138c Henry's Constants of Volatile Organic Compounds in Aqueous Electrolyte Solutions

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The partitioning of volatile organic compounds (VOCs) between an aqueous phase containing salts and the vapor above is important in the development of processes that conform to increasingly stringent emission standards. In spite of this importance, however, the literature on aqueous systems containing salts and organics is sorely lacking, particularly with respect to Henry's constants at conditions above room temperature. We have shown in our previous work that VOC emissions from complex solutions such as spent pulping liquors can be simulated from a knowledge of Henry's constants of the VOC in a ternary system of water, salt and the VOC. This implies that the salt concentration has the strongest influence on partitioning of the VOC. We have also shown that with the system reduced to three components, it is possible to correlate Henry's constants as a function of temperature using a relatively simple model that is based on dilute solution theory. Such a theory is useful for interpolation over large gaps in the literature data or extrapolating outside of the available data range. We will show that the parameters in this dilute solution theory are related to physical quantities that can be independently measured for a consistency check of the Henry's constants. Henry's constants of homologous series of methyl ketones and n-alkanols in addition to dimethyl sulfide and dimethyl disulfide over a range of temperatures and salt concentrations will be used to demonstrate our dilute solution theory.