

Heat Capacities of Concentrated Sodium Hydroxide Solutions to 300 °C

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Heat capacities of NaOH(aq) have been measured over a wide concentration range ($0.5 \leq m/\text{mol kg}^{-1} \leq 8$) at temperatures $323 \leq T/\text{K} \leq 598$ using a differential Calvet-type calorimeter at a pressure of 100 bar. Such solutions present special problems because of their aggressive nature. Brief descriptions will be given of the special features, operation and accuracy of the calorimeter. Experimental heat capacities per unit volume at constant pressure were converted to per unit mass values using density data measured recently in our laboratories by vibrating tube densimetry under identical conditions. This was necessary because of the inadequacy of existing density models of NaOH(aq) at high temperatures and concentrations. Apparent molar heat capacities, $C_{p\phi}$, for NaOH(aq) increase up to ~ 75 °C before decreasing dramatically at higher temperatures.