

Accepted Manuscript

Rapid detection of three quality parameters and classification of wine based on Vis-NIR spectroscopy with wavelength selection by ACO and CARS algorithms

Leqian Hu, Chunling Yin, Shuai Ma, Zhimin Liu



PII: S1386-1425(18)30708-X
DOI: doi:[10.1016/j.saa.2018.07.054](https://doi.org/10.1016/j.saa.2018.07.054)
Reference: SAA 16323

To appear in: *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*

Received date: 10 April 2018
Revised date: 16 July 2018
Accepted date: 17 July 2018

Please cite this article as: Leqian Hu, Chunling Yin, Shuai Ma, Zhimin Liu , Rapid detection of three quality parameters and classification of wine based on Vis-NIR spectroscopy with wavelength selection by ACO and CARS algorithms. Saa (2018), doi:[10.1016/j.saa.2018.07.054](https://doi.org/10.1016/j.saa.2018.07.054)

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 proof before it is published in its final 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.

Rapid detection of three quality parameters and classification of wine based on Vis-NIR spectroscopy with wavelength selection by ACO and CARS algorithms

Leqian Hu*, Chunling Yin, Shuai Ma, Zhimin Liu

College of Chemistry, Chemical and Environmental Engineering, Henan University of Technology, Zhengzhou 450001, China

*Corresponding author. Fax: +86-371-67756718

E-mail address: leqianhu@163.com

Abstract: The feasibility of rapid detection of three quality parameters and classification of wines based on visible and near infrared spectroscopy (Vis-NIRs) was investigated. A modified ant colony optimization (ACO) algorithm for wavelength selection in Vis-NIR spectral analysis was proposed to improve the prediction performance of partial least squares regression (PLSR) model. The result proved that feature wavelengths/variables can be selected by the proposed method for building a high performance PLSR model. The root mean square error of total acid, total sugar and alcohol obtained by ACO-PLS were **0.00122 mol/l, 0.0893 g/l and 0.206 (v/v)**, respectively. Their correlation coefficients obtained by ACO-PLS reach **to 0.973, 0.994 and 0.928**, respectively. Compared with full-spectral PLS and PLS based on competitive adaptive reweighted sampling (CARS-PLS) method, the application of ACO wavelength selection provided a notably improved regression model. The prediction results were significantly better than the full-spectral PLS model and slightly better than the CARS-PLS method. Meanwhile, a classification study was also constructed based on the ACO-Principal component analysis (ACO-PCA) model showed that Vis-NIR spectra could be used to classify wines according to the geographical origins. Therefore, it can be concluded that the Vis-NIR spectroscopy technique based on ACO wavelength selection has high potential to differentiate the wine origins and predict the quality parameters in a nondestructive way.

Keyword: Visible and near infrared spectroscopy; Wine; Quality parameters; Wavelength selection; Modified ant colony optimization algorithm.

Download English Version:

<https://daneshyari.com/en/article/7667814>

Download Persian Version:

<https://daneshyari.com/article/7667814>

[Daneshyari.com](https://daneshyari.com)