

Measurement of the Water Activity of Aqueous Solutions with FTIR Spectroscopy

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A new method was developed to measure the water activity of an aqueous solution by Fourier transformed infrared (FTIR) spectroscopy [1]. The water activity a_w is measured as relative humidity in the saturated humid gas above an aqueous solution. The absorbance A of IR light by humidity in the saturated humid gas increases sensitively with the water content in the gas phase. If this relation is linear as described by Beer-Lambert law, then it is possible to measure the water activity simply by one adsorption measurement above pure water (A^0) and another above the sample (A). The water activity is then given by the relation of both absorbance values as $a_w = A/A^0$. No additional calibration is needed. A similar method has already been used to measure the dew point of compressed gases [2,3]. The method was tested successfully at 25°C with saturated salt solutions which are used as humidity fixed points for the calibration of water activity instruments [4]. The relative humidity of the fixed points lithium chloride (0.1130), magnesium chloride (0.3279), potassium carbonate (0.4317), sodium chloride (0.7530), potassium chloride (0.8434), potassium nitrate (0.9359), and potassium sulphate (0.9730) was reproduced within their experimental uncertainty of 0.0012 to 0.0055 [4]. The method is applied to non-saturated solutions and dried food samples.

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