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FOR THE PROPERTIES OF WATER AND STEAM

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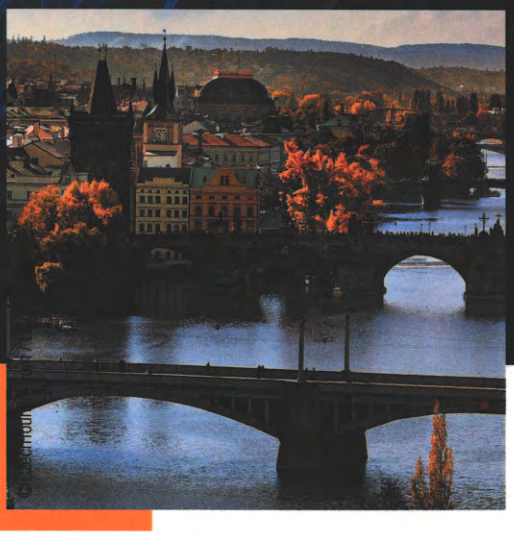
2–6 SEPTEMBER 2018
PRAGUE MARRIOTT HOTEL, PRAGUE, CZECH REPUBLIC



INSTITUTE OF THERMOMECHANICS
THE CZECH ACADEMY OF SCIENCES

PROGRAMME & ABSTRACT BOOK

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O 43

Distribution ratios of polyamines present in Helamin chemical between boiling water and saturated steam

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The test data on the effect of pressure on distribution ratio of polyamines between boiling water and saturated steam during treatment of boiler water with different grades of Helamin are presented. The tests were performed at two pressures: 0.2 and 7.0 MPa. The test results showed different pattern of pressure effect on distribution ratios of polyamines for different Helamin grades. For the BRW-150 grade, pressure increase resulted in decrease in polyamine distribution ratio; for the 906H grade, pressure did not virtually have any effect on the distribution ratio, and for the 90H Turbo grade, increase in pressure made polyamine distribution ratio higher. In addition, polyamine distribution ratio was influenced by composition of other chemicals present in boiling water.

O 44

AVT vs FFAP treatment: comparison of key indices

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The TGD8-16 issued by IAPWS in 2016 stays that "It is extremely important that the key objectives and performance indicators are identified and monitored prior to and during the application of a FFA/FFAP" and that "the best way of determining the baseline is through measurement of the key indices for the cycle chemistry, especially total iron (and total copper and/or aluminum if the plant contains these metallurgies) under the conditions of the chemistry before the application of the FFA/FFAP treatment."

This presentation consists of comparison of water chemistry before and after FFAP application for different power plants. The impact of FFAP on CACE of the steam. The iron concentrations before and after the application of FFAP. What other benefits and risks were noted during FFAP application.

O 45

Adsorption of oleyl propylenediamine on metal surfaces

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Operation of water/steam cycle is threatened by corrosion unless proper conditioning measures are taken. As an alternative for traditional cycle chemistry film forming amines (FFAs) is getting increasingly important.

FFAs inhibit corrosion by being adsorbed on the metal surface as a thin film. Efficiency of FFA is reported for various applications in power plants, which operate continuously or under wet/dry lay-up conditions.

Oleyl Propylenediamine (OLDA) is an effective film former. This contribution presents the results of an extensive study on adsorption characteristics of OLDA on metal surfaces: stainless steel, carbon steel, copper and aluminum alloys. Tests were carried out with different OLDA concentrations and at different temperatures.

Adsorption of OLDA is accelerated with temperature and follows first order kinetics. Moreover, surface coverage of OLDA was determined being greatly influenced by the metal used. Selected findings are compared to data obtained with other FFA.

O 46

Thermal decomposition of film forming amines in the power generating cycle

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Film forming amines (FFA) have been used as organic feedwater additives in the power industry for several decades. However, the utilization of FFA is still accompanied by a huge lack of data related to their decomposition in power water/steam cycle conditions and the impact of decomposition on power plant operation. In this paper the state-of-the-art for thermolysis of film forming amines in the water/steam cycle of thermal power plants is presented. A comprehensive critical review and a thorough analysis of research findings have been performed. Attention is primarily given to the commonly used filming amines: octadecylamine (ODA), oleylamine (OLA), oleil propylendiamine (OLDA). The results both obtained in industrial steam generators and laboratory high temperature conditions were analyzed. The possible mechanism of thermal decomposition of film forming amines was explained, the decomposition products were discussed, the deposition rate was considered and the most important parameters influencing thermal decomposition were identified. All obtained results are consistent in regard to organic acids which have been found in extremely low and harmless concentrations. On the basis of the published data it may be also stated that the decomposition products of film forming amines were: ammonia, acetic acid, hydrogen, carbon monoxide and methane. The results indicate that advanced fundamental scientific background information and additional research, allowing for a complexity of multicomponent solutions, are needed to improve the understanding of the thermolysis of film forming amines in order to facilitate their application in the power industry and provide their safe and effective application in industrial facilities using the high temperature water.

PCC6: CYCLE CHEMISTRY IN VARIOUS PLANTS

5 September 2018, 15:30 – 16:50 — **BOHEMIA 2**

O 63

Sulphate adsorption on magnetite under steam generator chemistry conditions

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Magnetite is a major corrosion product of carbon steel that forms deposits in the steam generators in water cooled nuclear reactors. Sulphate is present as an impurity in the steam generator feedwater that accumulates in the magnetite deposits within the steam generators and leads to formation of acidic crevices, which can affect corrosion and stress corrosion cracking of steam generator tubing. Reliable adsorption data are required to understand material degradation of steam generator tubing. Sulphate adsorption onto magnetite has been studied at temperatures from 25 to 300 °C as a function of pH, and chloride and sulphate concentrations. The results show that adsorption decreases with increasing pH and ionic strength, and adsorption followed Langmuir adsorption isotherm. Overall, sulphate adsorption onto magnetite is endothermic and the enthalpy of adsorption depends on the pH and ionic strength of solutions. Sulphate adsorption onto magnetite likely can lessen steam generator tube degradation in acidic conditions.

O 64

Makeup water treatment systems in nuclear power plants

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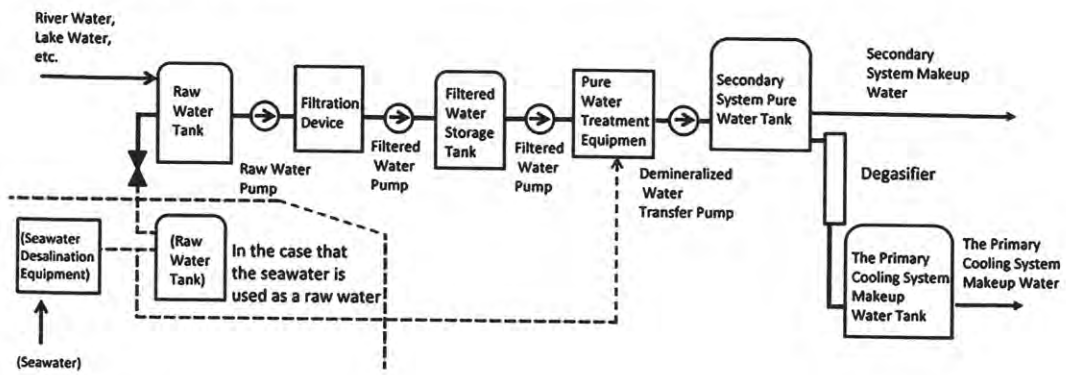
Introduction

The manufacturing process of the makeup water in the nuclear power plants and the fossil power plants is fundamentally the same. However, as for the nuclear power plants, the concentration management of the impurities being contained in the makeup water which affects the water qualities of the reactor coolant is very important issue. The impurities of reactor coolant affect the long-term integrity of nuclear power plants.

PWR Makeup Water Treatment System

Schematic makeup water system of PWR is shown in Figure 1. As shown in Fig.1, the makeup water made after various processes from the raw water is sent to the secondary system pure water tank and to the primary cooling system makeup water tank through a degasifier.



The makeup water of a primary cooling system is supplied to the chemical volume control system (CVCS). Primary coolant system makeup water mainly aims at the dilution of boric acid which is used to control reactor core reactivity. Because