New drop weight analysis for surface tension determination of liquids

## ABSTRACT

The validity of the existing drop weight analyses for determining surface tension could be influenced by the liquid properties. This study aimed to verify the validity of the Harkins-Brown correction factors and the Bond number correlation, as well as to develop a new drop weight analysis that is insensitive to liquid properties. The liquid samples of known surface tension and viscosity were chosen and classified into six different groups. Validation was done by comparing the data compiled in this study with the existing correlations as well as by dimensionless analysis. Results show that the existing drop weight analyses are valid for most liquid groups provided that the surface tension number ( $N\hat{I}^3$ ) exceeds 10-1 or the Ohnersorge number (Oh) is below 102. This, however, confirms the influence of liquid properties on the validity of the analyses. The LCP coefficient method was developed to eliminate this problem by using the drop weight results generated from multiple tips of different sizes. The surface tension could then be calculated by using a semi-empirical linear correlation. Error analysis shows that the LCP coefficient method gives the best reliability and accuracy among various drop weight analyses.  $\hat{A}$  2008 Elsevier B.V. All rights reserved.