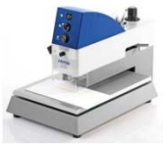
Analysis of caffeine in energy drinks with thin layer chromatography coupled to MS

Application details

The analysis and quantification of caffeine is performed using an elution based “TLC – MS interface” coupled with an “expression CMS”. Because of the high matrix tolerance of TLC no sample preparation is needed. The energy drinks are applied directly on the high performance thin layer chromatography (HPTLC) Si60 F_{254} MS grade plate.

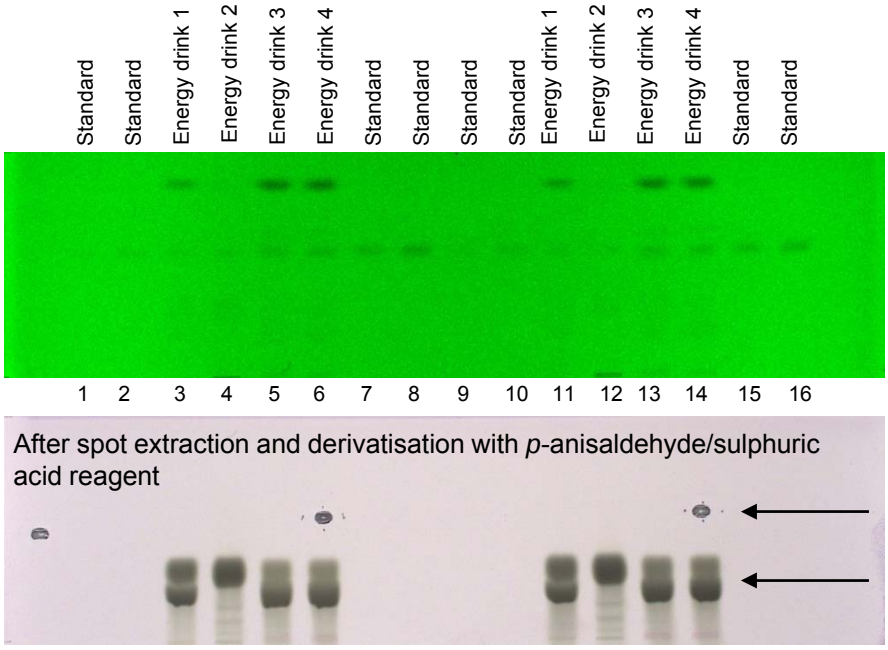


TLC – MS Interface

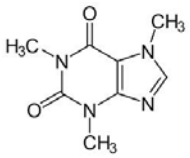
Advion expression CMS

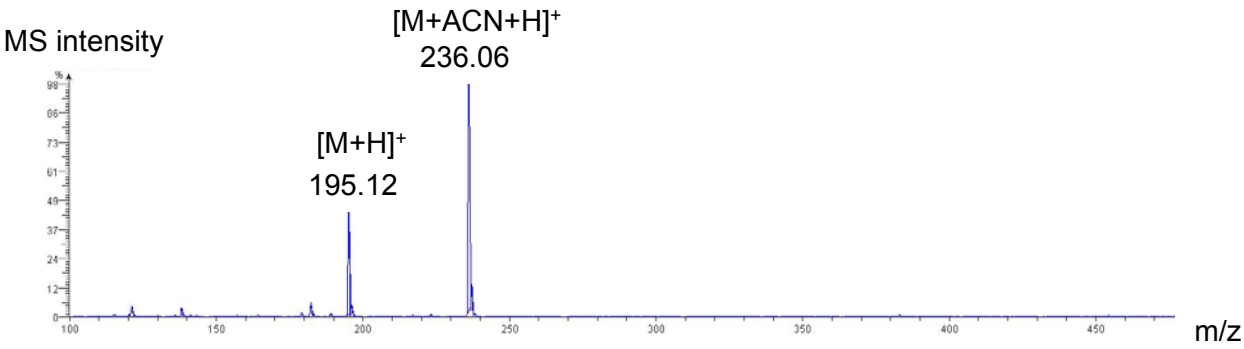
Chromatographic Conditions

Plate	HPTLC Silica gel 60 F_{254} MS-grade, 20x10 cm
Application volume	0.5 – 3 µL
System	TLC – MS Interface (Camag) coupled with expression CMS (Advion)
Detection	UV 254 nm Staining with *p*-anisaldehyde/sulphuric acid reagent pos. ESI-MS (m/z 100 – 500)
Migration distance	5 cm
Migration time	50 min
Mobile Phase	2-Propanol/ n-Heptane/ Water 7:3:1
Extraction solvent	Acetonitrile/ Water 95:5 (v:v) + 0.1% formic acid
Extraction flow	0.1 mL/ min
Sample preparation	No sample preparation → direct application of energy drinks
Sample application	Using the ATS4 sample applicator (CAMAG) 6 mm bandwise



Caffeine
194.19 g/ Mol





Chromatographic Data

Track	Compound	Concentration	Applied volume	hRf	Detected mass *m/z* g/ Mol
1, 9	Caffeine Standard	0.10 mg/ mL	0.5 µL	55	
2, 10	Caffeine Standard	0.10 mg/ mL	1.0 µL	55	
3, 11	Energy drink 1	0.17 mg/ mL	0.5 µL	55	195.1 / 236.1
4, 12	Energy drink 2	0.13 mg/ mL	0.5 µL	56	195.1 / 236.1
5, 13	Energy drink 3	0.41 mg/ mL	0.5 µL	55	195.1 / 236.1
6, 14	Energy drink 4	0.40 mg/ mL	0.5 µL	56	195.1 / 236.1
7, 15	Caffeine Standard	0.10 mg/ mL	2.0 µL	55	
8, 16	Caffeine Standard	0.10 mg/ mL	3.0 µL	55	

Merck Millipore is a division of Merck KGaA, Darmstadt, Germany
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Ordering information

- HPTLC silica gel 60 F_{254} MS-grade 25 glass plates 20x10cm (Cat. No. 100934)
- 2-Propanol gradient grade for liquid chromatography LiChrosolv® (Cat. No. 101040)
- n-Heptane for liquid chromatography LiChrosolv® (Cat. No. 104390)
- Acetonitrile hypergrade for LC-MS LiChrosolv® (Cat. No. 100029)
- Water for chromatography LiChrosolv® (LC-MS) (Cat. No. 115333)
- Formic acid 98-100% for analysis EMSURE® (Cat. No. 100264)