Forensic

Application note

chromatec

Drug screening in body fluids by GC/MS

Overview

Detection of drugs traces and their metabolites in body fluids and extracts plays an important role in various aspects of forensic and medical investigation. This type of qualitative screening assists in the diagnosis of medical emergencies involving possible drug overdose. Also, toxicology laboratories frequently perform qualitative and sometimes quantitative analyses of body fluids and tissues for drugs to aid in the determination of cause of death.

Equipment

- Gas chromatograph Chromatec Crystal 9000 with ADVIS Ion Source
- Capillary column CR-5ms 30 m × 0.25 mm × 0.25 µm
- Chromatec MSD with ADVIS ion source
- Split/splitless inlet
- Autosampler AS-2M
- Software “Chromatec Analytic”

Search features for screening in Chromatec Analytic MSD software

Both automated and manual search provides higher productivity of the Gas Chromatography – Mass Spectrometry analysis. Integrated deconvolution tools in automated search makes the screening routine work on GC-MS fast and comfortable.

Analysis mode

Run time	**30 min**	
Inlet		
Injection mode	splitless	
Inlet temperature	270 °C	
Capillary column		
Carrier gas	Helium	
Constant flow	1 ml/min	
Oven		
Rate, °C/min	Temp, °C	Time, min
	115	3
15	280	9
Post run at 320 C for 5 minutes is recommended		
MSD		
Mode	Scan	
Transfer line	300 °C	
Ion source	230 °C	
Scan range	50 - 550	

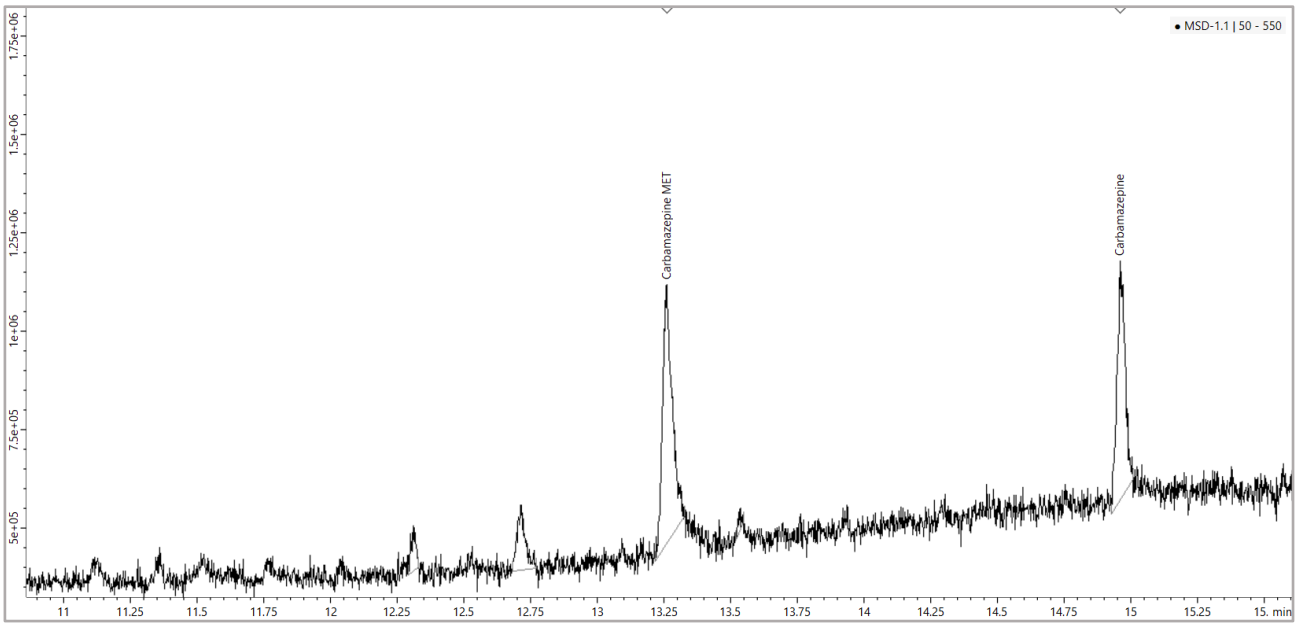
Method and sample preparation

In the examples below some samples of different body fluids were collected for forensic medical examination and subjected to minimal sample preparation: urine after SPE, acid extract from human liver, alkaline extract from human stomach.

Samples after preparation were injected to GC-MS system by AS-2M Autosampler with 1 µL injection volume.

Example #1:

Trace of Drug and Metabolite in Urine sample



Components

Component	Ret. time (min)	Detector
Carbamazepine MET	13.261	MSD-1.1
Carbamazepine	14.959	MSD-1.1

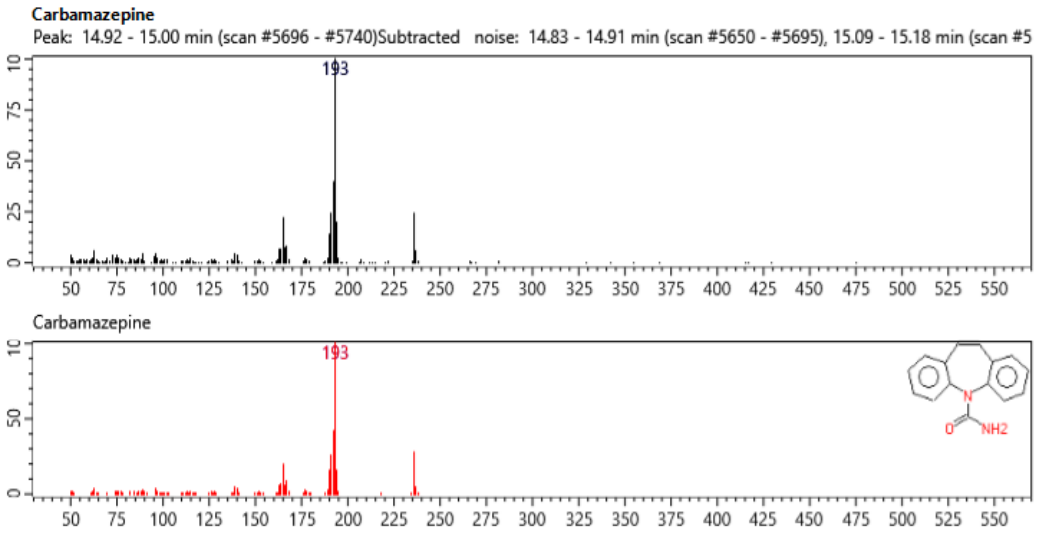
Carbamazepine is an anticonvulsant medication used primarily in the treatment of epilepsy and neuropathic pain.
Could be used as a drug of abuse.

Was clearly detected with metabolite compound in urine sample.

Search result

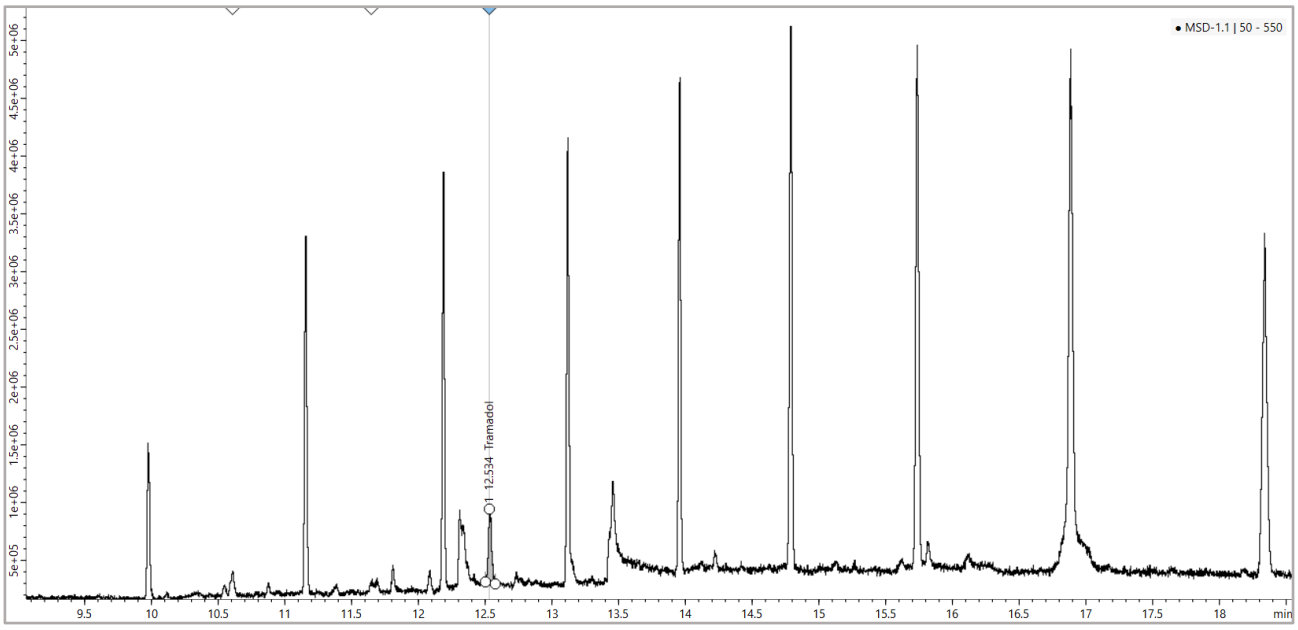
Ret. time	Name	P, %	Match	R.Match
14.96	Carbamazepine	67.01	914	934
13.26	CARBAMAZEPINE MET @P905 12.873 min	80.25	883	889

Spectra



Example #2:

Screening of Drugs in acid extract from human liver:



Components

Component	Ret. time (min)	Detector
Tramadol	12.534	MSD-1.1

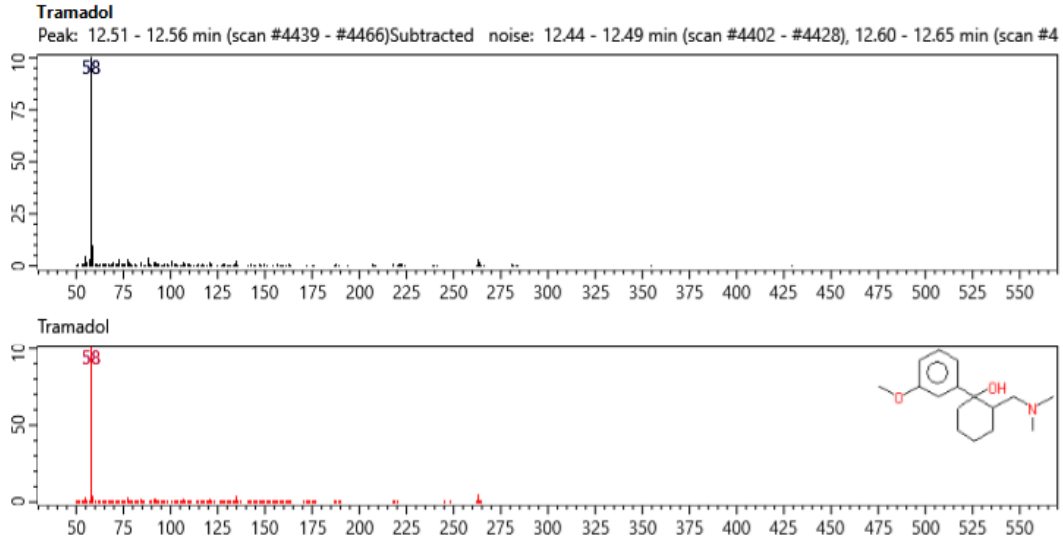
Tramadol is an opioid pain medication used to treat moderate to moderately severe pain. It is very limited and under high restrictions in the most of countries.

Tramadol has been detected in human's liver extract solution.

Search result

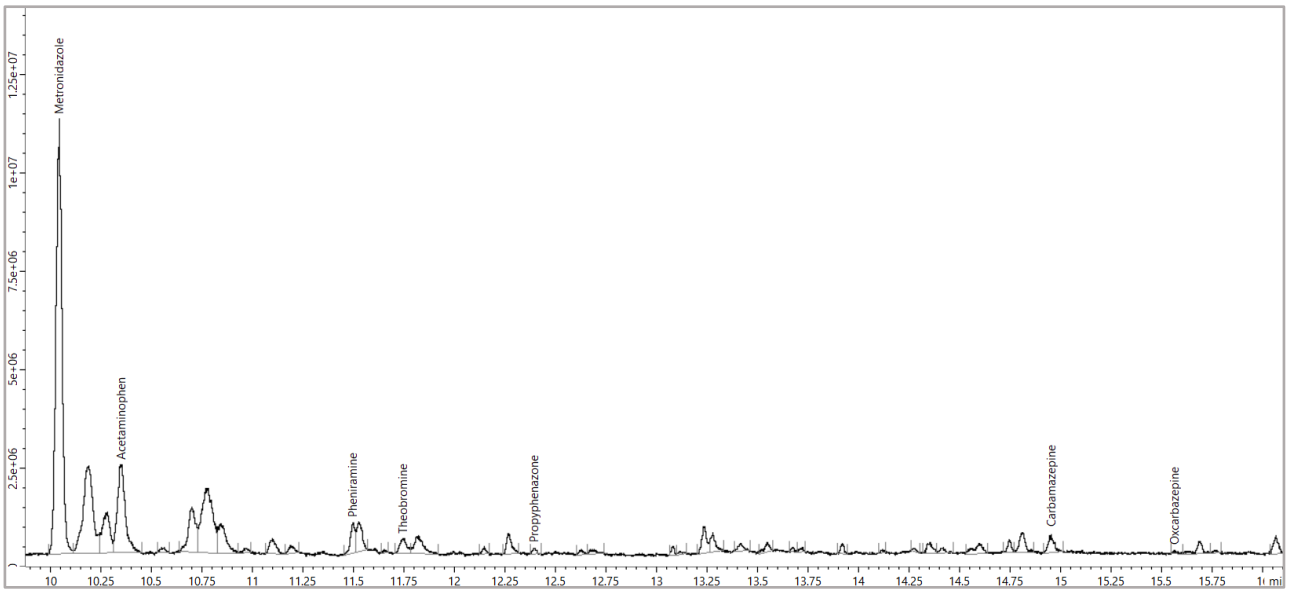
Ret. time	Name	P, %	Match	R.Match
12.53	Tramadol	67.71	786	829
10.61	Cotinine	88.91	805	854
7.73	Niacinamide	73.76	844	913
11.65	Caffeine	88.41	735	809

Spectra



Example #3:

Screening of Drugs in alkaline extract from human stomach:



Search result

Ret. time	Name	P, %	Match	R.Match	MW
10.04	Metronidazole	86.95	931	931	171
10.35	Acetaminophen	30.86	886	905	151
11.50	Pheniramine	42.24	709	762	240
14.95	CARBAMAZEPINE fenlepsine 14.656 min	71.07	862	903	0
17.11	Carbamazepine-10,11-dihydrodiol	66.58	747	881	270
12.40	Propyphenazone	91.42	771	833	230
12.68	CARBAMAZEPINE MET/artifact 12.180 min	30.29	626	694	0
11.61	Caffeine	41.45	622	768	0

Conclusion

Fast analysis time in such laboratories resulted in a demand for an analytical instrument with high resistance to "dirty" samples after rapid and accelerated sample preparation. New Chromatec MSD with ADVIS Ion Source demonstrates the highest level of resistance to contaminations caused by raw and unpurified biological matrices.

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