Simultaneous Determination of Food Dyes (Sunset Yellow and Carmoisine) by Generalized Net Analyte Signal Standard Addition Method (GNASSAM) and Spectrophotometric Technique

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Recently the use of synthetic additives and food colours in commercial food products has been increased. Therefore, it is necessary to determine food dyes quantitatively and qualitatively because of some regulations in all countries. Sunset yellow (SY) and carmoisine (CA) are as food dyes that are used in various foods. These dyes were analyzed with several methods, such as: high performance liquid chromatography [1], ion-pair liquid chromatography with photodiode array and electrospray mass spectroscopy detection [2], capillary electrophoresis [3] and spectrophotometric methods [4]. Most of these methods require a highly qualified operator and are expensive, laborious, and time-consuming. Among the listed methods quantitation of chemical species, spectrophotometric methods play a prominent role, but because of spectral overlapping, the selectivities of most spectrophotometric procedures are not satisfactory. In these cases, chemometric methods can be used as an alternative to obtain reliable analytical results in shorter intervals.

Recently we introduced a new method for determination of an analyte in the presence of known interferences called the net analyte signal standard addition method (NASSAM) [5]. Although NASSAM were used for individual standard addition, novel Generalized Net Analyte Signal Standard Addition Method (GNASSAM) used for simultaneous standard addition. The NAS is the part of the signal which is directly related to the concentration predicted by the calibration model. In mathematical terms, it is the part of a spectrum which is orthogonal to the space spanned by the spectra of all analytes except one [6]. Sunset yellow and carmoisine demonstrate strong spectra overlapping at usual spectrophotometry technique. GNASSAM was used for simultaneous determination of sunset yellow and carmoisine in synthetic binary mixtures. Solutions were made in phosphate buffer (pH=7) and their maximum wavelength are: 482 nm and 515 nm for SY and CA, respectively. The investigated method was also used to calculate figures of merit; good limit of detection (SY=0.15 and CA=0.18 µg/ml) and suitable selectivity and sensitivity (SY=0.16,0.37 µg/ml and CA=0.14,0.34 µg/ml) were determined. This method was successfully applied to determine synthetic dyes in commercial candies. The method was validated with standard HPLC method and the results obtained were in a good agreement with those of HPLC method.

KEYWORDS: sunset yellow, carmoisine, simultaneous determination, net analyte signal

REFERENCES: