Accepted Manuscript

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PII: S0026-265X(17)30380-6
DOI: doi: 10.1016/j.microc.2017.05.014
Reference: MICROC 2835

To appear in: *Microchemical Journal*

Received date: 21 April 2017
Revised date: ###REVISEDDATE###
Accepted date: 25 May 2017

Please cite this article as: Vishal Sharma, Raj Kumar , Dating of ballpoint pen writing inks via spectroscopic and multiple linear regression analysis: A novel approach, *Microchemical Journal* (2017), doi: 10.1016/j.microc.2017.05.014

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Dating of ballpoint pen writing inks via spectroscopic and multiple linear regression analysis: A novel approach

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Abstract

The dating of questioned document is a firmest problem for forensic experts. The current work is focused on the study of the dating of ink samples by using spectrophotometry technique and multiple regression analysis. A multiple linear regression (MLR) model has been proposed for the estimation of blue ballpoint pen ink dating by measuring the fading of ink with respect to time using UV–Vis spectrophotometer. Before developing the model, the factors like the best solvent for ink extraction and the conditions through which maximum ink is extracted has been determined. All the samples have been treated with the same method to avoid differences caused by the extraction procedure.

Cross check of the predicted model has been done by analyzing the known writings. Validation of the equation has been done by calculating the aging of already known values of the same samples. The differences between expected and estimated dating were used to determine the average errors in the dating method. The standard errors have been minimized in case of MLR model significantly.

Keywords: writing ink, Dating, Forensic, UV-Vis spectrophotometer, Regression Model.

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