Author's Accepted Manuscript

www.elsevier.com/locate/talanta

Combination of electrochemistry with Chemometrics to introduce an efficient analytical method for simultaneous quantification of five opium alkaloids in complex matrices

Mohammad-Bagher Gholivand, Ali R. Jalalvand, Hector C. Goicoechea, Raimundo Gargallo, Thomas Skov, Giti Paimard

PII: S0039-9140(14)00621-3
DOI: http://dx.doi.org/10.1016/j.talanta.2014.07.053
Reference: TAL14962

To appear in: *Talanta*

Received date: 9 June 2014
Revised date: 19 July 2014
Accepted date: 20 July 2014

Cite this article as: Mohammad-Bagher Gholivand, Ali R. Jalalvand, Hector C. Goicoechea, Raimundo Gargallo, Thomas Skov, Giti Paimard, Combination of electrochemistry with Chemometrics to introduce an efficient analytical method for simultaneous quantification of five opium alkaloids in complex matrices, *Talanta,* http://dx.doi.org/10.1016/j.talanta.2014.07.053

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Combination of electrochemistry with chemometrics to introduce an efficient analytical method for simultaneous quantification of five opium alkaloids in complex matrices

Mohammad-Bagher Gholivand[a,*], Ali R. Jalalvand[a,b], Hector C. Goicoechea[b], Raimundo Gargallo[c], Thomas Skov[d], Giti Paimard[a]

[a]*Faculty of Chemistry, Razi University, Kermanshah 671496734, Iran*

[b]*Laboratorio de Desarrollo Analítico y Quimiometría (LADAQ), Cátedra de Química Analítica I, Universidad Nacional del Litoral, Ciudad Universitaria, CC 242 (S3000ZAA), Santa Fe, Argentina*

[c]*Solution Equilibria and Chemometrics Group, Department of Analytical Chemistry, University of Barcelona, Diagonal 645, E-08028 Barcelona, Spain*

[d]*Quality & Technology, Department of Food Science, Faculty of Science, University of Copenhagen, Copenhagen, Denmark*

**Tel.: +98 831 4274557; fax: +98 831 4274559; E-mail:* mbgholivand2013@gmail.com; mbgholivand@yahoo.com (M.-B. Gholivand)

Abstract

For the first time, an analytical methodology based on differential pulse voltammetry (DPV) at a glassy carbon electrode (GCE) and integration of three efficient strategies including variable selection based on ant colony optimization (ACO), mathematical pre-processing selection by genetic algorithm (GA), and sample selection (SS) through a distance-based procedure to improve partial least squares-1 (PLS-1, ACO-GA-SS-PLS-1) multivariate calibration (MVC) for the simultaneous determination of five opium alkaloids including morphine (MOP), noscapine (NOP), thebaine (TEB), codeine (COD), and papaverine (PAP) was used and validated. The baselines of the DPV signals were modeled as a smooth curve, using P-splines, a combination of B-splines and a discrete roughness penalty. After subtraction of the baseline we got a signal with a two-component probability density. One component was for the peaks and it was approximated by a uniform distribution on the potential axis. The other component was for the observed noise around the baseline. Some sources of bi-linearity deviation for electrochemical data were discussed and analyzed. The lack of bi-linearity was tackled by potential shift correction using correlation optimised warping (COW) algorithm. The MVC model was developed as a quinternary calibration model in a blank human serum sample (drug-free) provided by a healthy volunteer to regard the presence of a strong matrix effect which may be caused by the possible interferents present in the serum, and it was validated and tested with two independent sets of analytes mixtures in the blank and actual human serum samples, respectively. Fortunately, the proposed methodology was successful in simultaneous determination of MOP, NOP, TEB, COD, and PAP in both blank and

Accepted manuscript

Download English Version:

https://daneshyari.com/en/article/7678972

Download Persian Version:

https://daneshyari.com/article/7678972

Daneshyari.com