

# **DYES MARKERS OF BIOFUELS: LEGISLATION AND ANALYTICAL METHODS FOR DETECTION**

**Magno Aparecido Gonçalves Trindade**

Universidade Federal da Grande Dourados, Faculdade de Ciências Exatas e Tecnologia, Rodovia Dourados-Itahum, Km 12, 79804-970, Dourados-MS, Brasil

**Nelson Ramos Stradiotto e Maria Valnice Boldrin Zanoni \***

Departamento de Química Analítica, Instituto de Química, Araraquara, UNESP, Rua Francisco Degni, s/nº - Bairro Quitandinha, 14800-900, Araraquara – SP, Brasil

The present work presents an overview about analytical method employed for detection and quantification of dyes markers of fuels. Spectrophotometric and chromatographic methods have been employed for marker dyes determination in matrices as petroleum derivatives, ethanol and biodiesel. The High-performance liquid chromatography (HPLC) technique coupled with spectrophotometry, diode array and mass spectroscopy detectors have been more efficiently employed for this purpose. Additionally, the major problems associated with the detection of these dyes are the matrices that have diversity of organic and inorganic compounds that potentially interfere in their analyses.

The electroanalytical methods have been investigated as successful alternative to analysis of these dyes in complex matrices as fuel. The development of electrochemical sensors has contributed to propose miniaturized devices able to detect dye markers by using methodology of modest cost, portability, simplicity of operation, reliability, and the small instrument footprint of the arrangement containing the working electrode, auxiliary and reference electrodes, which are printed directly onto a polymeric/plastic foil.

Recently, we have shown that the use of electroanalytical method and versatile electrochemical sensor to quantify quinizarin (QNZ) and Solvent Blue 14 (SB-14) in fuel samples. The methodology allowed to detect these dyes on glassy carbon electrode and screen-printed carbon electrodes in satisfactory concentration level. These sensors have been successfully applied as detector coupled to HPLC leading to low detection and easily pre-treatment of the sample. The electrochemical detection system can be recommended for the quantitative determination of dyes in fuels when low-level detection and interference separations are required. Based on the proposed, quantitative methods have been developed to detect dyes in gasoline and ethanol samples. The analytical method consists of the use of HPLC technique coupled with electrochemical detection for the quantification of the dye-compounds in fuel sample after a simple and fast pretreatment protocol. A suitable method of analysis of some fuel dyes in a simple and rapid procedure are described and the detection and quantification is compatible with the level required to combat the adulteration and fraudulent sale of various types of petroleum-based fuels.

**Keywords:** Dyes markers; Biofuels; Analytical methods.

\* e-mail: [boldrinv@iq.unesp.br](mailto:boldrinv@iq.unesp.br)

This document was created with Win2PDF available at <http://www.win2pdf.com>.  
The unregistered version of Win2PDF is for evaluation or non-commercial use only.  
This page will not be added after purchasing Win2PDF.