischen Reinigung bei der Vermeidung und Behandlung von Rohrschäden

Die chemische Reinigung ist, wird sie richtig angewandt, eine wertvolle Hilfe, welche benutzt wird, um Rohrschäden, die mit Überhitzung und Korrosion bedingt durch wasserseitige Beläge verursacht werden, zu verhindern. In vielen Fällen wird die chemische Reinigung allerdings zu einem zusätzlichen Kostenfaktor, welcher mit der Beseitigung von Rohrschäden in Verbindung steht. Der Beitrag befasst sich hauptsächlich mit Verfahren, die angewendet werden, um den wasserseitigen Zustand der Rohre abzuschätzen und den Bedarf an Reinigung zu bestimmen, wie sie in konventionellen Anlagen üblicherweise praktiziert werden. Es werden des weiteren die Beurteilung der Eignung und die möglichen Einschränkungen bei der Anwendung dieser Verfahren an Kombianlagen mit Abhitzekeesseln diskutiert.

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