

Conductivity Behavior of Salt Deposits on the Surface of Engineered Barrier Materials for the Potential High-Level Nuclear Waste Repository at Yucca Mountain, Nevada

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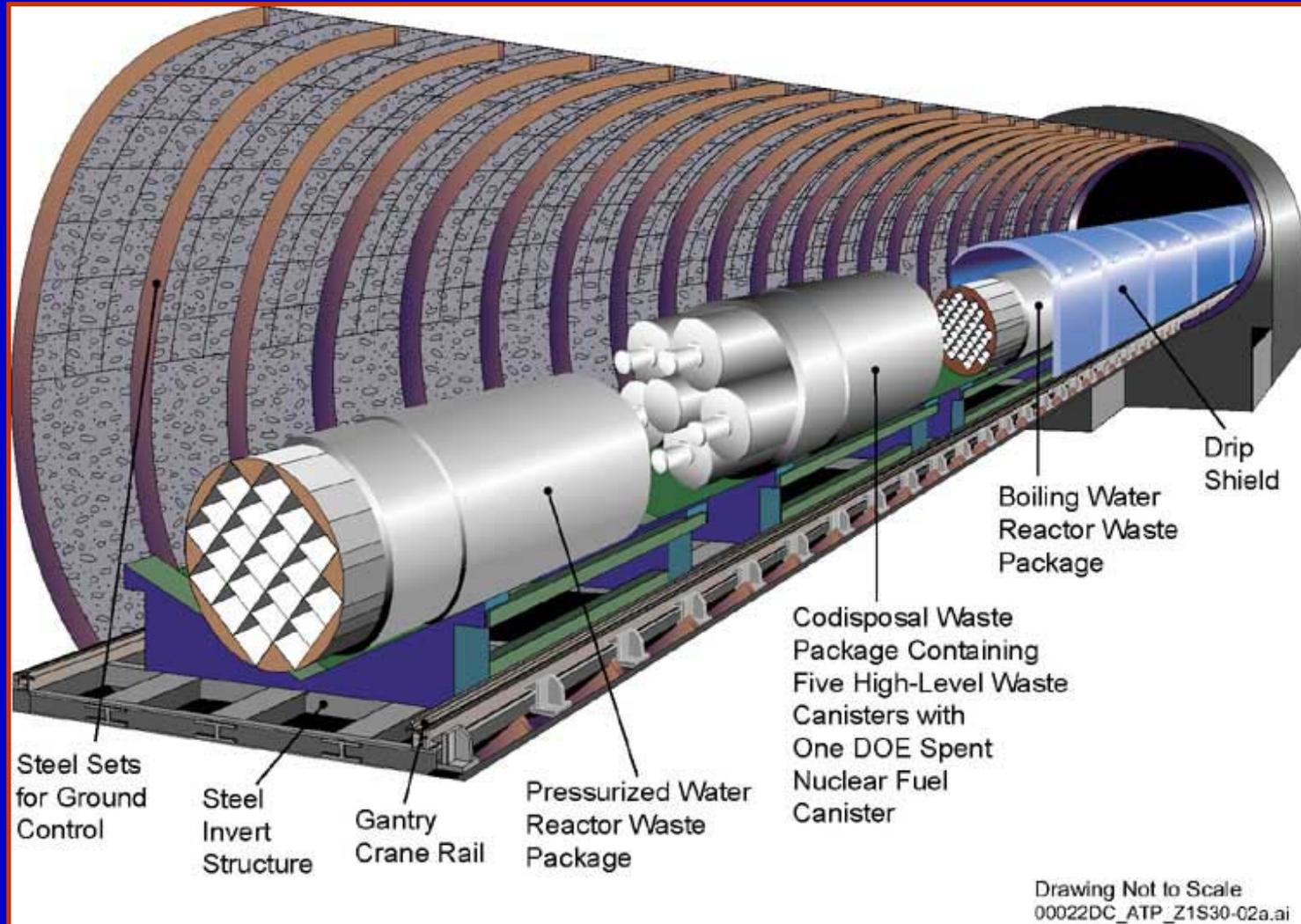
April 12-16, 2004



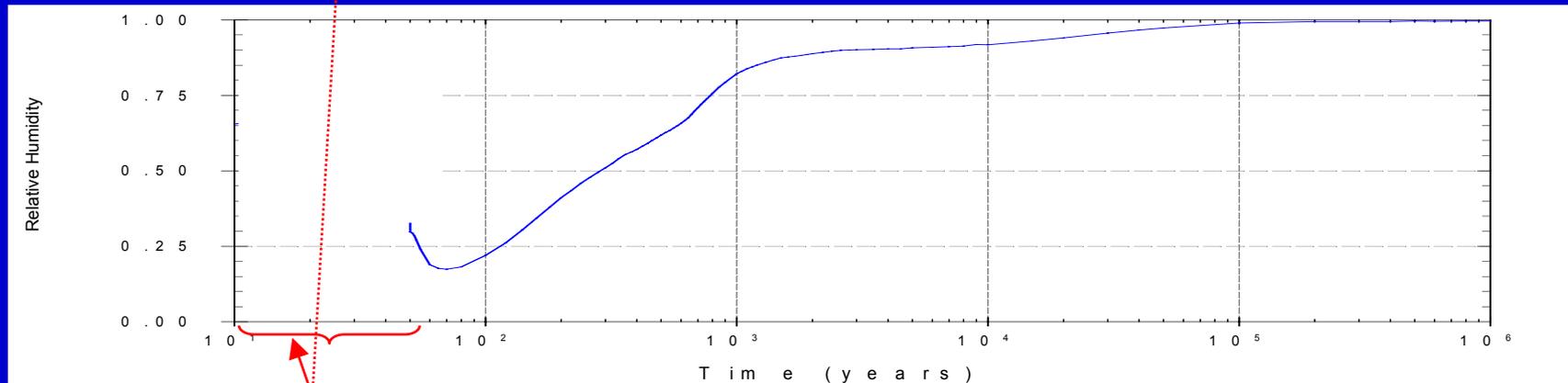
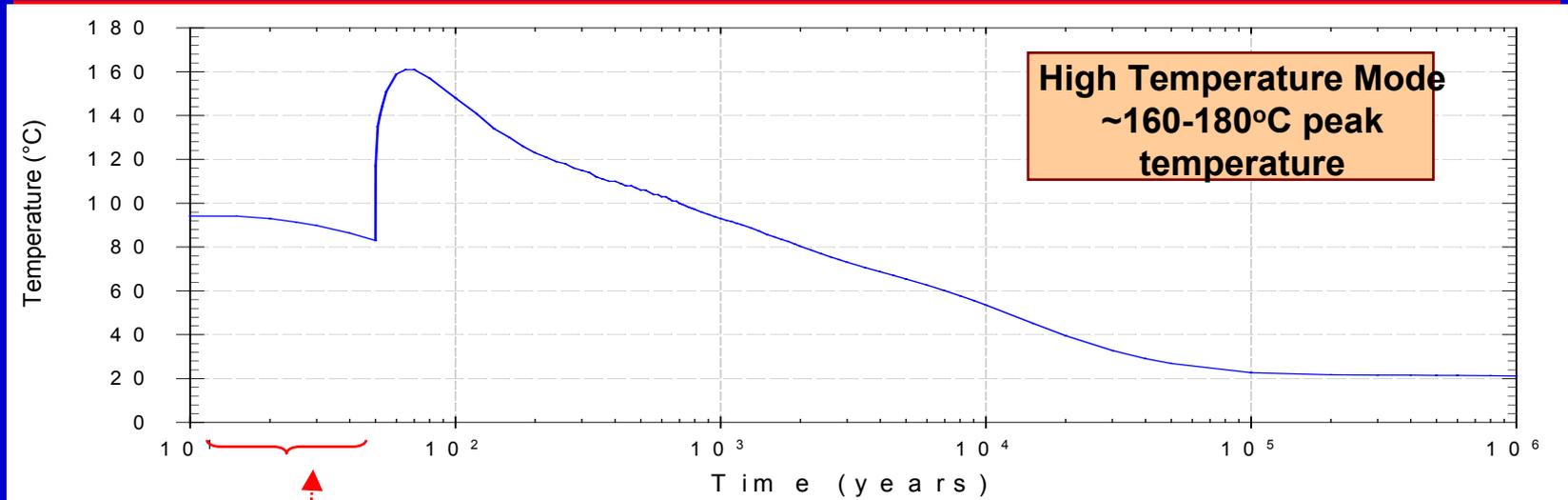
Presentation Overview

- **Background**
- **Aqueous Corrosion under Salt Deposits and Electrical Conductance of Salt Deposits**
- **Conductance Measurements**
- **Conductance and Deliquescence Relative Humidity (DRH) Results**
- **Conclusions**

Background: Proposed Repository System

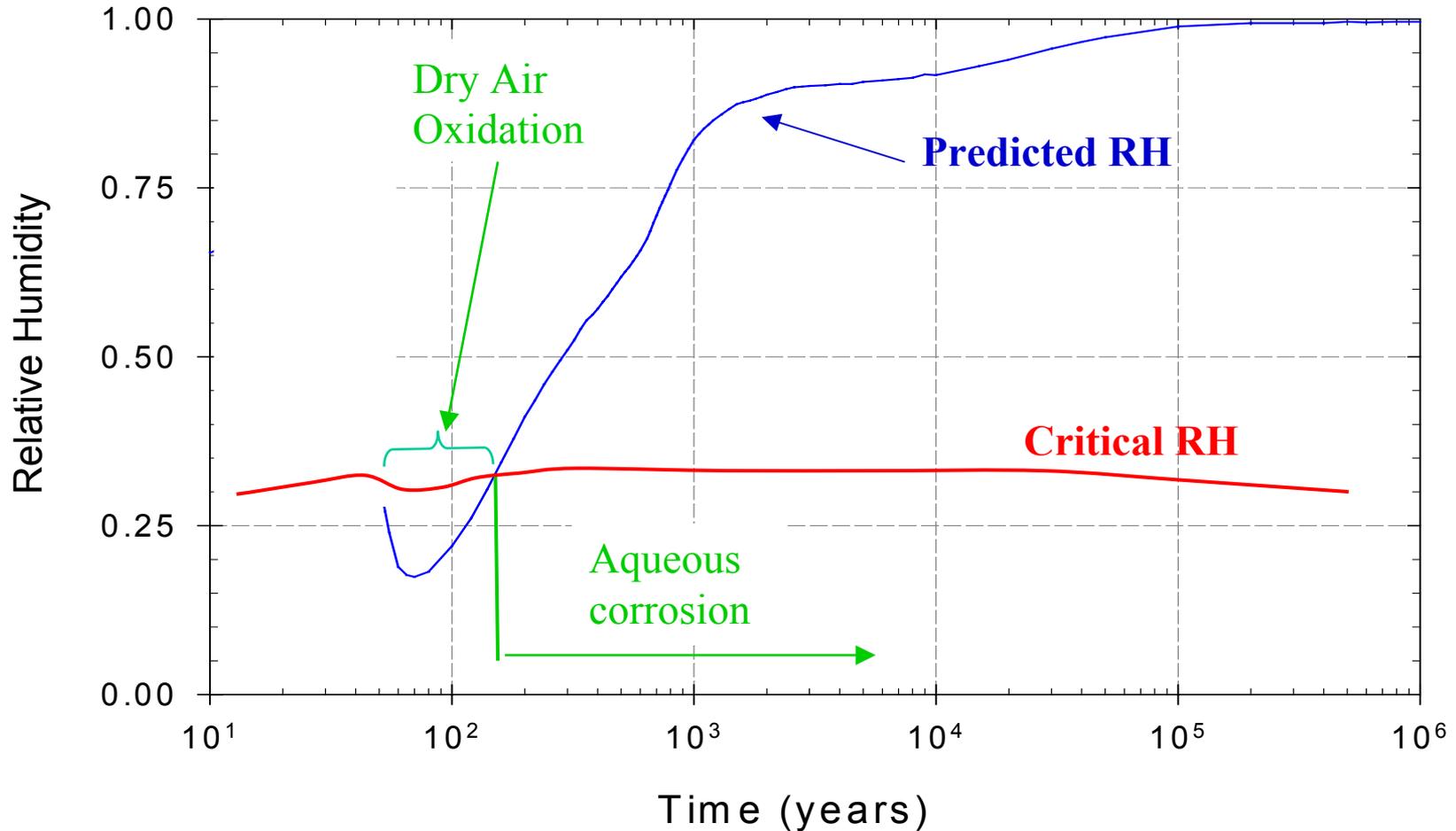


Background: Waste Package Surface Temperature and Relative Humidity (RH)

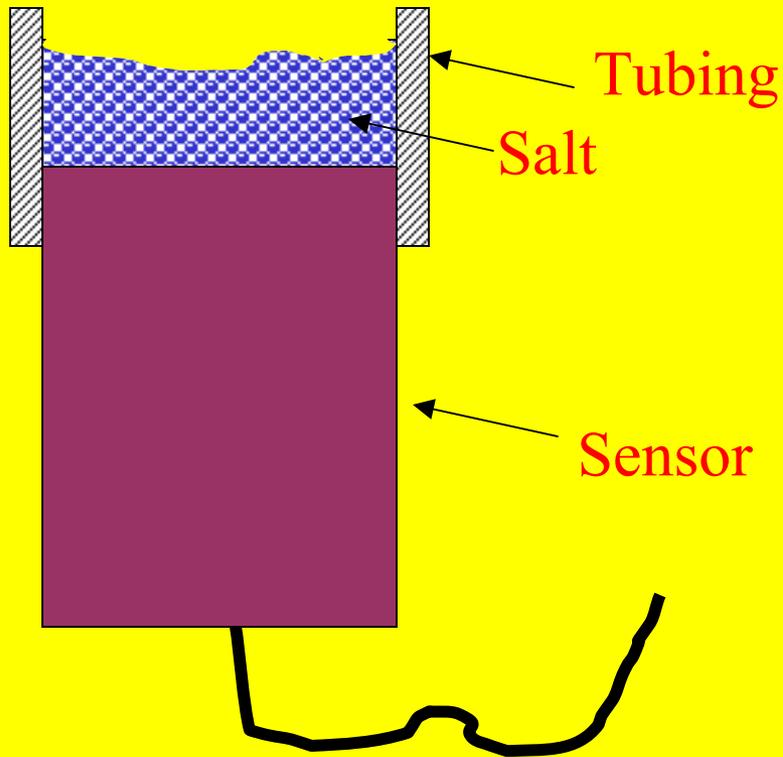


Waste emplacement/ventilation periods

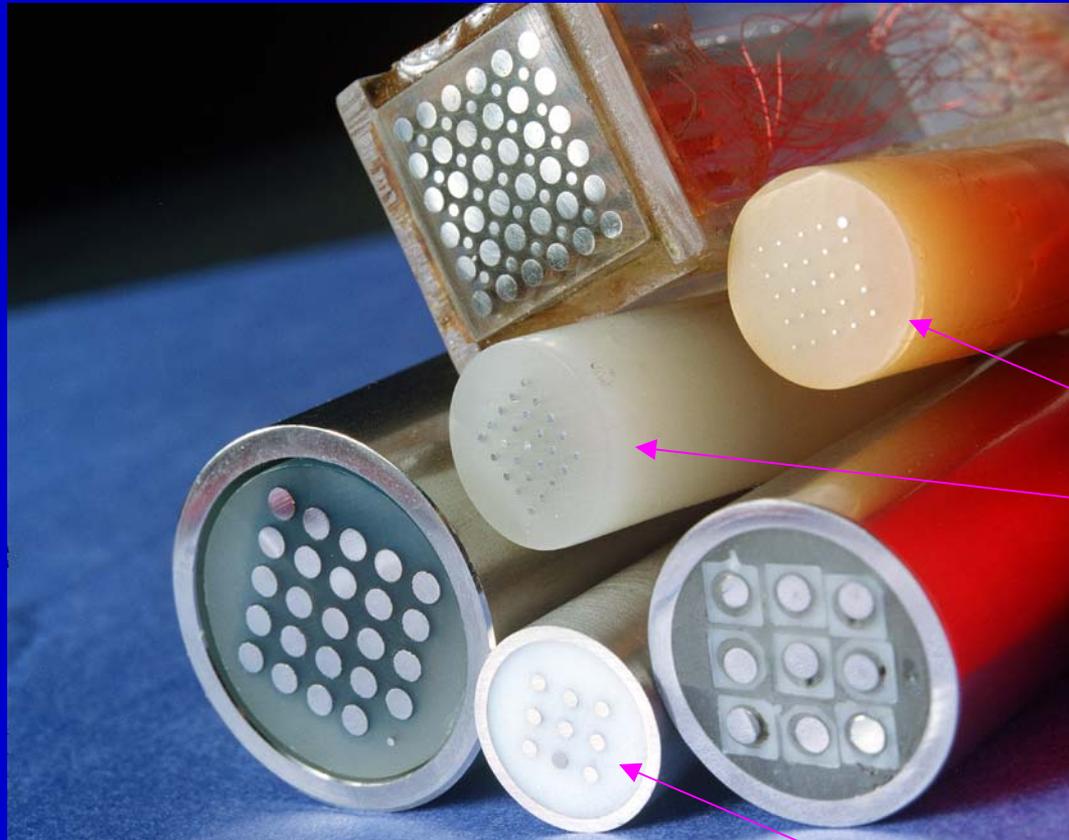
Relative Humidity and Aqueous Corrosion



Under Salt Corrosion Measurement Using Coupled Multielectrode Array Sensors



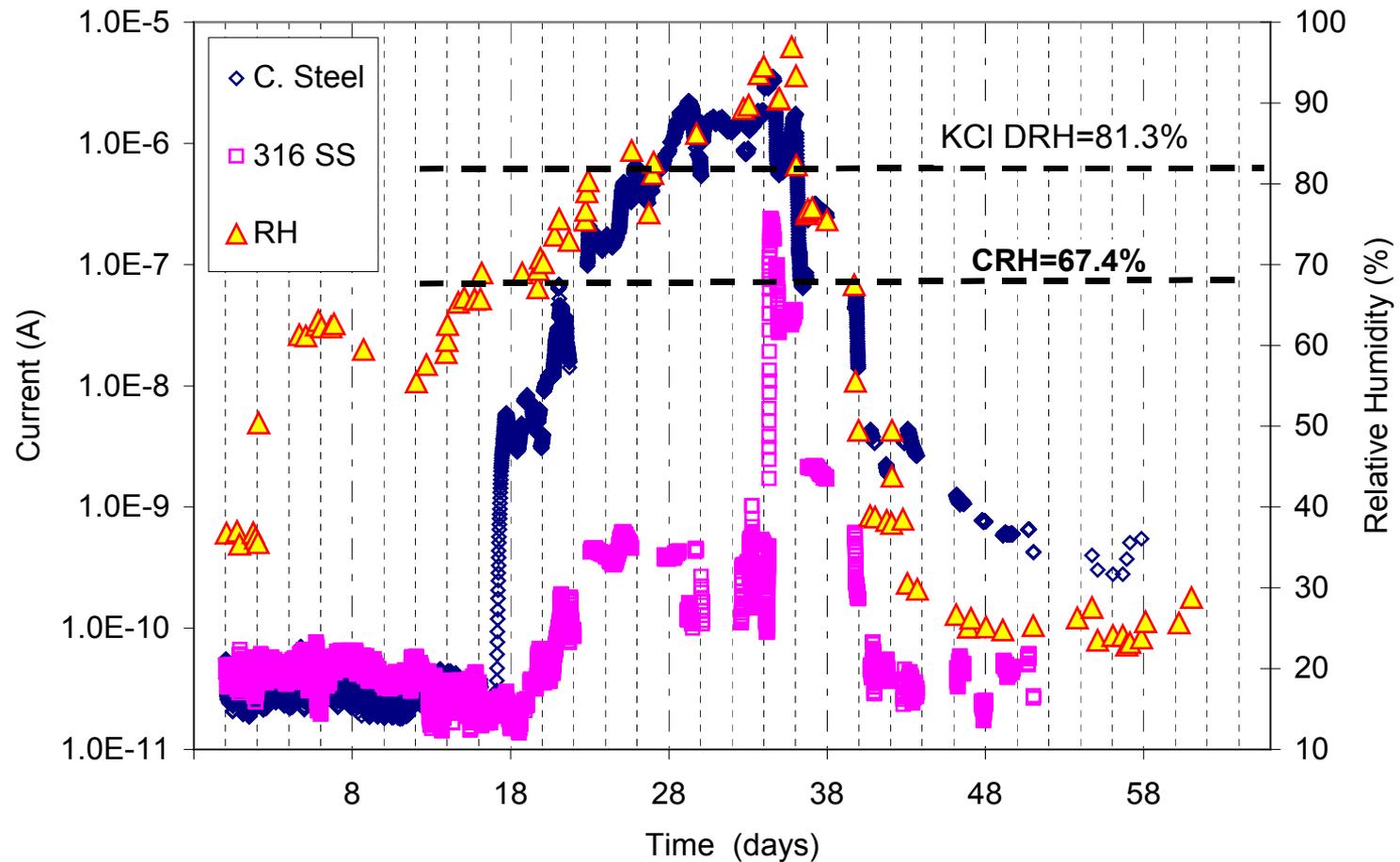
Coupled Multielectrode Array Sensors



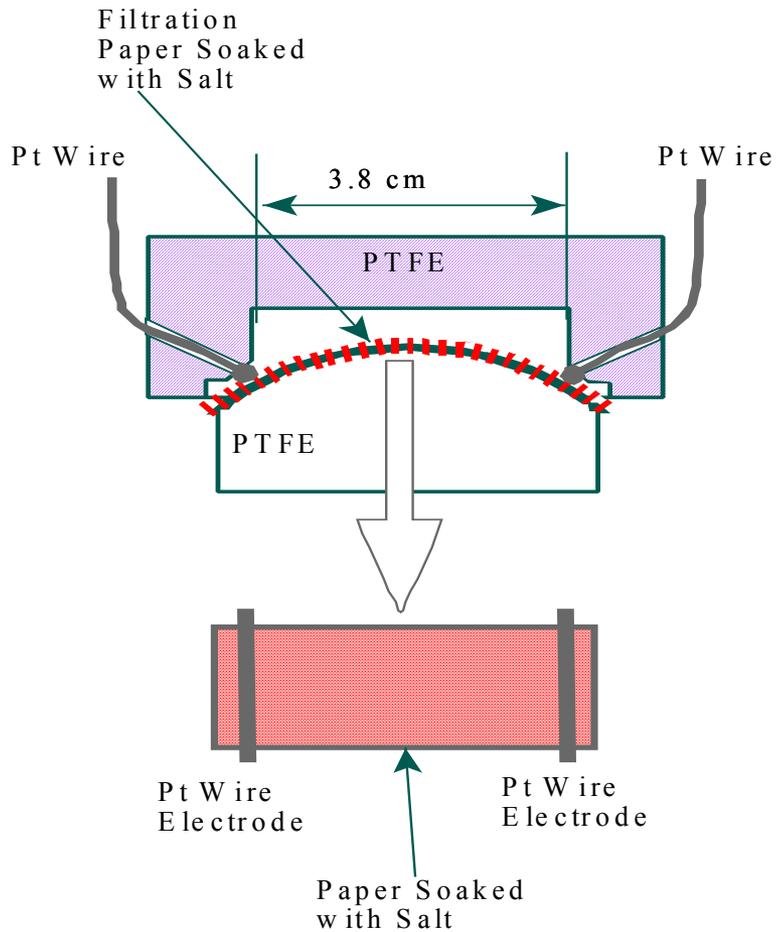
Epoxy
Insulator

PTFE Insulator

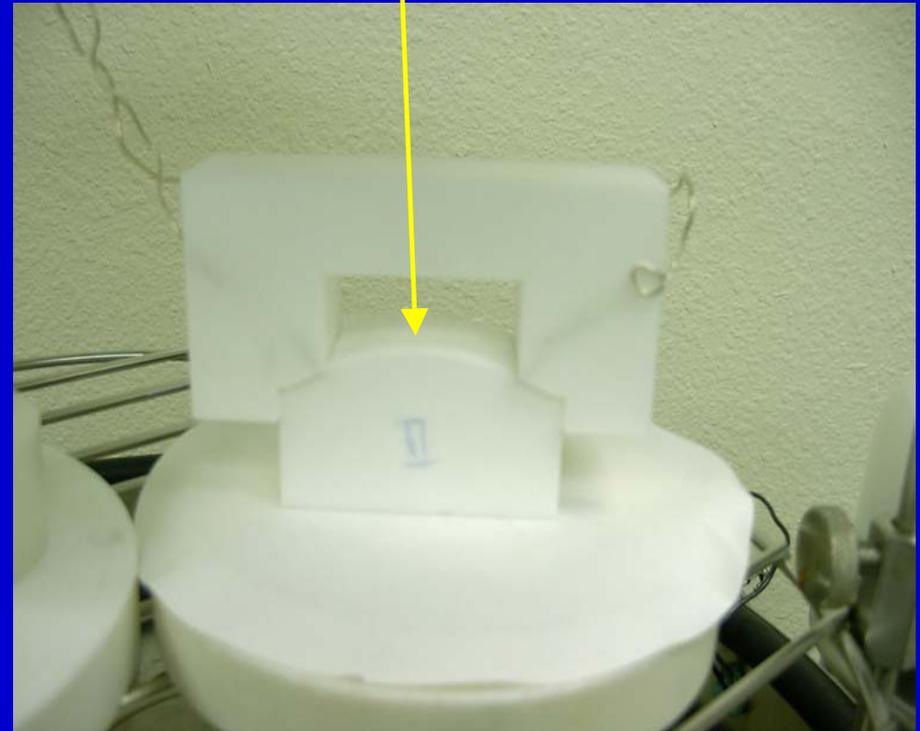
Response of Non-uniform Corrosion Currents under KCl Salt to Changes in RH



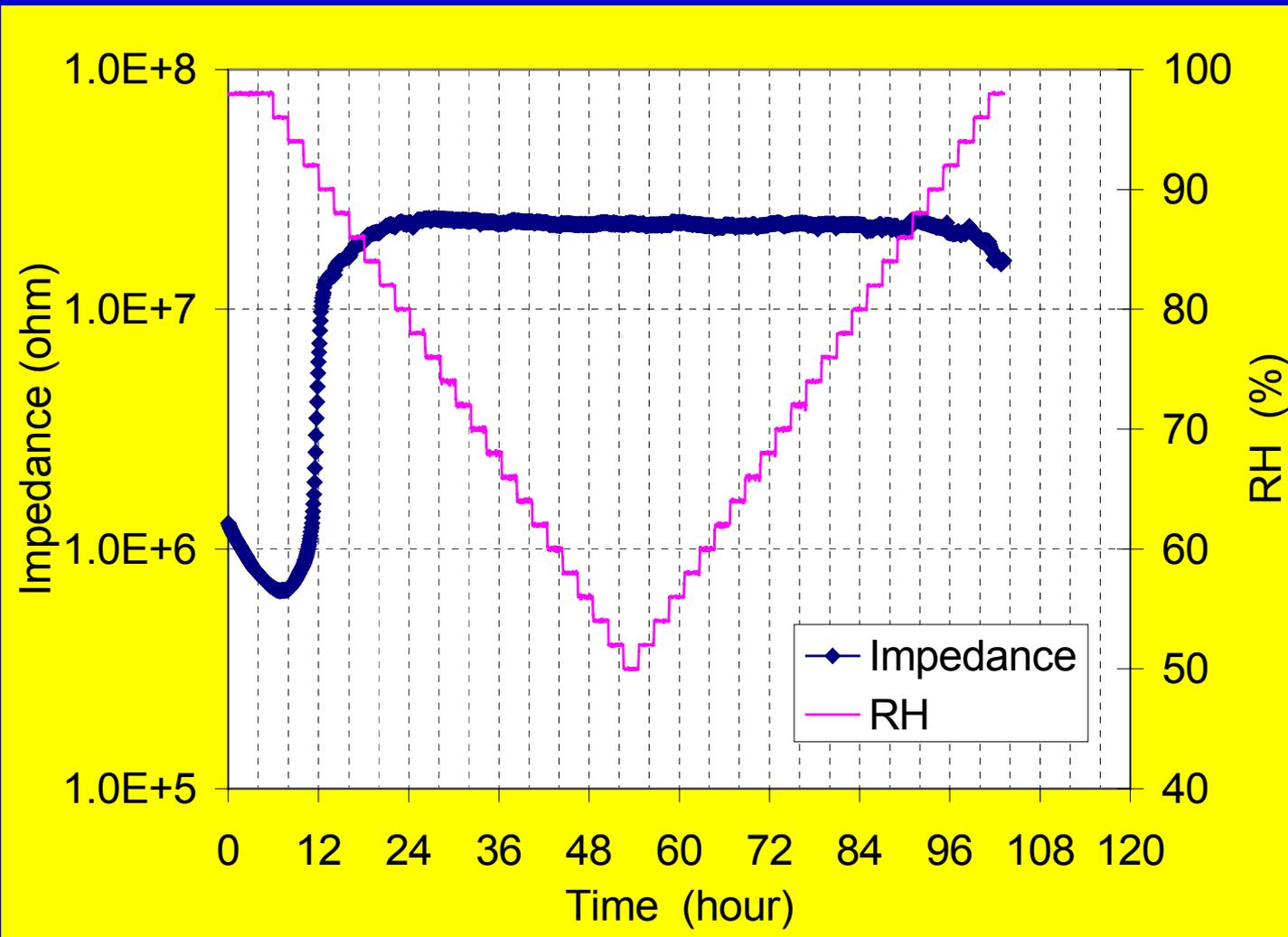
Conductivity Cells



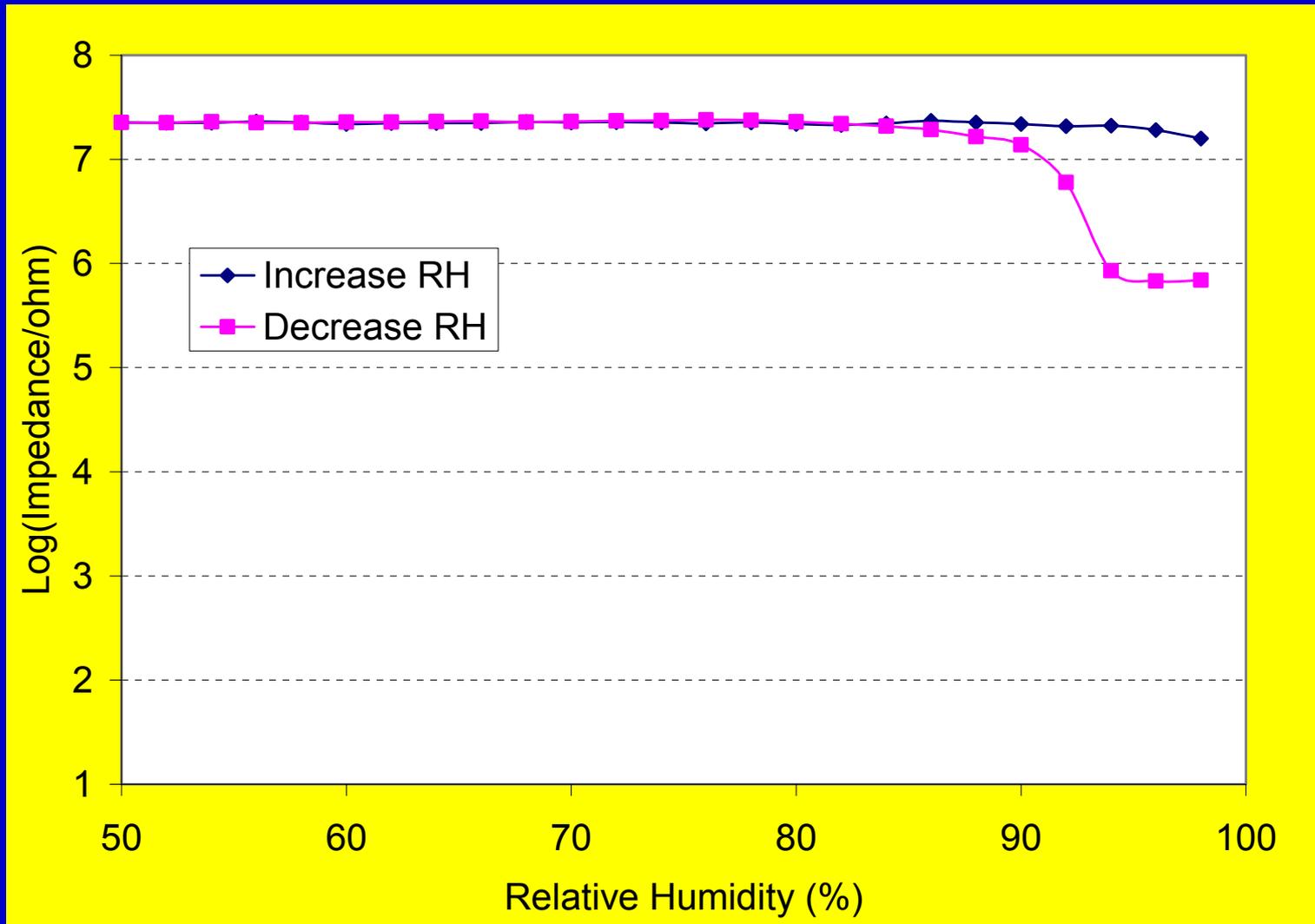
Paper Soaked with Salt



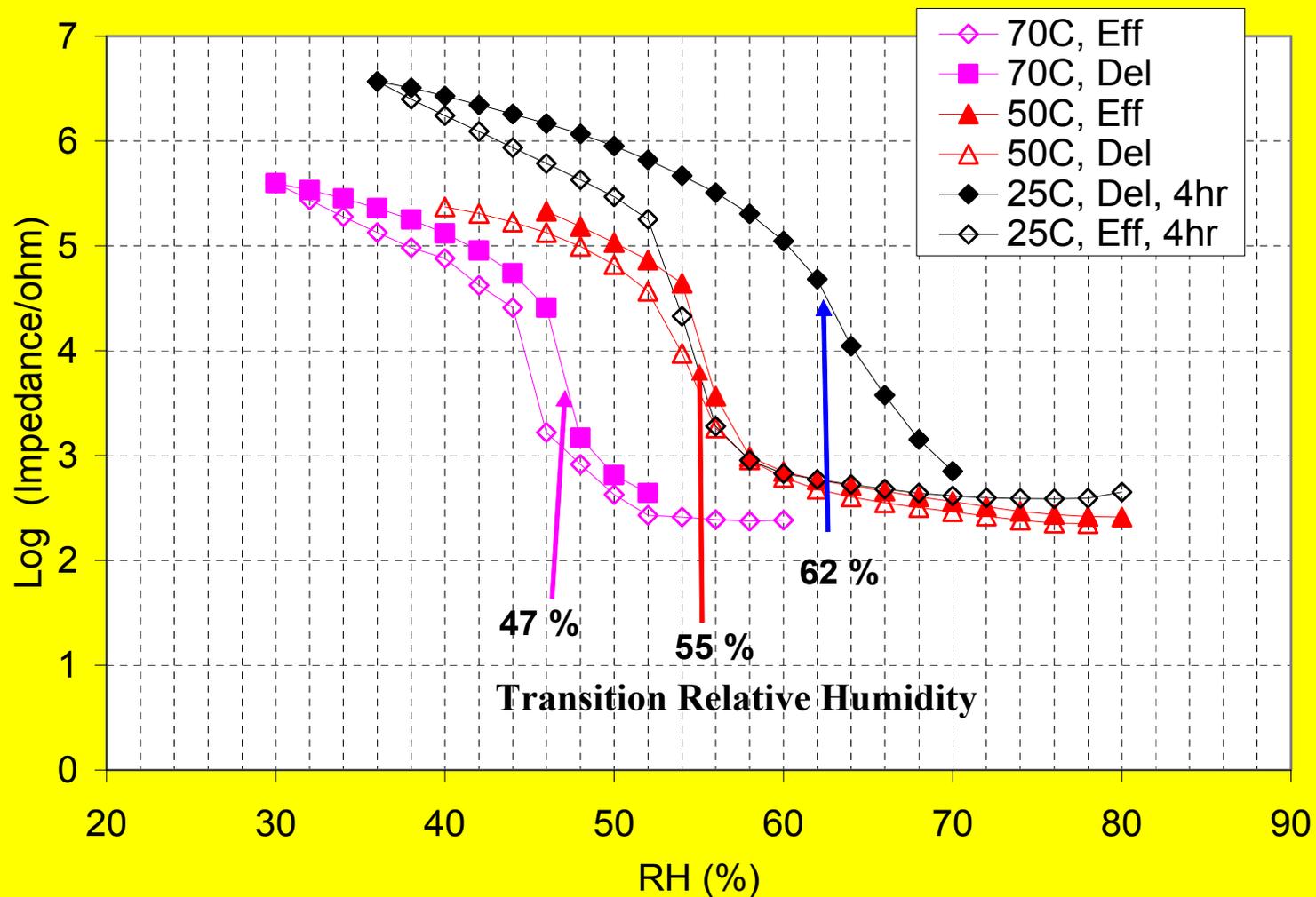
Response of Baseline Impedance of Filter Paper Soaked with Pure Water to Changes in Relative Humidity



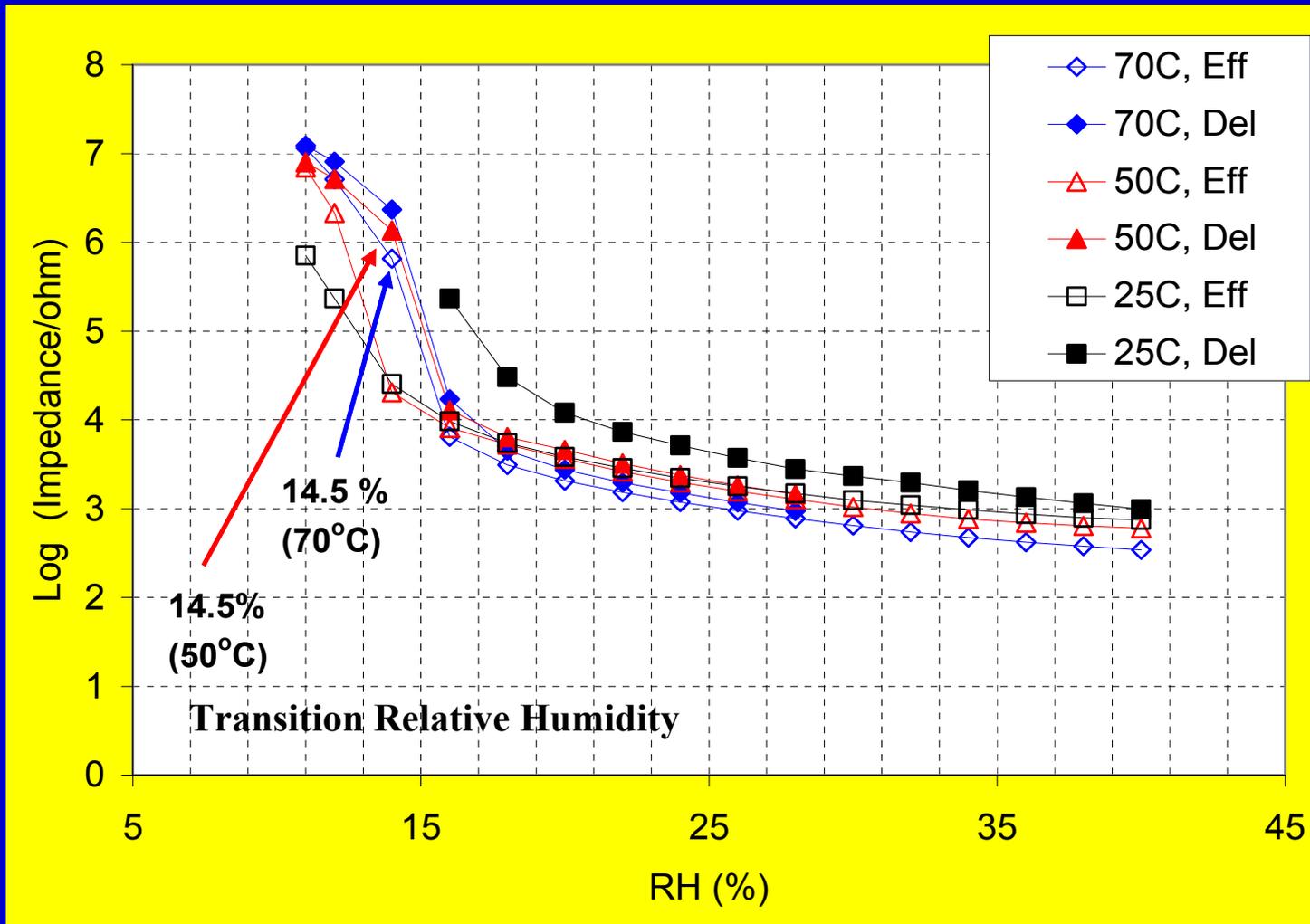
Baseline Impedance vs. Relative Humidity for Filter Paper Soaked with Pure Water



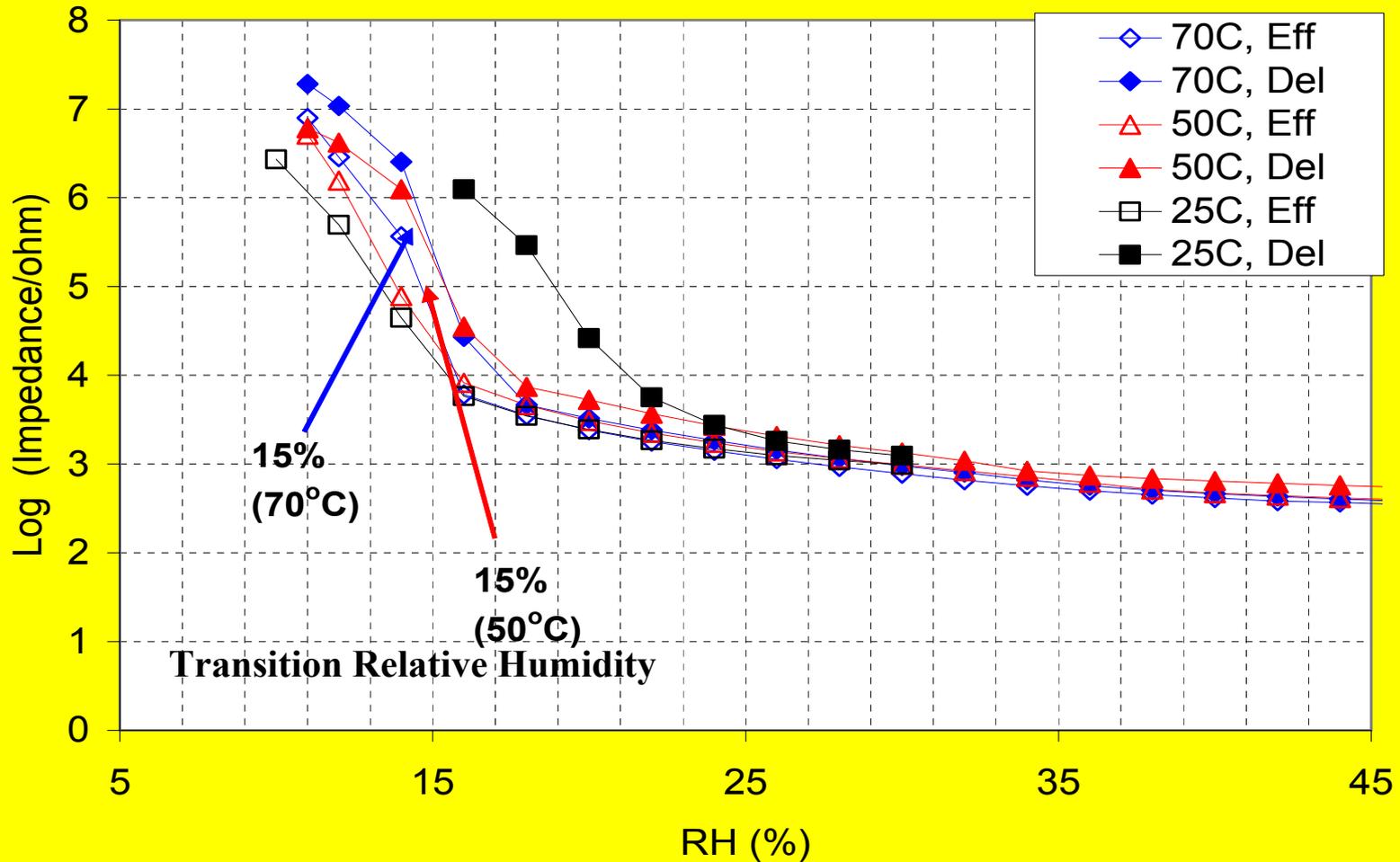
Impedance vs. Relative Humidity Curves for Na-K-Cl-NO₃ System



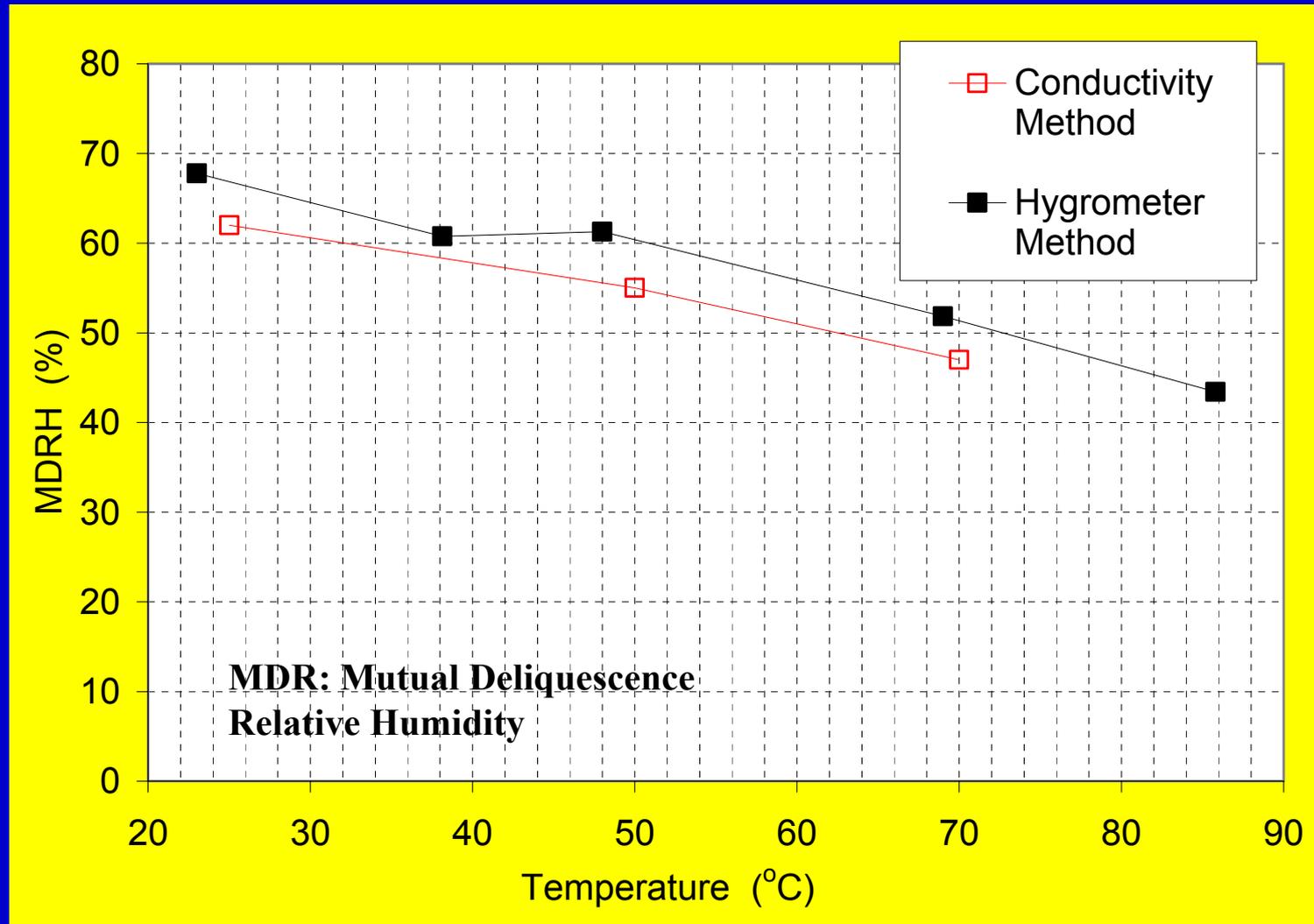
Impedance vs. Relative Humidity Curves for Ca-K-Cl System



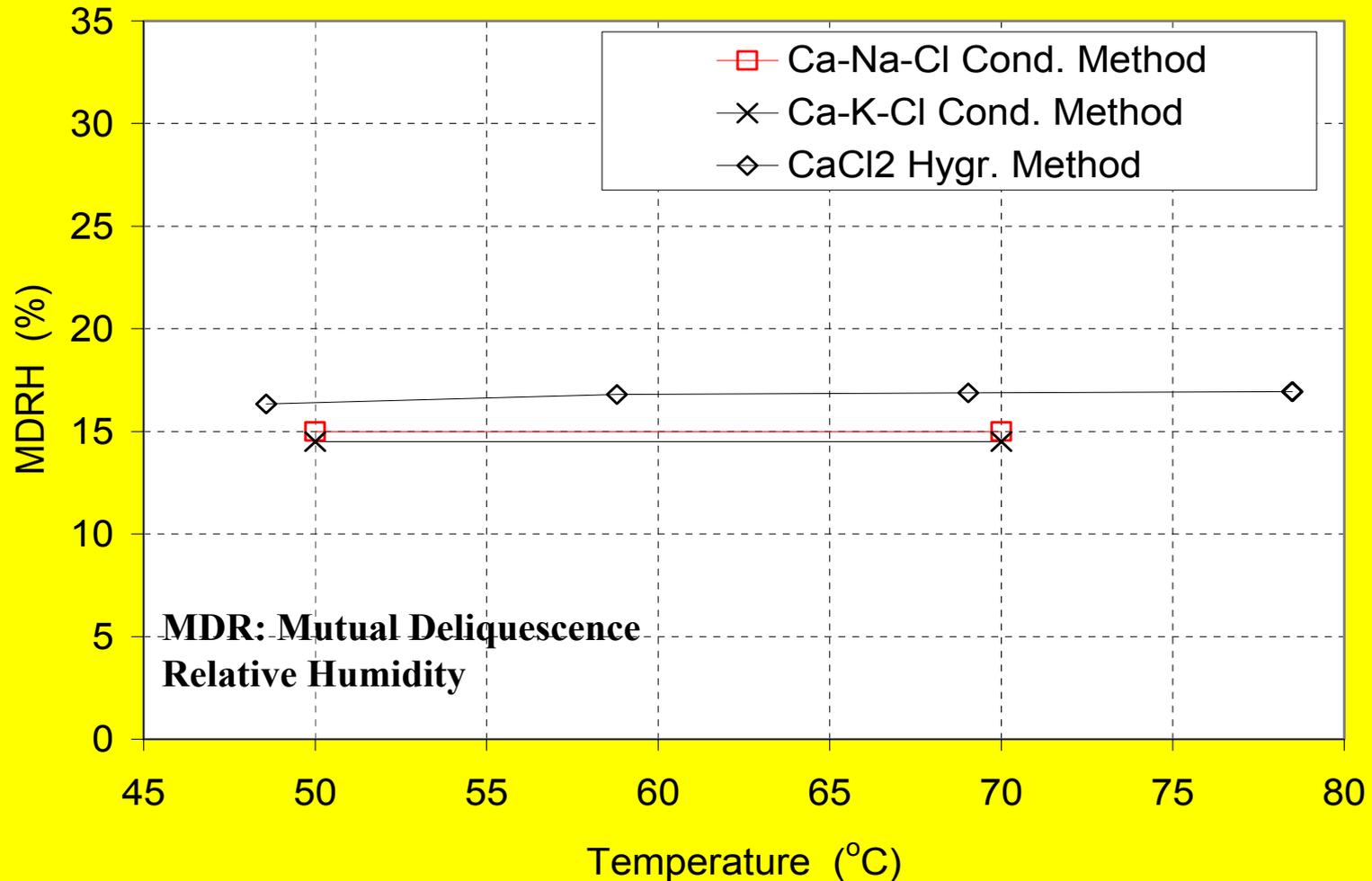
Impedance vs. Relative Humidity Curves for Ca-Na-Cl System



Mutual DRH Values Obtained in This Study Using Conductivity Method and in Previous Study Using Hygrometer Method



Mutual DRH Values Obtained Using Conductivity Method and Hygrometer Method



Conclusions

- **Conductance or conductivity of three salt mixtures started to increase at RH values that are approximately 40 % of their mutual deliquescence RH.**
- **Mutual deliquescence RH and mutual efflorescence RH for the Ca-K-Cl and Ca-Na-Cl systems were approximately 15 % in the temperature range of 50 to 70 °C [122 to 158 °F].**
- **Mutual deliquescence RH and mutual efflorescence RH for the Na-K-Cl-NO₃ system were approximately 46 % at 70 °C (158 °F) and showed significant decreasing trend with increase in temperature.**

Acknowledgments

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