Spectrophotometric Analysis of Cochineal Red A and Azorubine in Synthetic Mixtures and Drinks

Fatma Turak, Öznur Dülger, Ali Atbakar, Mahmure Ö zgür

Yıldız Technical University, Faculty of Arts and Sciences, Department of Chemistry, İstanbul mozgur@yildiz.edu.tr

In this work, four new spectrophotometric methods applied to the simultaneous determination of two food colorants, Cochineal Red A and Azorubine, in synthetic mixtures, powdered, carbonated and soft dirinks. The mixtures of Cochineal Red A (Ponceau 4R, E124) and Azorubine (Carmosine, E122) were assayed by derivative, ratio derivative, derivative differential and compensation techniques. The first method, zero-crossing derivative spectrophotometry, is based on recording the first derivative curves and determining each component using the zero-crossing technique [1]. Using first derivative spectrophotometry, the amplitudes in the first derivative spectra at 404 and 331 nm were selected to simultaneously determine E124 and E122 in synthetic mixtures, powdered, carbonated and soft dirinks. The second method uses the first derivative of ratio spectra [2]. This method depends on the application ratio spectra first derivative spectrophotometry to resolve the interference due to spectral overlapping. The ratio spectra were obtained by dividing the absorption spectra of the binary mixture by that of one of the components. The amplitudes in the first derivative of the ratio spectra at 397 and 404 nm were selected to determine E124, 323 nm and 492 nm selected for E122 in binary mixtures. Third method, derivative differential procedure comprised of measurement of difference absorptivities derivatized in first order (\(\Delta D_1\)) of solution of drink samples in 0.01N NaOH relative to that of an equimolar solution in 0.01N HCl at wavelengths of 352 nm and 366 nm respectively [3]. The presence of identical zero-crossing points for pure colorants and drink sample solutions established the non-interferences of excipients in the absorption of these wavelengths. The last method, based on the compensation technique is presented for derivative spectrophotometric determination of E124 and E122 mixtures with overlapping spectra. By using ratios of the derivative maxima, the exact compensation of either component in the mixture can be achieved, followed by its determination. The personal judgement of the correct evaluation of the balance point is eliminated. The compliance of Beer’s Law was adhered over a concentration range of 2.0-10.0 \(\text{µgml}^{-1}\) for both E124 and E122. The proposed methods were applied to the determination of these colorants in synthetic mixtures, powdered, carbonated and soft dirinks. The four methods are simple, accurate, rapid and require no preliminary separation steps and can therefore, be used for routine analysis of both colorants in quality control laboratories.

KAYNAKLAR