Comparisons among Methods of Simultaneous Determination of Saccharin and Cyclamate

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ABSTRACT

There are synergistic advantage for mixing artificial sweeteners, for example, saccharin and cyclamate have been widely combined and used in food, especially in snacks. The market in Taiwan has been opened after joining the WTO, and the quality of these products varies. So there exists an urgent need of finding a fast, simple and accurate method for our daily analysis. Currently, the China National Standard CNS 10950 N6191 is not suitable if we want to use one single instrument to test both saccharin and cyclamate. The CNS method is both time and labor intensive. The purpose of this study is to examine the sensitivity of different pre-treatment and extraction methods, and compare the current methods used in simultaneous determination of both saccharin and cyclamate. A sensitivity comparison of two extraction methods on two sample pre-treatment was performed. The results shows that the average recovery of soaking (89.6%) and dialysis (94.2%) pre-treatments differ significantly($P<0.05$) on determination of saccharin, that the average recovery of soaking (89.6%) and dialysis (94.2%) pre-treatments are not significantly different ($P>0.05$) on determination of cyclamate. The results shows that the average recovery of solvent extraction and without extraction differ significantly($P<0.05$) on determination of saccharin and cyclamate. After working up the papers we discover methods of simultaneous determination of saccharin and cyclamate by high performance liquid chromatography（HPLC）. These methods are the methods of Choi et al., (2000) (Choi ’ s), and of the British Standard EN 1379 (BS). Their suitable analysis conditions were probed and compared with CNS (China National Standard 10950 N6191). All three HPLC methods used a mobile phase consisting of phosphate buffer with methanol in different volume ratios and used different UV absorption wavelengths. The combined results shows that the best determination method of saccharin is BS, followed by CNS and Choi ’ s. The best determination method of cyclamate is BS, followed by Choi ’ s and CNS. According to the above findings BS method appears to be better than Choi ’ s, however the determination of BS at wavelength 200 nm was not unique and only applicable under simplified circumstances. There are certain advantages to Choi ’ s method as compared to CNS method. The material costs for Choi ’ s method is least; and for a simultaneous determination of saccharin and cyclamate the only requirement is to change mobile phases and wavelengths. The Methyl Red of ion-pair reagent is a toxic-free and cheap reagent. Therefore, Choi ’ s method is faster, cheaper and simple and does not consume large quantity of reagents and materials. It provides a fast, safe and accurate quantitative method for our daily analysis to shorten the testing time of the artificial sweetener and avoid the health hazard of the tab technician.

Keywords : saccharin ; cyclamate ; artificial sweetener ; high performance liquid chromatography ; HPLC ; method comparison

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