

Abstracts**Matthias Koebel and Robert Svoboda****Investigations on the Temporal Stability of Ultrapure Water Samples by Means of Ion Chromatography**

As part of the VGB research project # 182 "Chemistry of the Phase Transition in Steam Turbines" we have carried out an analytical study employing state of the art $\mu\text{g} \cdot \text{kg}^{-1}$ ion chromatography to investigate the long-term storage stability of ultrapure water samples in PP (polypropylene) and FEP (fluorinated poly-ethylene-propylene) storage media. In the case of chloride, sulfate, sodium, and potassium, over a period of 28 days we found no evidence of interactions with the storage media. This is reflected in the excellent temporal stability of blank water samples (no dissolution of ionic compounds from the polymer material) and diluted ionic cocktails (no adsorption or exchange reaction between sample and storage container). After 28 days, we found a 10 % decrease in ammonium. We therefore recommend analyzing samples for their ammonium content within 14 days. FEP bottles are ill suited for the analysis of fluorides due to their release of such ions; in polypropylene, however, no such effects on fluorides could be observed. Over all, the additional efforts connected with the use of FEP bottles in addition to PP bottles cannot be justified. Depending on the sample composition ("cocktail" or "blank"), we found decomposition as well as formation of the low molecular carboxylates acetate and formate within a few days. Based on this work it is possible to ship ultrapure water samples from anywhere in the world to a given analytical laboratory, confident that a measurement will yield a representative result of its ionic contents.

VGB Conference "Chemistry in Power Plants 2003"

This year's VGB Conference *Chemistry in Power Plants* took place in Essen, Germany, on October 22–23. This paper presents extended abstracts of all the papers presented at this conference.

Ruedi Germann**Automation of Analytical Systems**

The paper explains the possibilities and limitations of automation of analytic systems used for cycle chemistry surveillance in fossil and nuclear power plants. The most important interrelations among sample input conditions, actual analytical devices and output information are discussed. Among other things, the author presents some examples of verification of values measured, a cation conductivity measurement with integrated automated quality assurance, and automated quality assurance systems.

Walter Guhl, Wolfgang Hater, and Thomas Hörtinger
The Environmental Behavior of Water Treatment Products in Cooling Water System

Water treatment products must be technically and economically effective; in addition, they have to be environmentally compatible, because they are generally discharged directly into the receiving water. Teamwork between product development, application technology and ecology from the beginning of the development of water treatment products leads to economically and ecologically optimised products, specially tailored for use in cooling systems. The ecological profile of a hardness stabiliser with long-term effectiveness (P3-ferrofos 8444) shows that the product degrades slowly after use in the receiving water, but due to its nontoxicity to water organisms, the environment will not be affected. A hardness stabiliser for shock dosage (P3-ferrofos 8413-3) is nontoxic, too, but is additionally rapidly biodegradable. When using the biocide for shock dosage, the product is destroyed in the environment by hydrolysis within a few minutes to some hours, so that a negative influence on the environment can be excluded. To reduce the biocide quantity, a biocide activator and dispersant (P3-ferrofos 8460) with a very low toxicity to water organisms is used.

This product is eliminated slowly, but enrichment in the receiving water can be excluded. The product properties promised by the producer have been confirmed by use in a German power station for several years. The hardness stabilising properties of the two products are determined by the threshold effect of the phosphonic acid composition and the polycarboxylic acid compounds, so that the concentration of use is very low. In the same way that the products stabilise the hardness components to harmless aggregates, the mostly small organisms (bacteria, algae, protozoa) are stabilised, too, and eliminated with the effluent without any problems for the cooling system. It could be shown that the loss of product corresponds to the biological growth. Therefore, it is possible to reduce the application of biocide and biocide activator to one treatment per year. A specialty of this power station is the fish culture in by-passes of the cooling system. By a well-controlled dosing of the products, the fish are not impaired; any negative influence on the water conditioning, however, could be excluded by an optimisation of the fish feeding. With this collaboration between producer, ecology, power station management and fish culture, we can speak of a symbiosis between technology and nature.

Stephen W. Najmy
Ion Exchange Resin Analysis: What It Means and How It Helps

Sampling and analyzing ion exchange resin is a key part of ensuring long-term performance of the resin system in regard to product water quality and operational cost efficiency. This paper presents laboratory evaluation test methods essential for characterizing the mixed bed ion exchange resin used in steam cycle condensate polishing.

Ken McGrath

Independent Review of Operational Chemistry Practices at Power Plants

Management at both the local and corporate levels need an assurance that their power plants are being operated by best practice and to internationally recognised standards. A review of operational chemistry practices can provide a level of this assurance through an assessment of the quality and status of the chemistry of the power cycle. In this paper the author describes the review process he adopts and recommends. It is stressed that a review should involve the services of an experienced independent practitioner. The resulting benefits of a review are identified, as are some of the potential pitfalls.

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