



Press Release – IAPWS 2023

Executive Committee and Working Group Meetings

Between September 3rd – 8th, 2023, 62 scientists, engineers and guests representing 20 countries converged in Turin, Italy at the Star Hotel Majestic for the annual meetings of the IAPWS Executive Committee and Working Groups. This continues a series of meetings that began in 1929 in London, UK with the purpose to connect scientists and researchers with the industry operators, engineers and managers who use their work. Collaboration and engagement across these varied groups provides guidance to the researchers on topical problems within industry and provides the engineers with the latest research results for direct application in their facilities.

The main meetings included discussions around power cycle chemistry, high temperature aqueous technologies applicable to steam cycles and hydrogen generation, oceanography and global climate modelling, geothermal steam, electrode boilers, power cycles with CO₂ capture and storage systems and combined heat and power systems.

IAPWS produces releases and guidelines on the recommended scientific formulations for physical and chemical properties of water in its various forms as well as technical guidance documents that are the concerted opinion of IAPWS members on the best operating practices for power plant chemistry. IAPWS also documents certified research needs that represent the opinion of experts in their respective fields that a research topic is greatly needed to fill a current gap in knowledge. All this information is freely available and can be found on the IAPWS website at www.iapws.org.

As traditionally held during the middle of the annual IAPWS meeting, the 2023 IAPWS Symposium entitled “Underpinning the Seawater Science” was focused on oceanographic research and climate modelling. Nine presentations intrigued the IAPWS delegates and additional Symposium attendees from diverse areas of ocean science including state-of-the-art measurements for carbon dioxide and dissolved oxygen in sea water, aspects of physical properties such as sea water density and salinity, acoustic thermometry



in oceanic environments and emerging technology including hybrid ocean-wave power conversion systems. No Helmholtz award was presented this year. Following the Symposium, the delegates were treated to a private tour of the Egyptian Museum where exhibits from various epochs of antiquity enlightened the group. The IAPWS banquet was held at the magnificent Stupinigi Palace where the delegates were treated to stunning architecture and Italian hospitality.



IAPWS, through the various working groups, produces releases and guidelines, technical guidance documents (TGD) and IAPWS certified

research needs (ICRN). These can be found for free download on the IAPWS website at www.iapws.org.

The Thermophysical Properties of Water and Steam (TPWS) working group is developing an IAPWS guideline to provide enhancement factors for the solubility of water vapor in important gases at elevated pressures. As a pilot project, one system (presumably water-argon) will be chosen. Initial work involving new, theoretically calculated second and third virial coefficients and transport properties for the water-argon system were reported at the meeting.

The Industrial Requirements and Solutions (IRS) working group proposed a white paper as a progression toward development of a TGD on estimating low sulfur dew point in GTCCs to prevent acid corrosion and discussed future directions of IRS. A task group was established to define issues in industrial calculation needs for steam properties involving the translation of IF97 Fortran routines into other programming languages. There is on-going activity on wet steam properties, new calculation needs for mixtures with H₂O and other medium for geothermal or renewables including CO₂ cycle and H₂ combustion to establish IAPWS formal guidelines in future.

The Physical Chemistry of Aqueous Systems (PCAS) working group discussed reactions of alkyl amines in water at high temperatures with the goal of understanding reactions of film-forming amines (FFA). Re-evaluation of the database and formulation for the ionization constant of water and the comparison of experimental and computational results were discussed with the goal to develop a new guideline. Thermal effects of cavitation in water were also discussed. These topics are all relevant to the basic understanding of corrosion processes.

The Power Cycle Chemistry (PCC) working group had a productive week with a focus on progressing and completing TGDs that are currently in progress via ongoing white paper development. Areas of active work include corrosion product transport in cycling plants, flue gas condensate use or reuse and dew point of low sulfur exhaust gas. An open and robust review of the future of PCC was conducted and resulted in topics to develop an action plan to enhance the reach of PCC in the future including new areas of interest such as hydrogen production and use.

IAPWS welcomes scientists and engineers with interest in the thermophysical properties of water, steam, and aqueous systems and in the application of such information to industrial uses. The next IAPWS meeting will be the 18th International Conference on the Properties of Water and Steam (ICPWS) to be held in Boulder, USA from the 23rd – 28th June 2024. Further information on meetings can be found at the IAPWS website (www.iapws.org) as it becomes available. People interested in IAPWS documents and activities should contact the chairman of their IAPWS National Committee (see website) or the IAPWS Executive Secretary, Dr. R. Barry Dooley, bdooley@iapws.org. People do not need to be citizens or residents of member countries to participate.

