PowerPlant Chemistry®

International Edition | ISSN 1438-5325 | Volume 11 (2009), No. 2
February

Abstracts

Behaviour of Copper in Generator Stator Cooling Water Systems

Robert Svoboda and Donald A. Palmer

Water-cooled generators with hollow copper strands frequently suffer from deposition of copper oxides that clog them and thus impair cooling water flow. Solubility is one of the factors governing the release and the re-deposition of copper oxides. Results presented in this paper indicate that under generator cooling water conditions the solubility of copper oxides is dependent on pH and also, to a lesser degree, on temperature. In pure or moderately alkalized (pH < 10 at 25 °C) water, the solubility of copper oxides increases with increasing temperature. The dependence is stronger for Cu_2O than for CuO. At acidic conditions in a generator, the solubility of CuO decreases slightly with temperature. The apparently contradictory information in the literature – whether the solubility decreases or increases with increasing temperature – is probably a result of differing test conditions, or a differing mix of copper oxides, or of experimental differences, or of a combination of these effects. In strongly alkaline conditions it is unambiguous that the solubility of both oxides increases significantly with increasing temperature.

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Legionella Control in Power Station Cooling Towers Using Oxidising Biocides

Christian Sailer, Julia Rawlinson, and Paul Killeen

Power stations have used oxidising biocides such as chlorine or bromine for many years to control microbial growth in their cooling towers. In this paper Ecolab™ looks at the direct effect halogen concentration has on *Legionella* populations in order to determine the most effective halogenation rate required to ensure that the site key performance indicator (KPI) of < 100 colony-forming units (cfu) per mL can be maintained.

PowerPlant Chemistry 2009, 11(2)

The Chemistry and Properties of Organic Boiler Feedwater Additives Based on Film-Forming Amines and Their Use in Steam Generators

Wolfgang Hater, Niels Rudschützky, and David Olivet

Film-forming amines have been successfully used for a number of decades to treat boiler feedwater, especially in industrial power plants. The results of recent studies of their properties and the results of operational trials should close the existing gaps in our knowledge of film-forming amines, so that this technology can be incorporated into the appropriate guidelines for the treatment of steam generators.

PowerPlant Chemistry 2009, 11(2)

Effective Monitoring and Control in Steam Generating Systems

Irvin J. Cotton

The objective of the water treatment for any type of boiler system is to prevent metal failure due to corrosion, minimize deposition on heat transfer surfaces, and to maintain steam purity.

This paper reviews the newer ASME recommended guidelines for sampling, monitoring and control of water chemistry in steam generating systems. Sample points, sampling parameters, recommended sample frequency and analytical methods and interferences are discussed. The need for site-specific water chemistry is discussed, including the requirements for process steam quality, potential contamination issues and meeting manufacturer's requirements.

A growing number of new power stations are now being equipped with air-cooled condensers. One of the most commonly used designs employs a large area of finned carbon steel tubes that has been shown to be prone to corrosive attack. It is known, however, that this attack can be minimised by increasing ammonia levels in the bulk condensate to a pH of about 9.8–10. This paper considers the possibility of using a volatile amine with ammonia to ensure that the pH in the early condensate droplets formed in air-cooled condensers is high enough to suppress any corrosion.

An overview of various refinery and petrochemical steam generating systems, including HRSG designs, and major common water-related problems is given. Methods to minimize corrosion in these systems and basic corrosion reactions throughout the cycle, along with chemistry guidelines and monitoring requirements, are discussed.

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Flue Gas Condensate and Energy Recovery

Milan Teppler, Jonathan Wood, and Patrick Buzzell

Energy plants in Europe are increasingly turning to biosolids as an alternative to traditional non-renewable fossil fuels. Biosolids have a high water content, resulting in a flue gas with 30–50 % water. Radscan has developed a process to treat and recover 90 % of this flue gas condensate for reuse as boiler makeup water, while recovering considerable energy from the hot gas. The process uses a combination of scrubbers, heat exchangers, ultrafiltration, reverse osmosis, membrane degasification and electrodeionization. This report will describe a commercial system that has been in operation for over two years, and has paid for itself in energy savings.

PowerPlant Chemistry 2009, 11(2)

PPChem 101 – Fossil Cycle Chemistry
Lesson 12:
Minimum-Level Instrumentation for Plant Cycle Chemistry Monitoring

In the February 2008 issue, we introduced our project PPChem 101 "Fossil Cycle Chemistry" with the first lesson (*What Is Plant Cycle Chemistry and Why Is It Important for Steam and Power Generating Plants?*). With this lesson, *PPChem 101 – Fossil Cycle Chemistry* is completed. PowerPlant Chemistry acknowledges the mostly very positive response from its readers. Your recommendations with respect to comparable future projects are appreciated.

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