

ABSTRACTS

Three Years of Experience with Polyamines in the High Pressure Steam System of a Naphtha Cracker

Roy van Lier, Gerard Janssen, and Jo Savelkoul

The design and operation of the high pressure steam system of a naphtha cracker pose specific problems which in some cases cannot be satisfactorily resolved with conventional water/steam treatment programs. Following a decade of operational experience with polyamine products at lower pressures at the Geleen (petro)chemical site in the Netherlands, the ammonia/morpholine treatment of the 12.5 MPa steam system of one of SABIC Europe's naphtha crackers was converted to a polyamine program in November 2005. In this paper, the characteristics of the cracker's steam system are first described. Particular aspects of the conversion are then discussed. Finally, the experience gained and insights obtained into the polyamine treatment during the first three years are elaborated.

PowerPlant Chemistry 2008, 10(12)

Carbon Is Not Equal to Carbon – An Update (Comments on TOC Discussions)

Albert Bursik

Organics has resounded throughout the world. This paper tries to clarify some of the most frequently discussed organic matter-related issues. In particular focus are the behavior of organics and organic plant cycle treatment chemicals in fossil plant cycles and the pros and cons linked with the application of the polyamine/amine treatment. The importance of cation conductivity monitoring in the plant cycle is emphasized, if necessary by means of degassed cation conductivity instruments. It is demonstrated that further independent investigations of the polyamine/amine treatment are required.

PowerPlant Chemistry 2008, 10(12)

Primary Water Chemistry and High Temperature Filtration System Experience at Temelín WWER-1 000 NPP

Kateřina Vonková, Jan Kysela, Miroslav Martykán, Jaroslav Janešík, and Václav Hanus

This paper contains a summary of the water chemistry utilized at the Temelín Nuclear Power Plant from the start of its operation, with a focus on the high temperature filtration (HTF) units. It contains the results of the monitoring of the radiation situation in the main system components with the help of in-situ gamma spectrometry and the measurement of radioactivity of corrosion products in the coolant and on the surface.

A positive effect of HTF has been observed during the early cycles of equipped reactor units. This paper deals with the issue of the behaviour of HTF and its effect on the entire primary circuit. An analysis of an HTF system is performed in this paper. Operation experience from the Temelín Nuclear Power Plant and other WWER (water-water energetic reactor, a Russian nuclear power reactor of pressurized water reactor type) units is compared.

PowerPlant Chemistry 2008, 10(12)

Influence of Operational and Shutdown Chemistry on Dose Rate Build-up at WWER-440 Units

Ivan Smieško and Igor Skorvaga

This paper presents results of a study performed on the operating data of two WWER-440 reactors (water-water energetic reactor, a Russian nuclear power reactor of pressurized water reactor type) in the nuclear power plant Jaslovské Bohunice in Slovakia. The influence of the primary coolant pH at temperature, pH (T), during selected periods of operation (including the shutdown process prior to refueling outages) on dose rate build-up was studied. Coordinated shutdown chemistry was applied during several recent shutdown processes, and results are presented and discussed. The role of other operations performed during shutdown and outage was also analyzed.

Very good operating results of two WWER-440 units which have been operating for 24 years are presented. In-situ gamma spectrometry measurement results show low and relatively stable radiation fields of primary circulating loops. Some correlation was found between "beginning of cycle" chemistry and dose rate build-up. Coordinated shutdown chemistry based on moderation of primary coolant pH (T) changes during the shutdown process was tested during several shutdowns. The aim of such a treatment was suppression of activated corrosion product mobilization and redeposition. Experience with this treatment indicates some promising results, but analysis is hampered by the interference of various factors and more operating experience is needed for trustworthy conclusions. There were no clear correlations identified between shutdown and outage primary loop manipulations and dose rate build-up.

PowerPlant Chemistry 2008, 10(12)

Carbon Steel Corrosion in Water-Cooled Condensers

Andrew Howell

Iron released from carbon steel components in the condenser is often not viewed by power plant operators as a major concern, but in some cases the amount of iron oxide transported to the feedwater can be significant and may contribute to the various problems that result from heavy boiler deposits (frequent chemical cleanings, boiler tube failures by a variety of deposit-induced mechanisms). As with any corrosion mechanism, steps to properly address the issue require knowledge of the corrosion process, however the mechanism for the corrosion of steel in water-cooled condensers has not yet been described. This contribution provides photographic documentation of carbon steel corrosion in a condenser, and proposes a partial mechanism for this corrosion. Then a scheme is proposed to help initiate further discussion and investigation towards the resolution of this issue.

PowerPlant Chemistry 2008, 10(12)

Photocatalytic Performance of Nano-Sized β - and γ -Ga₂O₃ for the Degradation of Hydrazine in Aqueous Solution under Ambient Conditions

Hariharan Seshadri, Palagummi Sasidhar, Sriperumbudur Echambadi Kannan, and Pradeep Kumar Sinha

We report on photocatalytic degradation of hydrazine (N₂H₄) using nanophased wide band gap β - and γ -Ga₂O₃ under ambient conditions using UV radiation ($\lambda_{\text{max}} = 254 \text{ nm}$) and compare this with a benchmark photocatalyst, P-25 TiO₂ (P-25). The average particle size of the combustion-synthesized photocatalysts was estimated (X-ray diffraction studies) to be 30 and 3 nm respectively for β - and γ -Ga₂O₃. Hydrazine degradation was followed by a spectrophotometric procedure. Though complete degradation of hydrazine was achieved in less than 2 h using all the catalysts, the kinetics of degradation was found to be in the order β -Ga₂O₃ \geq P-25 TiO₂ $>$ γ -Ga₂O₃. It was found that neutral and alkaline pH conditions favour the higher kinetics for hydrazine degradation whereas the acidic pH does not. Degradation of hydrazine results in the formation of innocuous products such as nitrogen and water in addition to trace quantities of nitrate. The requirement of the catalyst for the above degradation is as low as 3 mg for 1 000 mL of 100 mg · kg⁻¹ hydrazine.

PowerPlant Chemistry 2008, 10(12)

PPChem 101 – Fossil Cycle Chemistry**Lesson 10:****Boiler Water Treatment – Part 3**

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?*). This – tenth lesson – deals with the boiler water treatment. This time, the focus is on the boiler water treatment in which both Volatile and non-volatile (solid) chemicals are applied.

PowerPlant Chemistry 2008, 10(12)