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TAURINE AND CAFFEINE SIMULTANEOUS DETERMINATION IN ENERGY DRINKS

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Energy drinks contain, in addition to a high dose of caffeine, taurine and glucuronolactone. Taurine, a non-essential amino acid involved in many metabolic actions of the body, is found in these drinks at levels 10 times higher than in other food products. Its effects on the body at these levels and in the presence of caffeine and glucuronolactone are not well known. In this context, a need has developed for specific, robust, inexpensive and simple to implement methods for simultaneously dosing methylxanthines and taurine and ensuring quality control of the various solid or liquid nutritional supplements marketed.

Chromatographic conditions

Column: Astec apHera NH_2 150 x 2.1 mm
Column temperature: 45°C
Mobile phase: MeOH/H2O 30/70 v/v
Flow: 0.15 mL.min^{-1}
Injection volume: 10µL
ELSD Sedex 85:
Evaporation temperature: 40°C
Nebulizer gas: 3 bar
UV: 272 nm

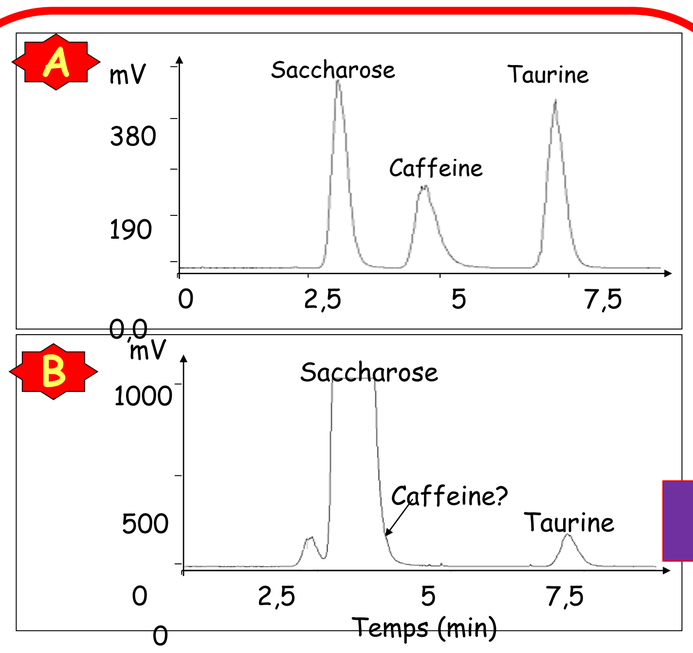

FIGURE 1

FIGURE 1: LC-ELSD analysis of standard solution of saccharose, caffeine and taurine (a) analytes concentration 100 mg·L^{-1} each (b) analytes concentration 2000, 6, 80 mg·L^{-1}, respectively

NEED FOR THE DOUBLE DETECTION UV/DEDL

Method validation

Table 1: LIMITS OF DETECTION (LOD) AND LIMITS OF QUANTIFICATION (LOQ); CALIBRATION CURVES AND DETERMINATION COEFFICIENT, r2

Analyte	Detection	LOD mg,L^{-1}	LOQ mg,L^{-1}	Calibration curve		
				Range C_{Min} – C_{Max} (mg.L^{-1})	Linearity equation n =3	r²
Caffeine	UV	0.01	0.03	3.6 – 8.4	y=26252.53 x -2721.86	0. 9988
Taurine	DEDL	2	5	48 - 112	y=1.542 x +3.7655	0.9954

5 points calibration curve prepared in the mobile phase:
60 to 140% of the expected concentrations for caffeine and taurine (diluted drink 1/50) + 2 g.L^{-1} saccharose
ELSD: response type $y=a^x$, linearization possible in logarithmic coordinates
Validity of the linearity model (ELSD AND UV) prouved by Fisher tests (F1 et F2)
Method precision verified with control samples:
-caffeine: 100,7-102,2 %
-taurine: 101,1 - 102,3%

Energy drink analysis

Table 2: Analysis of energy drinks

Analyte	Drink	Labeled concentration (mg.L^{-1})	Found concentration (calibration curve) (mg.L^{-1})	Found concentration (standard adition) (mg.L^{-1})
Taurine	RB ED BB	80	71,13 ± 0,01 78,39 ± 0,01 95,08 ± 0,01	-
Caffeine	RB ED BB	6	4,8 ± 0,2 4,4 ± 0,1 5,4 ± 0,1	6,73 ± 0,7 5,43 ± 0,7 7,54 ± 0,5

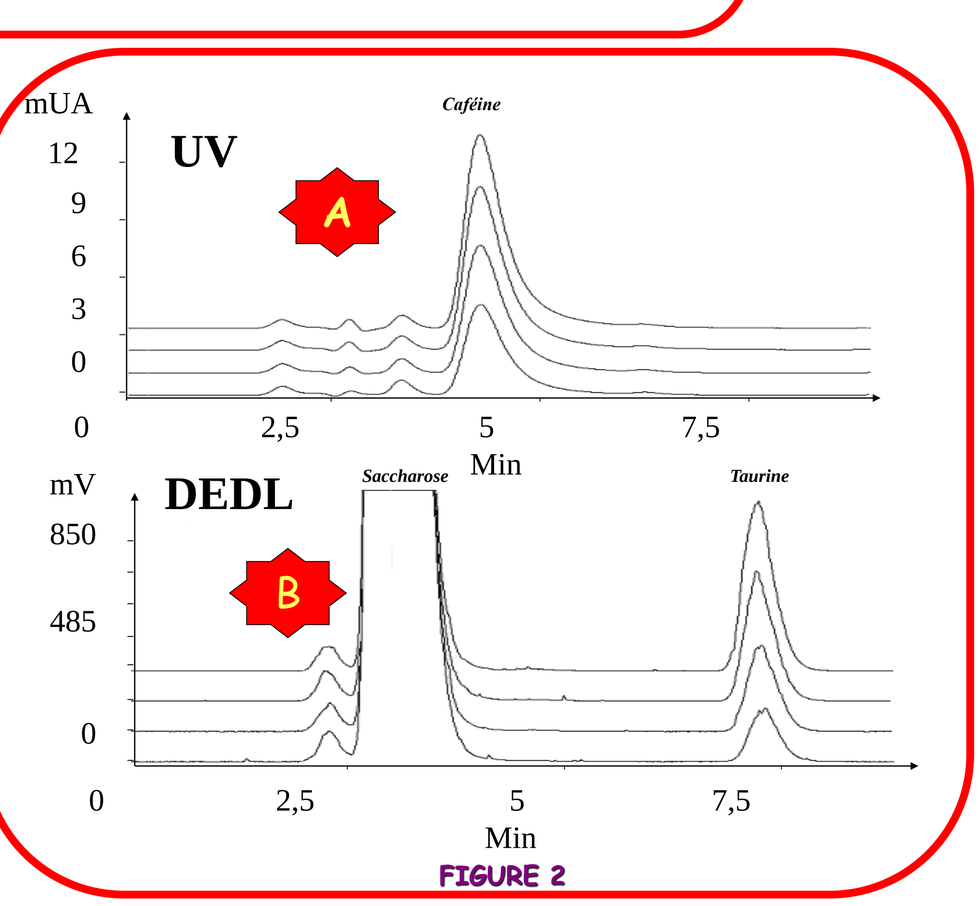

FIGURE 2 : Analyse CPL –UV/DEDL d'une boisson diluée 1/50e
Méthode des ajouts dosés
Ajout de 0%, 50%, 100% et 150% de la valeur annoncée par le fabricant