

## Application Note # MS-14

# Fast On-site Identification of Drugs with the mobile GC/MS system E<sup>2</sup>M

For the detection of drugs a couple of quick tests are available which were used by the police departments and the State Offices of Criminal Investigations. These tests are limited to substance specific reactions and do not give any information about different drug compositions (thin down compounds, by-products, precursors, impurities etc.) which were necessary for criminal investigations. For a clear identification of complex mixtures GC/MS is still the method of choice. With the mobile GC/MS system E<sup>2</sup>M a fast and inexpensive detection and identification of drugs can be accomplished directly at the scene of crime. This application note demonstrates the time saving determination of different drugs/drug compositions with the E<sup>2</sup>M in the GC mode and by direct measurements with the Air/Surface probe.

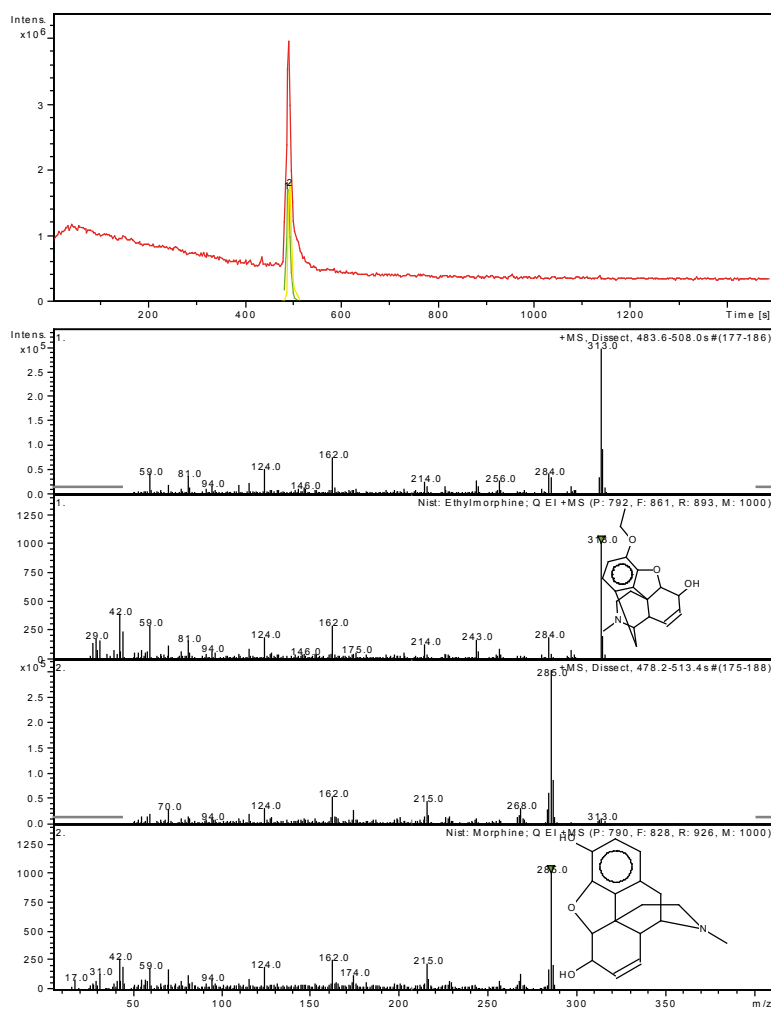
### Sampling preparation

For this application note the following solutions were prepared by dissolving the raw material in methanol (hashish: 4.7 mg/ml, marihuana: 2.2 mg/ml, morphine: 2.8 mg/ml, cocaine: 2.2 mg/ml, heroin: 2.6 mg/ml). For the identification on-site (not quantification) where a microbalance may not be present this can be done by transferring the amount of one micro-spatula tip (1 – 5 mg) into a vial filled with 1 ml methanol.



Figure 1: Opium poppy yields the raw material for morphine and heroin production..

### Chromatogram and appropriate mass spectra from a morphine sample



### Analytical conditions

E<sup>2</sup>M with mounted GC in injector mode: 3.5 m HP5-ms, 0.32 mm ID, 1 µm film. injector temperature: 240°, hold-time: 10s, charging time: 30s, pressure during charging: 600 mbar, GC temperature program: 100° to 240° at 15°/min (hold: 600s), carrier gas: ambient air at 1.5 ml/min, MS Scan: 46 – 350 u, integration time: 5 ms/mass; injected volume: 1µl.

E<sup>2</sup>M with mounted Air/Surface probe: probe head temperature: 240°, probe line temperature: 220°, sampling pump pressure: 850 mbar. MS Scan: 46 – 350 u, integration time: 5ms/mass; sampling: 1µl with probe (pressing probe head on the sample).

Figure 2: GC run; Injection: 1µl morphine solution (2.8 mg/ml): Beside morphine the derivate ethyl morphine was identified.

### Identified substances morphine sample

#	RT [s]	Area	Compound Name	Library	CAS#	Purity'
1	490.4	17050945	Ethylmorphine	Nist	76-58-4	792
2	493.5	17312711	Morphine	Nist	57-27-2	790

### Chromatogram and appropriate mass spectra from a cocaine sample

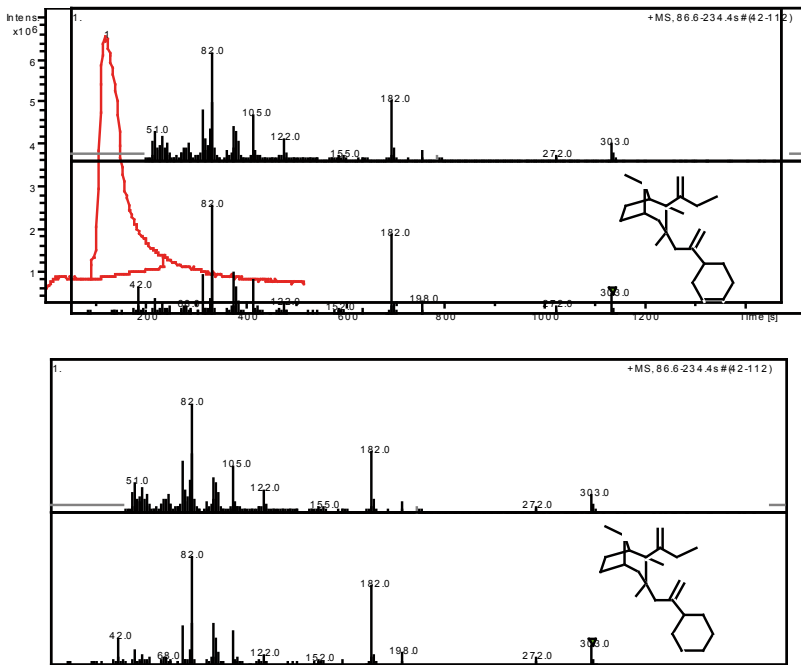


Figure 3: Direct sampling of 1µl cocaine solution (2.2 mg/ml) from a surface with E<sup>2</sup>M Air/Surface probe; Analytical conditions: see E<sup>2</sup>M with mounted Air/Surface probe.

### Identified substances cocaine sample

#	RT [s]	Area	Compound Name	Library	CAS#	Purity'
1	119.8	304612217	Cocaine	Nist	50-36-2	847

### Chromatogram and appropriate mass spectra from a hashish sample

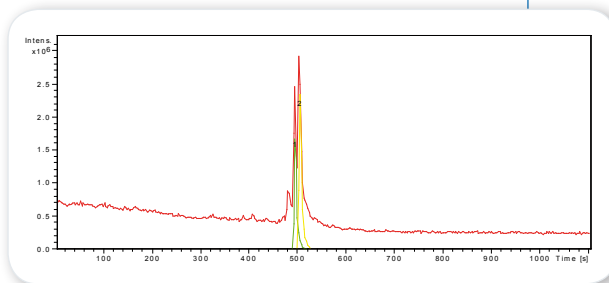
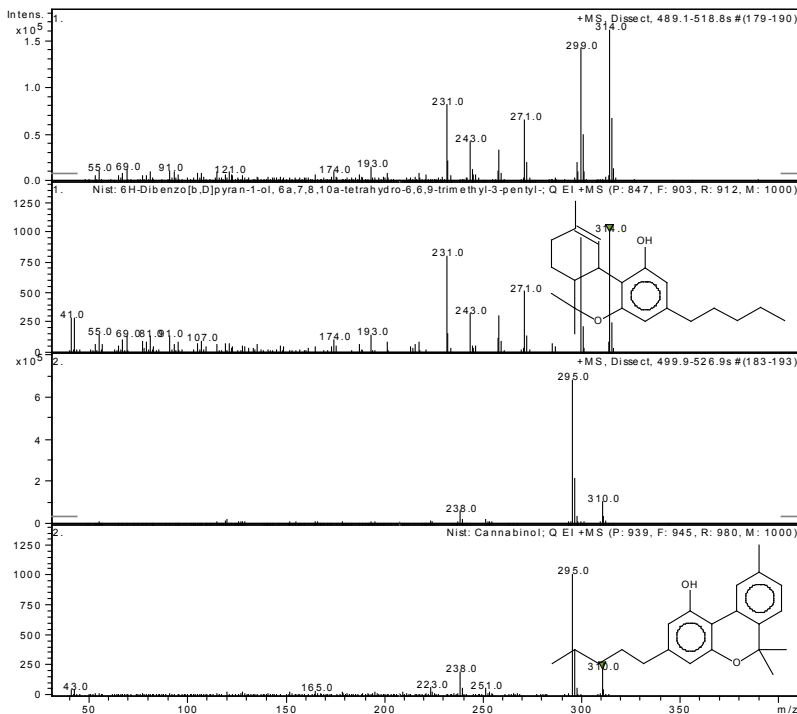


Figure 4: GC run; Injection: 1µl hashish solution (4.7 mg/ml): two typical components of hashish / marijuana identified: Cannabinol, THC; Analytical conditions: see E<sup>2</sup>M with mounted GC in injector mode.

### Identified substances hashish sample

#	RT [s]	Area	Compound Name	Library	CAS#	Purity'
1	495.5	11662059	Tetrahydrocannabinol (THC)	Nist	33086-25-8	847
2	505.8	15867883	Cannabinol	Nist	521-35-7	939

### Chromatogram and appropriate mass spectra from a heroin sample

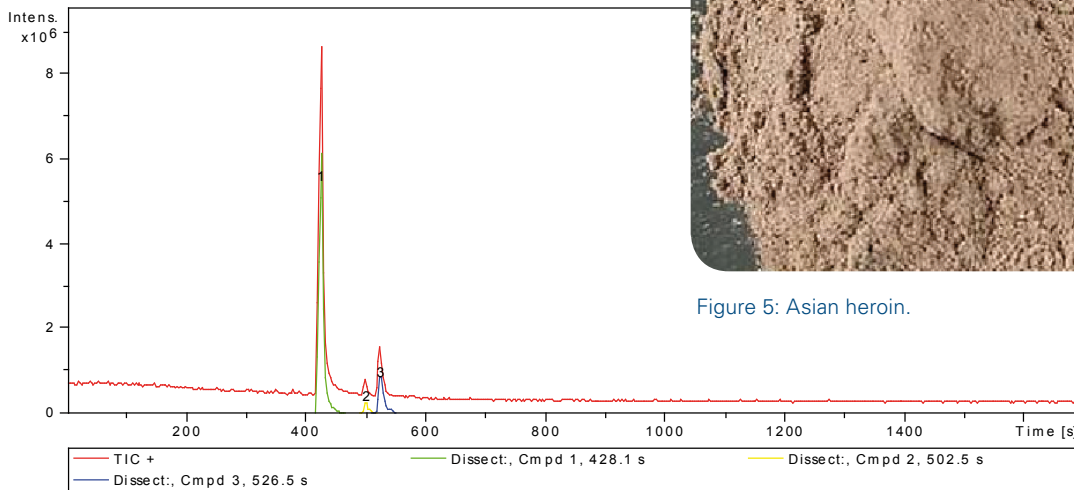


Figure 5: Asian heroin.

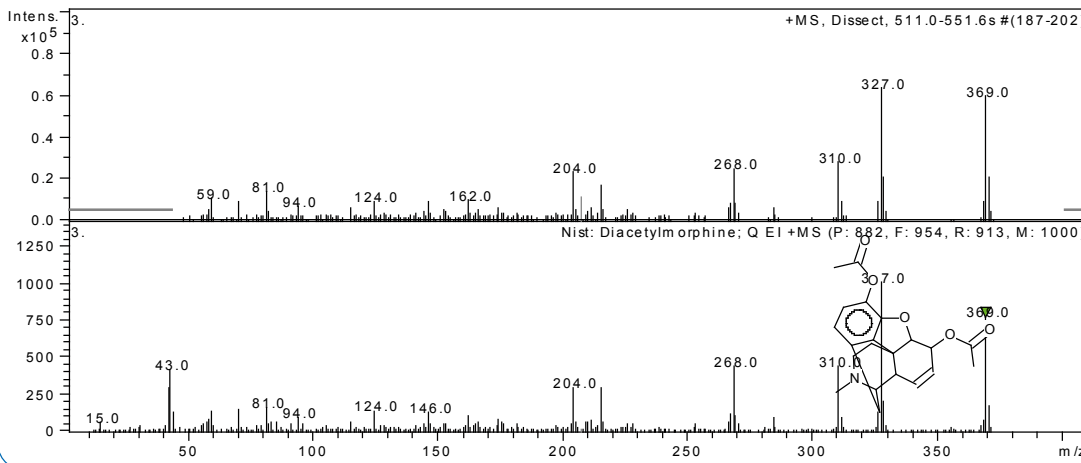


Figure 6: GC run; Injection: 1µl heroin solution (2.6 mg/ml): Beside diacetylmorphine (heroin) the compounds acetylcodein and novocaine were identified which are typical thin down compounds of heroin; Analytical conditions: see E<sup>2</sup>M with mounted GC in injector mode.

### Identified substances heroin sample

#	RT [s]	Area	Compound Name	Library	CAS#	Purity'
1	428.1	55787740	Novocaine	Nist	59-46-1	941
2	502.5	1991596	Acetylcodein	Nist		716
3	526.5	8490099	Diacetylmorphine (Heroin)	Nist	561-27-3	882



Figure 7: Unknown sample confiscated by the police and suspected of being a drug.

**Chromatogram and appropriate mass spectra from an unknown sample**

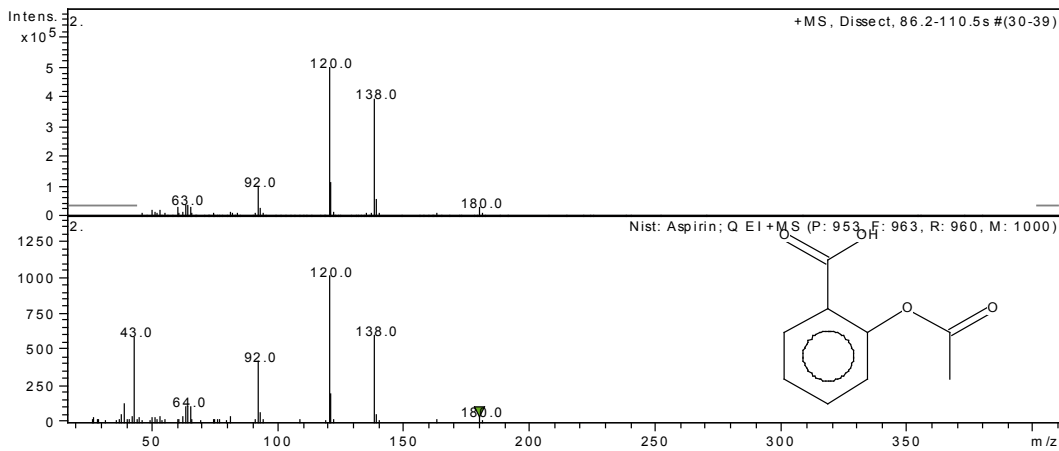
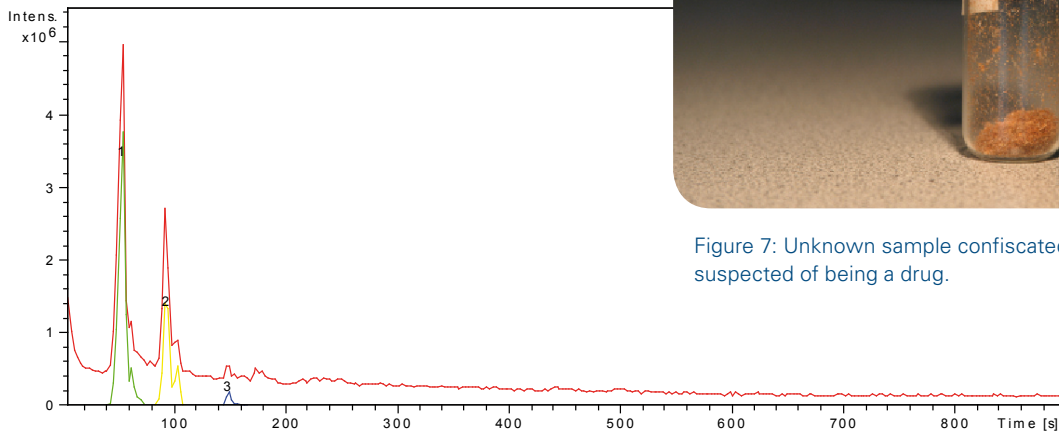


Figure 8: GC run; Injection: 1µl unknown solution (2.2 mg/ml): Results show that no drug is present; sample is just rotten Aspirin® (Aspirin + salicylic acid) with some caffeine; Analytical conditions: see E<sup>2</sup>M with mounted GC in injector mode.

**Identified substances unknown sample**

#	RT [s]	Area	Compound Name	Library	CAS#	Purity'
1	55.6	27522076	Salicylic Acid	Nist	69-72-7	956
2	95.5	12232044	Aspirin	Nist	50-78-2	953
3	150.8	1072028	Caffeine	Nist	58-08-2	710

## Conclusions

With the mobile GC/MS system E<sup>2</sup>M drugs (here: hashish, marihuana, morphine, cocaine, heroin) can be identified directly on the scene of crime within 10 – 15 min. The operation of the system is reduced to the lowest possible level so that non-chemists are able to run the system. In comparison to classical investigations (laboratory measurements), which are time consuming, and expensive identification of drugs can be carried out quickly and at low cost. Therefore the GC/MS system E<sup>2</sup>M is a powerful analytical tool to save time and money.

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### Instrumentation & Software

Mobile GC/MS System E <sup>2</sup> M
E <sup>2</sup> M Software Package

For research use only. Not for use in diagnostic procedures.



Figure 9: Mobile GC/MS system E<sup>2</sup>M