



2AM-MEL---- NWB Public Hearing: Freezing point depression calculation - reference

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Hi

During the public Hearing of today, AEM committed to provide to INAC the reference of the freezing point calculation.

Please find this reference.

Meliadine groundwater is a highly saline, multi-ion solution, more concentrated than sea water. In this case, basic chemistry principles dictate that Blagden's Law cannot be used because it is meant for dilute solutions of a simple solute in water (basic chemistry principles from any textbook, such as *Chemistry the Central Science*, third edition by Brown and Lemay Jr., 1985). In highly saline water like that of Meliadine groundwater, it is most appropriate is to extrapolate the FPD from a solution of a similar chemical composition (i.e. ionic proportions), such as sea water, the Freezing point value of which is well documented (https://en.wikipedia.org/wiki/Freezing-point_depression). This value is then compared as a cross-check to tables of freezing point depression for single-solute brines (NaCl being the prevalent ions) such as found in the MERCK INDEX, 1987, Eleventh Edition and Patwardhan and Kumar, 1986 (*A unified Approach for Prediction of Thermodynamic Properties of Aqueous Mixed-Electrolyte Solutions Part II: Volume, Thermal, and other Properties*. AIChE, Vol 32, No.9, 10 pages).

Regards

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