

Power Cycle Chemistry Committee Minutes, July 22-25, 2002

July 22, 2002

Agenda adopted with modifications

- Structure of IAPWS
- Symposium schedules
- Gibbs committee member
- Atlas issues

James Bellows volunteered for Clerk of minutes.

Discussions on IAPWS Structure

- Long term research strategy (roadmap) –PCC-PCAS joint effort. ICRN's are a building block. (PCC needs more vision)
- How do we help PCAS get funding?
- Procedures for getting EC funding
- Advertise ICRN's
- Need from PCAS: Closure statements and references
- PCC needs more free discussion
- Vision ideas
 - What will we need for the new ultrasupercritical plants
 - Chemistry programs
 - Instrumentation
 - Issues in two-phase chemistry
 - Solution chemistry
 - Chemical Thermodynamic Database—this could be just recommendations
 - Assess need for metallurgists and corrosion engineers—other organizations exist—what is IAPWS role?
 - What visibility does PCC have outside IAPWS

International Collaborations

Proposal:

- From Czech Republic—with Don Palmer
- Condensation and kinetics from physical chemistry view
- Have condensation rates computer program for water mixtures
- Oak Ridge might provide data (along saturation line to fairly high pressures), boiling and cavitation

(Symposium on power cycle chemistry with PCAS)

July 23, 2002

International Collaboration Proposal adapted

Proposal for Collaboration proposal:

Formulations for the viscosity...heavy water

PCC Representative to Gibbs Award Committee: Karol Daucik

Attachment 7

Discussion of Atlas: Chapter 14 to be fully drafted by September 30. Andre will take this date to Atlas meeting this afternoon.

IAPWS Structure Committee

(Anneke Sengers, Jeff Cooper, Roberto Fernandez Prini, Koichi Watanabe)

Anneke remarks

What are functions and purpose of each working group

Input by noon on Thursday

Prefer in put in written form

Work down to a few positions if unanimity is not achieved

Questions:

1. Which product of your working group do you consider as your most valuable achievement of the past 5 years
2. Please formulate a vision of the future directions of electirc power generation, including new technologies and reduced environmental impact.
3. Could you envision alternative Working Group structures that would make IAPWS work more effectively and more productively.? Consider merger of existing WGs, creating new WGs, different ways of organizing the working week, and different spacings of the IAPWS Conferences, or any other constructive ideas

July 23, 2002

Tuesday morning technical presentations

July 25, 2002

Thursday morning technical presentations

1. Questions:

Which product of your working group do you consider as your most valuable achievement of the past 5 years

- *ICRNs on surface tension and on Na₂SO₄ distribution between water and steam*
- *International Collaboration project reports on nucleation and on solubilities in steam*
Power cycle sessions at ICPWS 13
(Technical reports on thermochemistry of water/steam phase, Progress in power plant chemistry, Case studies)

2. Please formulate a vision of the future directions of electirc power generation, including new technologies and reduced environmental impact.

DRIVERS

- *Reduced emissions: CO₂, NO_x, SO_x,*
- *Reduced water use*
- *Reduce Cost, capital and production*

Options for coal

- *High pressure/high temperature plants (ultrasupercritical)*
- *Integrated coal gassification*
- *Pulverized fluidized bed combustion*

Options for gas

- *Combined cycle plants*
- *Water injection/recovery*
- *Fuel Cells*

General

- *Reduced Staffing—automation and sophisticated monitoring*
- *Optimize economic life*
- *Knowledge maintenance*

- *Intrinsic safe nuclear plant (Advanced Plants)*
- *Alternative or new Chemistries*
- *Storage*
- *Start/Stop, load following*
- *Biomass*
- *Need for environmental concerns*
- *Gas hydrate use*
- *Membrane technology*
- *CO₂ Sequestration (zero emissions)*
- *Zero liquid discharge plants*

3. Could you envision alternative Working Group structures that would make IAPWS work more effectively and more productively.? Consider merger of existing WGs, creating new WGs, different ways of organizing the working week, and different spacings of the IAPWS Conferences, or any other constructive ideas
- *PCC better define its needs*
 - *More ICRNs*
 - *Other items*
 - *Task groups on topics—lead to and follow ICRNs*
 - *Presentation of problems—solutions presentations only in response*
 - *PCC needs to use national committees to be sure problems are general before putting them on agendas*
 - *PCC needs to think about chemical effects in leading edge technologies*
 - *Continue workshops*

Current topics list

Topic	Lead person
Copper	Jan Stodola
Organics	Andre Zeijseink
Solubilities of Impurities in Steam	O. Jonas
Chemical effects in Nucleation and condensation in Steam Turbines	M. Stastny
Physical & Chemical Processes of Concentration & Deposition in the Power Cycle	K. Daucik
Interpretation of Potential Measurements	H. Pflug
Exfoliation—oxide structure, chemical effects	To be determined
Chemistry (ie.Stability of ammonia) at ultrasupercritical conditions (750°C, 400 bar), in presence of oxygen	To be determined
Gas turbine injection water	To be determined
Neutral oxygen treatment	To be determined

Status

1. No ICRN
2. ICRN exists, needs to update to add removal technologies for Water/Steam cycle and make-up
3. No ICRN, may exist in the “Atlas”
4. Two ICRNs exist (F. Sigon)
5. Two ICRNs: Solubility of Sodium Sulfate (to close) and spinels (closed)
6. Uniform standardized procedure is required in this measurement technology

PCC requests national delegates to provide list of PCC issues based on national committee discussion based on major topics within countries in terms of reliability loss, capacity loss, corrosion.

ICRNs

1. Evaluation of Binary Nucleation Models (Sigon, 1993)—needs revision—needs new contact person: Frantisek & Stastny will prepare new document by 2003.
2. Solubility of Sodium Sulfate in Superheated Steam (Jensen,)—closed
3. Origin, behaviour, fate of organics in power cycle (Gilbert, 1993)—Zeijseink has revised but it is not through the
4. Surface tension of aqueous solutions (1998, Sigon & Gabrielli)—needs revision—new contact person needed—closing statement by chairman: died of lack of interest

In discussion of Guidelines from EBA, discussion of draft guideline for boiler water: Karol Daucik reports that the drafting committee has decided to make the guidelines non-mandatory

Discussion of IEC Steam purity guideline: Guidelines have been published

New members:

Leonard Olavessen

Shunsuke Uchida

Eric Maughn

Jergen Peter Jensen

Frantisek Marsik to go to PCAS.