

**TITLE:** NEW TOOL FOR PH MEASUREMENT OF CELL CULTURE MEDIA USING DIGITAL IMAGES AND SMARTPHONE AS AN ALTERNATIVE TO PHMETERS

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**ABSTRACT:**

Precisely setting the pH in the culture medium is crucial for the growth of microorganisms and cells. Due to the difficulty of analyzing the pH of the culture media without compromising sterility, either by pH meter or pH tape or by a large sampling of culture medium, we explored the possibility of using a colorimetric method of pH measurement using the camera of a smartphone. With the use of the red phenol dye present in the culture medium, this work performs a calibration procedure with a portable pHmeter in a comparative way and uses the color space (RGBHSV) to perform the calibration according to the color change of the medium. From the curve were obtained digital images that were then modeled with the aid of the PLS (Partial Least Squares) with the objective of producing a high resolution pH estimation allowing a fast, easy to use, portable and maintenance of the sterile environment with minimal sample. The model used 5 latent variables that allowed obtaining the following figures of merit:  $R^2_{cal}$  and RMSEC from 0.9943 and 0.1732 pH units, respectively. Cross-validation leave-one-out was used to access the reliabilities of the models. The validation results show that the RMSEV = 0.8542. In addition, it provides good predictive power ( $R_{pred}^2 = 0.9999$ , RMSEP = 0.4495 bias= 0.05). The experimental results obtained using a portable pH meter as reference show that the proposed color space provides a good estimate of pH detection with high reproducibility, low error and good sensitivity. In this way it is possible through the use of digital images an alternative for pH measurement in the pH range of 5 to 10 and with a sample volume of 200  $\mu$ L.

**Keywords:** pH-indicator; smartphone-based; RPMI 1640®; PLS; Chemometrics.

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