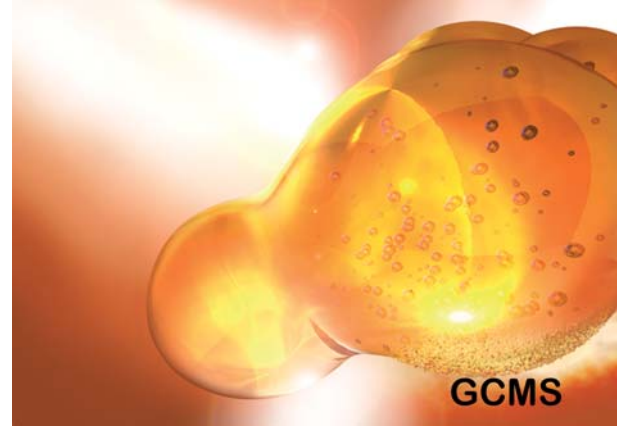


# Application Note



## The Identification of Benzodiazepine Derivatives and Their Metabolites in Urine and Blood Samples Using GCMS-QP2010 and a Database

The benzodiazepine derivatives are efficacious for insomnia and are commonly used in most types of sleeping pills. It is well known by law enforcement agencies that these pills are often used in criminal activities or to assist suicides. In hospitals or police labs the identification of these compounds in blood or urine samples using GCMS is vitally important to identify a crime. The results of the GCMS mass spectrum is compared with the mass spectra reference database such as the NIST-EPA-NIH, Wiley and Pfleger. Some

of these compounds and most of their metabolites are not registered in these mass spectrum databases. Also their concentration levels in blood samples are very low. In these cases the mass spectrum is less reliable as a tool for the identification of these compounds. An identification system, in addition to the mass spectrum, using the retention time and the mass number (mass chromatogram) has been developed, which gives reliable data for the identification of Benzodiazepines.

分析日時 : 2003/10/07 14:28:55  
 データ名 : Y381-11  
 プログラム : GCMSData\Project\2\NIST-1007\F02\_01\007\_00.apd  
 データの抽出

保留時間	高さ	質量比	質量比	質量比	化合物名	類似度
1	318.00	---	---	---	Alprazolam	---
2	318.00	---	---	---	Bromazolam	---
3	17.62 302.00	836	285	0.00	Target: Bromazolam	---
4	282.00	---	---	---	N.D.(Not Identified)	---
5	14.14 306.00	916	313	0.00	Target: Clonazepam	---
6	318.00	---	---	---	N.D.(Not Identified)	---
7	278.00	---	---	---	N.D.(Not Identified)	---
8	318.00	---	---	---	N.D.(Not Identified)	---
9	318.00	---	---	---	N.D.(Not Identified)	---
10	304.00	---	---	---	N.D.(Not Identified)	---
11	284.00	---	---	---	N.D.(Not Identified)	---
12	294.00	---	---	---	N.D.(Not Identified)	---
13	288.00	---	---	---	N.D.(Not Identified)	---
14	17.22 342.00	2518	477	0.00	Target: Ethyl loflazepate	---
15	332.00	---	---	---	N.D.(Not Identified)	---
16	313.00	---	---	---	N.D.(Not Identified)	---
17	14.67 88.00	41717	19181	0.00	Target: Flumazenil	---
18	289.00	---	---	---	N.D.(Not Identified)	---
19	342.00	---	---	---	N.D.(Not Identified)	---
20	---	---	---	---	N.D.(Not Identified)	---
21	304.00	---	---	---	N.D.(Not Identified)	---
22	334.00	---	---	---	N.D.(Not Identified)	---
23	278.00	---	---	---	N.D.(Not Identified)	---
24	14.12 319.00	1861	214	0.00	Target: Midazolam	---
25	325.00	---	---	---	N.D.(Not Identified)	---
26	14.67 289.00	8949	823	0.00	Target: Nitrazepam	---
27	289.00	---	---	---	N.D.(Not Identified)	---
28	289.00	---	---	---	N.D.(Not Identified)	---
29	351.00	---	---	---	N.D.(Not Identified)	---
30	324.00	---	---	---	N.D.(Not Identified)	---
31	18.49 288.00	2436	349	0.00	Target: Oxazolam	---
32	---	---	---	---	N.D.(Not Identified)	---
33	389.00	---	---	---	N.D.(Not Identified)	---
34	382.00	---	---	---	N.D.(Not Identified)	---
35	342.00	---	---	---	N.D.(Not Identified)	---
36	294.00	---	---	---	N.D.(Not Identified)	---
37	---	---	---	---	N.D.(Not Identified)	---
38	378.00	---	---	---	N.D.(Not Identified)	---
39	299.00	---	---	---	N.D.(Not Identified)	---
40	370.00	---	---	---	N.D.(Not Identified)	---
41	285.00	---	---	---	N.D.(Not Identified)	---
42	317.00	---	---	---	N.D.(Not Identified)	---
43	294.00	---	---	---	N.D.(Not Identified)	---
44	---	---	---	---	N.D.(Not Identified)	---
45	---	---	---	---	N.D.(Not Identified)	---
46	220.00	---	---	---	N.D.(Not Identified)	---
47	19.25 358.00	642	414	0.00	Target: 1-(2-Hydroxyethyl)pyrrolidine	12
48	18.99 326.00	1809	339	0.00	Target: 4-(2-Hydroxyethyl)pyrrolidine	12
49	14.76 300.00	1852	682	0.00	Target: 3-Hydroxyflunitrazepam	10
50	14.18 283.00	7918	710	0.00	Target: 7-Aminoflunitrazepam	14
51	305.00	---	---	---	N.D.(Not Identified)	---
52	332.00	---	---	---	N.D.(Not Identified)	---
53	288.00	---	---	---	N.D.(Not Identified)	---
54	332.00	---	---	---	N.D.(Not Identified)	---
55	14.82 310.00	2846	960	0.00	Target: alpha-Hydroxymidazolam	11
56	14.88 285.00	11323	3606	0.00	Target: 7-Aminonimetazepam	76
57	16.80 301.00	97322	18483	0.00	Target: 7-Acetamidonimetazepam	59
58	351.00	---	---	---	N.D.(Not Identified)	---
59	340.00	---	---	---	N.D.(Not Identified)	---
60	288.00	---	---	---	N.D.(Not Identified)	---
61	12.77 342.00	4669	936	0.00	Target: Nifedipine	9
62	---	---	---	---	N.D.(Not Identified)	---
63	328.00	---	---	---	N.D.(Not Identified)	---
64	---	---	---	---	N.D.(Not Identified)	---
65	286.00	---	---	---	N.D.(Not Identified)	---
66	10.71 53.00	66189	152844	0.00	Reference: C18	33
67	11.28 57.00	432986	109455	0.00	Reference: C22	85
68	11.86 57.00	849883	125232	0.00	Reference: C24	39
69	12.89 57.00	497737	964681	0.00	Reference: C26	27
70	13.67 57.00	508841	65228	0.00	Reference: C28	61
71	14.42 57.00	328327	38668	0.00	Reference: C30	81
72	17.33 57.00	48576	15123	0.00	Reference: C32	78
73	17.33 57.00	53746	16163	0.00	Reference: C34	38
74	---	---	---	---	N.D.(Not Identified)	---
75	13.74 375.00	8279	1883	1.00	Small Standard: Nordazepam-d5	31
76	313.00	---	---	---	N.D.(Not Identified)	---

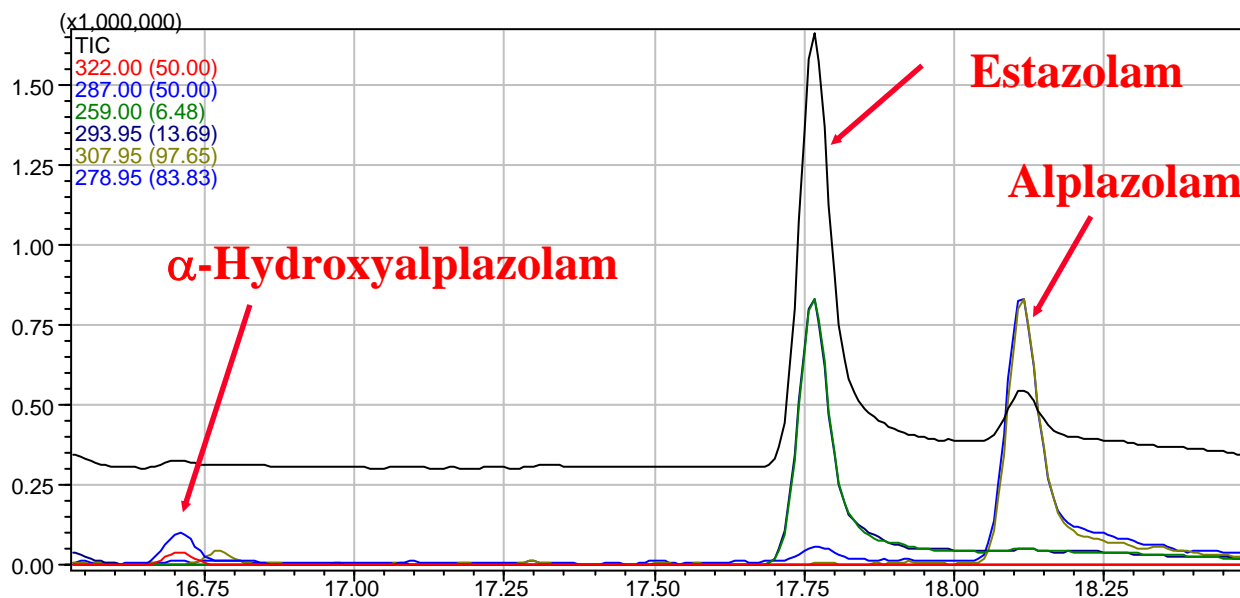
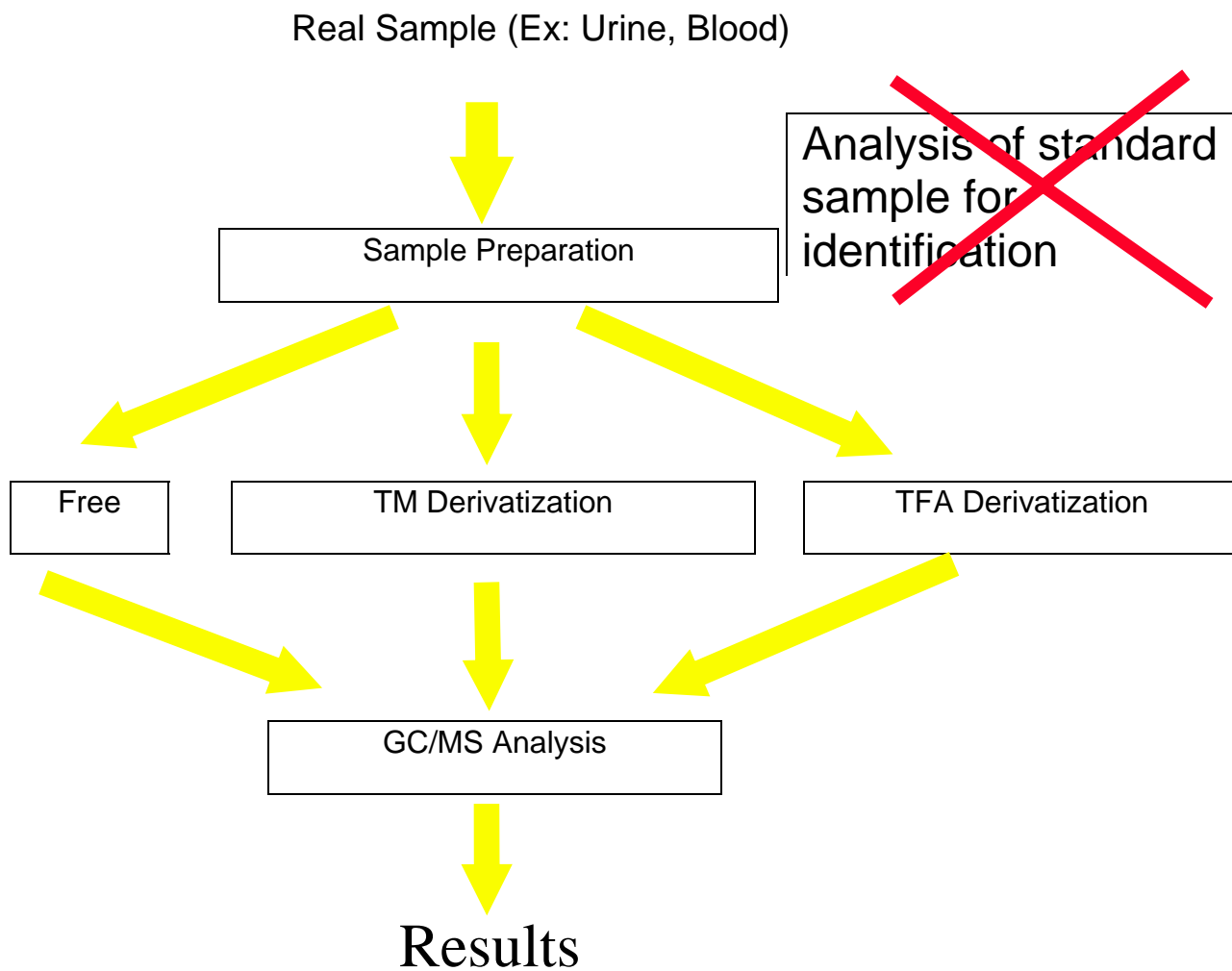


Fig. 1: Identification of Benzodiazepines:  $\alpha$ -Hydroxyalplazolam is the metabolite of Alplazolam. This compound is easily decomposed to Estazolam and Alplazolam.

The given specifications serve purely as technical information for the user. No guarantee is given on technical specification of the described product and/or procedures.