

This study was done to determine the  $pK_a$  values of a number of weak acidic and basic compounds at different temperatures and to be able to identify the effects of temperature variations in the measured  $pK_a$  using capillary zone electrophoresis. The method employed was adopted from Fuguet et al [12] in which internal standard is used. Running buffers of different pH were prepared. The maximum voltage was chosen based from Ohm's law to reduce the Joule heating effects. Considering the linearity in the relationship between voltage and current to be with an  $r^2 \geq 0.999$ , the maximum voltage was found to be 18 kV and applied to the determination of  $pK_a$  values of several compounds at 20°C, 25°C, 30°C, 35°C, 40°C, 45°C, and 50°C.

For the determination of the  $pK_a$  values of the analytes using internal standards with comparable  $pK_a$  values at different temperatures, generally the calculated values did not vary significantly from the literature values under all the observed temperatures. For the investigation of the effects of temperature changes during the measurement of the  $pK_a$  of the analyte at a specific temperature, internal standard with  $\Delta H$  similar or different with the analyte was utilized. Results showed a small difference between the literature and experimental  $pK_a$  values of the analyte at a specified temperature despite the temperature variations in the instrument when the internal standard and analyte have similar  $\Delta H$ , which follows that in this case temperature control is not critical.

*Keywords:* Acidity constant,  $pK_a$ , capillary electrophoresis, internal standard, Joule heat.