

# Mátrafüred 2022

## International Conference on Chemical Sensors

June 12 – 17, 2022  
Visegrád, Hungary



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### Variation of the ISE Resistance: Can We Use it Practically?

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The bulk resistance of ISE membranes increases along with a decrease of the solution concentration. We explain this in view of heterogeneity of the membranes consisting of a continuous organic phase and a dispersed aqueous phase (water droplets): lipophilic ions are confined to the organic phase of the membrane, and must circumvent the droplets [1]. On the other hand, the driving force for water uptake is the osmotic pressure of solution. Therefore, the membrane resistance is expected to be determined by the total concentration of ionic species in the solution, or by the ionic strength, rather than by the concentration of the primary ion. The data confirming these expectations will be presented (Figure 1). The sensitivity of the resistance to the ionic strength is high only in diluted samples. However, it will be shown that the non-uniform distribution of water in membranes [2] allows increasing the sensitivity by use of thin membranes (Figure 2).

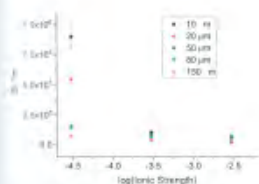


Figure 1. Resistivity of membranes with thickness of 400 μm.

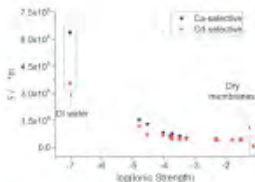


Figure 2. Resistivity of Cd<sup>2+</sup> membranes with different thicknesses.

From the practical point of view, it opens an opportunity for measurements both of the activity of an analyte (in the potentiometric mode) and its concentration (using the value of the ionic strength estimated from the resistance) with the same sensor.

#### References

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