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The proposed system improvements of the hydrometer calibration using the Cuckow's method at NMISA

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Hydrometers are instruments that are used for measuring the density or specific gravity of liquids. NMISA uses the Cuckow's method which is based on hydrostatic weighing to calibrate hydrometers. This involves weighing the dry hydrometer in air and then in liquid. The liquid level is aligned with the horizontal scale of the hydrometer point to be calibrated and the reference density is determined at that point to get the correction for the scale. The horizontal scale setting, vertical alignment and reference liquid density are some of the key factors that need to be set and measured accurately to ensure the quality of results. The horizontal scale (point to be calibrated) is set with the assistance of a computer software and a magnifying camera. This setting also depends on how well the vertical alignment is set as the hydrometer is suspended from the balance. Distilled water (reference liquid) temperature is measured at three different levels and used to determine the liquid density at the time of measurement. In this work, we discuss the setup for the hydrometer system at NMISA with the main idea being to highlight the required improvements that still need to be implemented and to address all the uncertainty contributions associated with this system. We also report some results found for hydrometers calibrated at the minimum and maximum points of their respective scales using the current system. Three hydrometers with scale ranges of 0.600 – 0.700 g/ml, 0.700 – 0.800 g/ml and 0.800 – 0.900 g/ml were calibrated at a temperature of 20 °C. The uncertainty of measurement was found to be ± 0.001 g/ml.

Apply to be considered for a student award (Yes / No)?

No

Level for award (Hons, MSc, PhD, N/A)?

N/A

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

Yes

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