Temperature and pressure dependence of acridine ionization.

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Thermally stable indicators gained popularity in the last years due to the possibility to measure pH directly *in situ* over a broad range of geochemical applications. The shortcoming of this approach is limited pressure and temperature range of currently available data. One the very promising candidate is acridine, because of its thermal stability and its high and clear absorbance peaks in the visible region [1,2,3].

The purpose of our work is to determine temperature and pressure dependence of the pK of acridine up to 300 C and 2500 bars. The UV-Vis spectra measurements at high temperatures and pressures were conducted in newly designed flow-through spectrophotometric cell made from titanium grade 5. Cell was equipped with sapphire windows sealed with elastometric graphite using a Bridgman type seal. Pressure was generated with a 7 cm³ titanium grade 5 spindle press and automatically controlled by powerful stepper motor using custom PID controller. Pressure was measured *in situ* with a strain gauge pressure transducer calibrated against a Heise® absolute pressure gauge. Density corrections for the obtained spectra were applied using experimental values of solution densities measured in situ using custom built vibration tube densimeter.

Combined chemometric and thermodynamic analyses of uv-vis spectrophotometric data were used to extract the dissociation constants as well as the changes in molar volume and isothermal compressibility of acridine as a function of temperature and pressure.

References

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