

Chemical Analysis of Fingerprints

Fingerprints contain a great deal of chemical information that is not often exploited for forensic analysis. DART can detect and identify the chemical components of fingerprints, often providing information about what substances a subject has been handling.

An example is shown here for DART analysis of a single fingerprint made on a glass vial after touching an aspirin/oxycodone tablet. The aspirin and oxycodone are readily detected, along with minoxidil (hair-loss

treatment), fatty acids, urea, lactic acid, squalene, cholestadiene, and the common plasticizer BEHP bis(ethylhexylphthalate). The amino acids A, F, G, I/L, S, P, T, and V are also detected with relative abundances between 0.5% and 18%. Other lipids can be detected at higher masses (not shown). Oxycodone is readily separated at the AccuTOF's high resolving power from an unassigned interference at m/z 316.

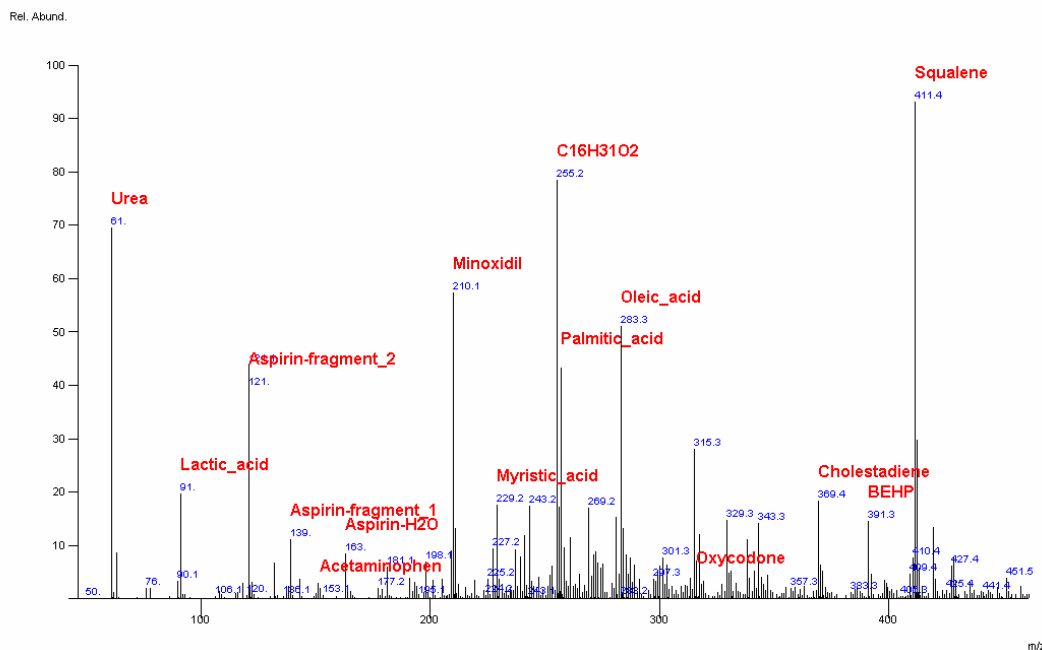


Figure 1. Fingerprint on a glass vial after touching Oxycodone tablet.

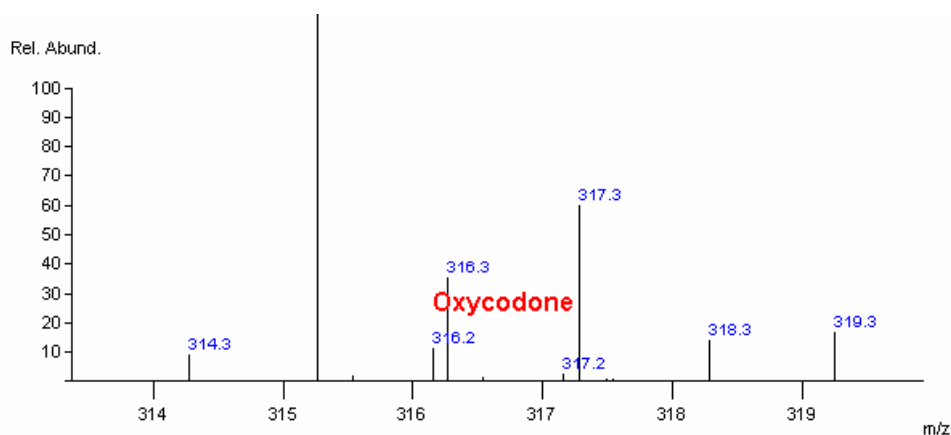


Figure 2. Enlarged view of region near m/z 316, showing that oxycodone is resolved from interference at the same integer m/z .

Name	Meas.	Calc.	Diff(u)	Abund.
Oxycodone	316.1554	316.1549	0.0005	2.3573
Aspirin-H ₂ O	163.0398	163.0395	0.0003	8.9676
Aspirin-fragment_1	139.0401	139.0395	0.0006	11.9823
Aspirin-fragment_2	121.0286	121.0290	-0.0004	42.4559
Minoxidil	210.1355	210.1355	0.0000	61.6484
Urea	61.0413	61.0402	0.0011	74.7234
Palmitic_acid	257.2477	257.2480	-0.0003	46.4336
C ₁₆ H ₃₁ O ₂	255.2324	255.2324	0.0000	84.2178
Squalene	411.3996	411.3991	0.0005	100.0000
Cholestadiene	369.3525	369.3521	0.0004	19.7204
Lactic_acid	91.0400	91.0395	0.0005	21.1630
BEHP	391.2854	391.2849	0.0005	15.6784
Oleic_acid	283.2637	283.2637	0.0000	54.9441
Myristic_acid	229.2162	229.2168	-0.0006	18.8792

Table 1. Compounds detected within 0.002 u of compounds in a list of common drugs and components in human sweat.

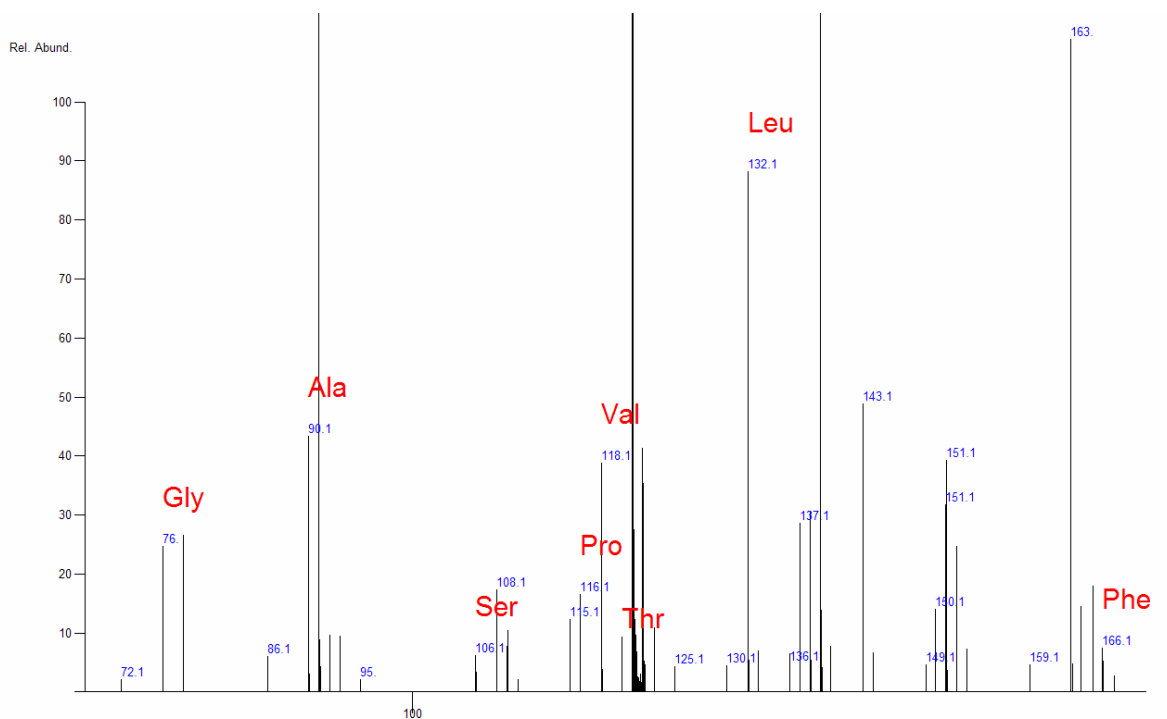


Figure 3. Amino acids A, F, G, I/L, S, P, T, and V detected with relative abundances between 0.5% and 18%

Conclusion

DART can identify compounds in fingerprints, often making it possible to determine what substances a subject has been handling.

