PowerPlant Chemistry® **The Journal of All Power Plant Chemistry Areas**

International Edition **ISSN 1438-5325 March** **Volume 7 (2005), No. 3**

Abstracts

Coolant Technology and Experience in VVER Units
Milan Zmítko and Jan Kysela

The primary coolant technology approaches currently used in VVER units are reviewed and compared with those used in PWR units. Standard and modified water chemistries differing in boron/potassium control are discussed. Preparation of the VVER Primary Water Chemistry Guidelines in the Czech Republic is noted. Operational experience of some VVER units operated in the Czech Republic and Slovakia in the areas of the primary water chemistry and radioactivity transport and build-up are presented. In the Mochovce and Temelín units, a surface preconditioning (passivation) procedure has been applied during hot functional tests. The main principles of the controlled primary water chemistry applied during the hot functional tests are reviewed and the importance of the water chemistry, technological and other relevant parameters is stressed in regard to the quality of the passive layer formed on the primary system surfaces. The first operational experience obtained in the course of the commissioning of these units is presented, mainly with respect to the corrosion product level in the coolant and surface activities of the corrosion products. The effect of the initial passivation performed during hot functional tests and the primary water chemistry on the radioactivity level and radiation situation of corrosion products is discussed.

PowerPlant Chemistry 2005, 7 (3)

Stress-Assisted Corrosion: Case Histories
Ewa M. Labuda and Robert D. Bartholomew

Three case studies involving waterwall and economizer tubes from a conventional type boiler and a high pressure primary superheater header removed from a heat recovery steam generator are presented. In each case, results of visual examination, scanning electron microscopy/energy dispersive X-ray spectroscopy, and optical metallography are provided. Corrosive environments and possible stresses that led to failures are discussed.

PowerPlant Chemistry 2005, 7 (3)

Stress-Assisted Corrosion Simulation in the Laboratory

Preet M. Singh, Jorge J. Perdomo, Jamshad Mahmood, and Pablo Conde

Stress-assisted corrosion (SAC) of boiler tubes and economizer tubes from the waterside is one of the major problems in availability loss and safety of power plants and industrial boilers. Use of carbon steel for the service of high temperature water applications strongly depends upon the formation and stability of the protective magnetite oxide film, Fe_3O_4, on the waterside surface of boiler tubes. Failure mechanisms involved in waterside SAC surely include film damage as an important step. To understand SAC, a recirculation-loop autoclave facility for high temperature water testing was set up. The autoclave is designed for tests under industrial boiling water conditions. The maximum operational temperature is 350 °C, with test pressures of up to 24.1 MPa (3 500 psi) and flow rates of up to 10 $L \cdot h^{-1}$. Boiler water chemistry can be changed during the tests and the dissolved oxygen can be controlled within the range of 10 $\mu g \cdot kg^{-1}$ to 32 $mg \cdot kg^{-1}$. Initial tests were conducted to develop magnetite film on carbon steel tube samples at different temperatures.

PowerPlant Chemistry 2005, 7 (3)

Wet Oxidation of EDTA Using Metal-Doped MCM-41 as Catalyst

Keezhanatham Srinivasan Seshadri, Muthiah Pushpa, Pradeep Kumar Sinha, and
Kamal Behari Lal

Decontaminants like ethylenediaminetetraacetic acid (EDTA), ascorbic acid, and citric acid are widely used in the radioactive decontamination of reactor components. The complexants interfere in the treatment of radioactive effluent and hence it is imperative to oxidatively destroy the complexant to enable easy treatment of radioactive effluent. An attempt has been made to oxidatively destroy EDTA using hydrogen peroxide as oxidant in the presence of metal-doped MCM-41 as catalyst. The reason for using metal-doped MCM-41 as catalyst for the oxidative degradation is because of its larger surface area (~ 1 000 $m^2 \cdot g^{-1}$) with small pore size (20–100 Å). Also the metal used has variable valency, which helps in undergoing electron transfer reactions. Metal-doped MCM-41 was synthesized. Results indicate that among the metals chosen for doping MCM-41, the catalytic efficiency in the oxidative degradation decreased in the following order: molybdenum > vanadium > titanium..

PowerPlant Chemistry 2005, 7 (3)

Power Plant Cycle Chemistry – A Currently Neglected Power Plant Chemistry Discipline
Albert Bursik

Power plant cycle chemistry seems to be a stepchild at both utilities and universities and research organizations. It is felt that other power plant chemistry disciplines are more important. The last International Power Cycle Chemistry Conference in Prague may be cited as an example. A critical reviewof the papers presented at this conference seems to confirm the abovementioned statements.

This situation is very unsatisfactory and has led to an increasing number of component failures and instances of damage to major cycle components. Optimization of cycle chemistry in fossil power plants undoubtedly results in clear benefits and savings with respect to operating costs. It should be kept in mind that many seemingly important chemistry-related issues lose their importance during forced outages of units practicing faulty plant cycle chemistry.

PowerPlant Chemistry 2005, 7 (3)

pH – A Simple Measurement Most Frequently Done Incorrectly
Eric V. Maughan

pH is the most popular analytical process measurement. Despite this, it is also very often misinterpreted. This paper will attempt to explain the measurement of pH, the pitfalls and the influences which other variables have on this analytical method.

PowerPlant Chemistry 2005, 7 (3)