"Crack" Cocaine: A Study of Stability over Time and Temperature

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ABSTRACT: Changes in the appearance, weights, purity levels, and alkaloidal profiles of 146 laboratory-prepared "crack" cocaine exhibits stored under different temperatures and packaging types, were studied over a one year period. An accelerated aging study (elevated temperature, one month) was also performed with 2 "crack" cocaine exhibits, to simulate very long-term or higher temperature storage. The results indicate that higher purity "crack" that was prepared by the classic method is reasonably stable over 12 months if stored at or below 20^{O}C, irrespective of incidental moisture and/or packaging type. However, extended storage times and/or elevated temperatures can result in weight loss and/or degradation, especially for samples sealed in plastic bags or heat-sealed evidence envelopes.

KEYWORDS: Cocaine, "Crack," Stability, Storage, Degradation, Weight Loss, Forensic Chemistry

Introduction

Cocaine base, commonly referred to as "crack," is a major drug of abuse. Forensic drug analysts routinely analyze "crack" exhibits and present their findings in court. Over the past 20 years, many instances of weight loss and degradation of stored "crack" exhibits have been noted, especially for exhibits stored for long time frames or under non-ideal conditions. Such changes can be an issue for forensic chemists when testifying at trial, particularly if the original results are not in agreement with reanalyses that were conducted within the same laboratory, at a different forensic laboratory, or independently by chemists employed by the defense.

Weight changes in cocaine hydrochloride exhibits have been previously studied, with research concluding that weight gain is often due to water absorption associated with packaging [1]. Cocaine hydrochloride degradation processes have also been previously studied, and the resulting products have been characterized [2-5]. The stability of cocaine hydrochloride in aqueous solutions has also been extensively researched [6-8]. Minor alkaloids present in illicit cocaine exhibits, such as the truxillines, have also been examined for stability over time, with the conclusion that a direct relationship exists between the sample age and the increased levels of the truxilline degradation products, i.e., the truxillic and truxinic acids [9].

However, a search of the literature found no studies on the stability of "crack" cocaine, or the products resulting from the degradation of "crack." In this study, the stability of "crack" was monitored in two independent experiments. In the first, 146 prepared samples were stored for one year at three different temperatures (room temperature (20^{O}C), refrigerator (5^{O}C), and freezer (-5^{O}C)) and two different types of packaging (standard zip-lock plastic bags and Heat Sealed Evidence Envelopes (HSEEs)). In this case, the exhibits were examined for weight loss, changes in purity, and degradation on a monthly basis. In the second experiment, two prepared samples were stored for one month at 65^{O}C, one unsealed and one sealed in a zip-lock plastic bag. The elevated temperature was used to simulate very long term storage. In the latter case, the exhibits were analyzed at the start and finish only.

For the one year study, the "crack" was prepared via the "classical" technique. In this method, cocaine hydrochloride is dissolved in water, and an alkaline substance such as sodium bicarbonate or sodium carbonate is added to precipitate cocaine base. The solution is brought to a boil, and the cocaine base melts and forms an oil that pools on the bottom of the container. The solution is cooled, and the oil solidifies, allowing the water layer to be poured off. For the one month (high temperature) study, the "crack" was prepared via the production technique known by the street term "whipping." In this method, water is "whipped" into the molten cocaine base prior to its solidification, to increase its bulk. The samples used for the one year study were processed using the "classical" method because it gives a reasonably uniform product (homogeneity is necessary for valid sample comparisons). The samples used for the one month study were processed using the "whipping" method because it maximizes the amount of water in the sample, and water can be considered to be the key factor in sample degradation during extended or higher temperature storage.

Other types of "crack" production techniques, including the "microwave" method, were not employed in this study because they give inhomogeneous products that contain extensive sodium bicarbonate and other processing impurities.

Figure 1 illustrates the products resulting from the degradation of cocaine and the cinnamoylcocaines in "crack." The amounts of benzoylecgonine and the cinnamoylecgonines were tracked to determine the extent of cocaine and cinnamoylcocaine degradation, respectively (ecgonine methyl ester and ecgonine were also quantitated, but are not reported here because they result from the degradation of both cocaine and the cinnamoylcocaines). The amounts of tropacocaine and trimethoxycocaine present in "crack" were also tracked, because these alkaloids are key "marker" compounds that are used in many cocaine profiling (signature) programs [2,4,5,10].

Experimental

Materials: "Crack" cocaine was produced in-house as described below, starting with uncut, illicitly prepared cocaine hydrochloride from the laboratory inventory. Pharmaceutical cocaine base (used as the quantitation standard for all GC analyses) was obtained from Merck Chemical (Rahway, NJ). Chloroform was a distilled-in-glass product of Burdick and Jackson Laboratories (Muskegon, MI). Reagent grade diethylamine was obtained from Sigma-Aldrich Chemical Company (Milwaukee, WI). N-Methyl-N-trimethylsilyltrifluoroacetamide (MSTFA) was a product of Pierce Chemical (Rockford, IL). *para*-Fluorococaine and isopropylcocaine (both used as internal standards (ISTDs)) were synthesized in-house.

Gas Chromatograph / Flame Ionization Detection (GC/FID): Quantitative analyses of cocaine were performed using isopropylcocaine as a structurally related ISTD [11]. An Agilent (Palo Alto, CA) Model 6890N gas chromatograph fitted with a 30 m x 0.25 mm ID fused-silica capillary column coated with 0.25 µm DB-1 (J&W Scientific, Rancho Cordova, CA) was used for cocaine quantitation. An isothermal oven temperature of 250^{O}C was used for 7.00 min. Hydrogen (99.999 percent UHP) was the carrier gas at a flow rate of 1.1 mL/min. The injection port and detector were maintained at 280^{O}C. Samples (2 µL) were injected in the split mode (25 : 1) by an Agilent 7683 Series Auto Injector. Nitrogen was used as the auxiliary make-up gas for the detector. For all quantitations, a minimum of triplicate analyses (N = 3) were performed and results are reported as the average.

Quantitative analyses of cocaine alkaloids and their degradation products were performed using a previously detailed chromatographic impurity signature profile analysis method [2]. Analyses were conducted using an Agilent Model 6890N gas chromatograph fitted with a 30 m x 0.25 mm ID fused-silica capillary column coated with 0.25 µm DB-1701 (J&W Scientific). The oven temperature was programmed as follows: Initial temperature 170^{O}C; 1 min hold; program rate 4^{O}C/min to 200^{O}C; program rate 6^{O}C/min to a final temperature of 275^{O}C; 9 min hold. Samples (1 µL) were injected in the split mode (21.3 : 1) by an Agilent 7683 Series Auto Injector. The injection port and flame ionization detector were maintained at 230^{O}C and 300^{O}C, respectively. Hydrogen (99.999 percent UHP) was the carrier gas at a flow rate of 1.1 mL/min. Nitrogen was used as the auxiliary

make-up gas for the detector. For all quantitations, a minimum of triplicate analyses (N = 3) were performed and results are reported as the average.

Sample Preparation for Cocaine Quantitation: About 16 - 20 mg of cocaine base were weighed (to the nearest 0.01 mg) into a 50 mL Erlenmeyer flask. Samples and standards were diluted with 20 mL of chloroform containing 50 µL of DEA and 5.0 mL of the isopropylcocaine ISTD solution (0.9 mg/mL) [11].

Sample Preparation for Signature Analysis: Approximately 4 - 5 mg of cocaine base was weighed (to the nearest 0.01 mg) into an autosampler vial. The samples were diluted using 250 µL of the *para*-fluorococaine ISTD solution (0.20 mg/mL), 250 µL of MSTFA was added, and the resulting solution was heated for 30 min at 75^{O}C. Samples were allowed to cool to room temperature (approximately 30 min) prior to injection into the GC [2].

Production of "Crack" Cocaine for the One Year Stability Study: Approximately 2 kg of uncut cocaine hydrochloride were dissolved in 10 L of water, and saturated sodium bicarbonate added until pH 8 was obtained. The solution was brought to a boil, and the cocaine base melted and settled to the bottom. The solution was then allowed to cool, the water was poured off, and the solidified "crack" cocaine was removed and separated into two batches. The first batch was immediately placed into plastic bags while still wet (hereafter referred to as "fresh"), while the second was allowed to "dry out" for two hours before being placed into bags (hereafter referred to as "dry"). Although packaged wet, the fresh batch did not in fact contain a significant amount of water. Each batch was divided equally into zip-lock plastic bags and HSEEs, with approximately 4 grams of cocaine base in each bag. The samples were weighed (to the nearest 0.1 g) for initial net weights. Samples were stored at: 20^{O}C, 5^{O}C, and -5^{O}C. Approximately every 30 days, one sample from each temperature condition/package type was analyzed for cocaine purity, weight change, and cocaine degradation.

Production of "Crack" Cocaine for the One Month (Accelerated Aging) Stability Study: Two samples were prepared: *Sample 1* - Saturated sodium bicarbonate (100 mL) was added to approximately 110 grams of illicit cocaine base in a beaker and heated. After the cocaine melted, the mixture was "whipped" to a nearly homogeneous composition, then allowed to cool and solidify. The net weight of the resulting "whipped crack" was determined, and small samples were removed to establish the starting cocaine purity and level of degradation; the bulk sample was stored in an oven at 65^{O}C, unsealed. After one month, the net weight, purity, and degradation of the resulting product were determined. *Sample 2* - The experiment was repeated with approximately 105 grams of illicit cocaine base and 60 mL of water (not containing sodium bicarbonate); however, in this latter case the resulting "whipped crack" was sealed in a zip-lock plastic bag before being stored in the oven.

Results and Discussion

12 Month Study of "Classically"-Prepared Fresh and Dry "Crack" Samples

Because the "crack" samples that were prepared for the 12 month experiments were uniform, of reasonably high purity, and contained little/no sodium bicarbonate and only incidental moisture, this study gives a "best case" scenario for stability and weight loss. The large number of samples (N = 146) allow for valid comparisons. Use of other preparative methods, or the presence of excess water, excess sodium bicarbonate, or other impurities, would have resulted in non-uniform samples and invalid comparisons (Note: Illicitly prepared "crack" samples typically vary widely in their composition, and therefore are unsuited for a study of this type).

Moisture content did not have a significant effect on purity, weight change, and/or degradation of the samples (i.e., the fresh and dry samples did not differ significantly versus each other after 12 months). Similarly, packaging type also did not play a significant role on sample stability - samples stored in either zip-lock plastic bags or HSEEs displayed similar trends when comparing purity, weight change, and degradation.

Cocaine purity results were very similar across all temperatures and packaging types, with an average purity range of 86.0 - 86.9% for HSEE stored samples, and 85.7 - 86.8% for zip-lock plastic bag stored samples. Tables 1 and 2 show the cocaine purity results for HSEE and zip-lock plastic bag stored samples, respectively.

Weight losses were highest for samples stored at room temperature, with a 2 - 5% loss after 12 months. There was a 2 - 3.5% loss at refrigerator temperature, and from a 0.5% loss to a 1.5% gain at freezer temperatures. Not surprisingly, fresh samples displayed slightly greater losses than dry samples. Tables 3 and 4 show the percent weight change over 12 months for samples stored in HSEE and zip-lock plastic bags, respectively.

Various other cocaine alkaloids were also monitored. Many of these compounds are co-extracted with cocaine from coca leaf, and are observed in most illicit cocaine exhibits [3]; others may result from the degradation of cocaine [2]. Understanding and monitoring changes in these trace alkaloids are critical for laboratories that utilize signature methodologies for comparative analyses of exhibits [4] or for intelligence-deriving purposes, because even minor changes can impact cocaine classifications. Figure 2 contains the chromatographic profiles of "crack" cocaine stored at room temperature in HSEEs from start (Figure 2a) to finish (Figure 2b). Increases in ecgonine (peak #3), benzoylecgonine (peak #7), and *cis*- and *trans*-cinnamoylecgonine (peaks #9 and #11), are evident, as is a small decrease in trimethoxycocaine (peak #12).

Benzoylecgonine results from the hydrolysis of cocaine [2]. From start to finish, benzoylecgonine concentration changes for frozen samples were 0.05 - 0.10% (by weight), and for refrigerated samples 0.05 - 0.66% (by weight). Samples stored at room temperature, however, had more significant changes, 0.05 - 1.62% (by weight). Fresh samples showed a slightly higher rate of benzoylecgonine formation versus dry samples under the same conditions; however, this rate difference was minimal compared to the effect of storage temperature. Figure 3 illustrates the benzoylecgonine content in HSEEs over the 12 month study.

Cis- and *trans*-cinnamoylecgonine methyl esters, commonly referred to as the cinnamoylcocaines, are naturally occurring alkaloids that are co-extracted with cocaine from coca leaf. Degradation (hydrolysis) of the cinnamoylcocaines results in formation of *cis*- and *trans*-cinnamic acid and *cis*- and *trans*-cinnamoylecgonine. The results from this study indicate that there was a small increase in the cinnamoylecgonines. Again, the samples stored at freezer temperatures showed the smallest increases, while those stored at room temperature showed the highest increases (however, the relative change was small regardless of storage temperature). Figures 4 and 5 illustrate the total cinnamoylcocaine and total cinnamoylecgonine contents of "crack" stored over time in HSEEs, respectively.

Tropacocaine and trimethoxycocaine are also naturally occurring alkaloids that are co-extracted with cocaine from coca leaf [3]. These compounds are key components in classifying the origin of cocaine exhibits [10]; therefore, understanding their long-term stability is of great importance. Somewhat surprisingly, tropacocaine showed virtually no changes during the study, regardless of storage conditions and temperatures. Table 5 illustrates tropacocaine results (% by weight) for "crack" stored in HSEEs. However, trimethoxycocaine did degrade similarly to cocaine and the cinnamoylcocaines; i.e., samples stored at freezer temperatures showed very little degradation versus those stored at room temperatures. Figure 6 illustrates the trimethoxycocaine results (% by weight) for samples stored in HSEEs.

Accelerated Aging Study of "Whipped Crack" Samples

The accelerated aging (elevated temperature) study was performed to simulate both extended room temperature storage [12] and short term storage at elevated temperatures (for example, in a law enforcement officer's vehicle in summertime heat). As detailed in the Experimental section, two "whipped crack" exhibits were prepared and stored in an oven at 65^{O}C, one unsealed (Sample 1) and the other sealed in a zip-lock plastic bag (Sample 2). After one month, the samples were reanalyzed for purity, weight change, and degradation. Surprisingly, Sample 1 did not undergo significant degradation, with changes in alkaloid concentration very similar to the "Classical

Crack" samples monitored in the 12-month study. Cocaine purity actually increased almost 14% from the initial quantitation, but this increase was due to the evaporative loss of the water that was "whipped" into the sample prior to the oven storage (the overall net weight decreased by 62.95 g, or 37.3% of the initial weight). The resulting cocaine base remained crystalline and showed no noticeable change in color. Figures 7a and 7b show the chromatographic profiles for the initial and final analyses, respectively. The sample did not undergo significant cocaine degradation to benzoylecgonine (peak #7); however, increased amounts of benzoic acid (peak #1) and ecgonine (peak #3) were observed.

In contrast to Sample 1, however, Sample 2 degraded significantly, giving a thick, dark brown, molasses-like liquid. A similar result was reported by LeBelle *et al.* [4], who stored a sample of cocaine hydrochloride at 60^{O}C and at high humidity for 13 days (liquefaction was noted after the first day). Figures 8a and 8b show the chromatographic profiles for the initial and final analyses, respectively. The cocaine decreased dramatically (57.3% to less than 1%, peak #6), while the benzoylecgonine increased equally dramatically (0.06% to 44.4%, peak #7). The chromatograms also show increased concentrations of benzoic acid (peak #1), ecgonine methyl ester (peak #2), ecgonine (peak #3), and *cis*- and *trans*-cinnamoylecgonine (peaks #9 and #11). The cinnamoylcocaines also degraded similarly to cocaine, resulting in elevated cinnamoylecgonines. The amount of trimethoxycocaine was also much lower, decreasing from 0.26% to 0.06%. Tropacocaine was the only alkaloid that did not undergo significant degradation, with results similar to the initial analysis. Table 6 compares the results between Samples 1 and 2. Interestingly, this cocaine exhibit experienced a net weight loss similar to the unsealed exhibit, decreasing by 52.6 g or 32.5% of the initial weight (Note: Zip-lock plastic bags are not impermeable to water vapor).

Conclusions

To prevent degradation and weight loss, "crack" is best stored at -5^{O}C or below. However, for virtually all forensic laboratories or law enforcement agencies, such storage is not practical. Fortunately, this study indicates that relatively dry "crack" cocaine samples stored at room temperature may not undergo significant degradation within one year. However, this study used laboratory-prepared, reasonably pure samples with minimal moisture and/or sodium bicarbonate content. Retail (street) level samples that are highly adulterated or that contain excess water or sodium bicarbonate would be expected to degrade at a faster rate. Long-term storage of "crack" in sealed packaging (i.e., zip-lock plastic bags or HSEEs) may result in extensive cocaine degradation and significant weight loss. Similarly, even short-term storage of "crack" in sealed packaging at very elevated temperatures, such as within the trunk of an officer's vehicle during summer months, can result in rapid degradation and weight loss. Finally, "crack" that contains large amounts of occluded water (e.g., "whipped crack" or similar) may undergo significant weight loss if stored unsealed, due to the evaporative loss of water.

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Table 1. Cocaine Base Purity of Heat Sealed Evidence Envelope (HSEE) Stored Samples.

Month	20°C Dry	20°C Fresh	5°C Dry	5°C Fresh	(-5°C) Dry	(-5°C) Fresh
0	88.8	86.3	88.8	86.3	88.8	86.3
1	85.6	87.5	87.1	86.6	87.1	86.9
2	87.1	88.0	87.6	88.2	87.2	86.9
3	85.5	85.3	86.4	86.6	86.4	85.9
4	86.1	86.2	86.9	87.7	86.8	88.1
5	85.7	85.7	85.7	85.8	87.0	86.0
6	84.9	85.5	86.1	86.0	85.4	86.7
7	86.3	87.0	85.7	86.3	87.0	87.1
8	87.6	86.7	86.8	87.5	87.8	87.6
9	82.2	83.3	83.3	83.0	83.4	83.8
10	86.6	85.3	87.0	86.8	87.8	87.6
11	87.2	85.6	87.0	87.4	87.2	87.2
12	85.6	85.9	86.0	86.3	87.5	88.3

Table 2. Cocaine Base Purity of Plastic Bag Stored Samples.

Month	20°C Dry	20°C Fresh	5°C Dry	5°C Fresh	(-5°C) Dry	(-5°C) Fresh
0	88.8	86.3	88.8	86.3	88.8	86.3
1	86.1	86.2	86.7	86.9	86.3	87.7
2	86.2	86.4	87.2	87.0	86.8	87.0
3	86.0	84.9	86.4	86.6	86.6	86.6
4	86.2	86.1	86.8	87.1	87.1	87.9
5	84.5	83.4	86.0	85.4	85.7	85.6
6	86.4	86.2	86.6	87.0	87.6	87.5
7	85.4	86.4	86.3	86.4	86.3	86.0
8	86.7	86.0	86.0	86.1	85.9	85.5
9	83.8	84.3	84.1	85.1	84.7	84.9
10	86.5	85.2	85.7	86.7	87.1	87.5
11	88.0	87.7	88.2	88.7	89.6	89.5
12	87.4	85.0	85.4	86.0	85.6	86.2

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Table 3. Percent Weight Change of HSEE Stored Samples.

Month	20°C Dry	20°C Fresh	5°C Dry	5°C Fresh	(-5°C) Dry	(-5°C) Fresh
1	-0.2	-3.0	1.0	-2.0	1.0	0.7
2	-1.4	-1.1	0.0	-3.1	0.2	0.9
3	-2.3	-2.6	0.5	-2.6	1.1	0.7
4	-2.4	-4.7	-1.0	-2.8	0.2	-0.5
5	-1.0	-3.8	-0.5	-2.5	-0.4	-0.5
6	-1.1	-4.7	-0.5	-3.3	-0.2	-1.1
7	-2.5	-4.2	-0.6	-2.1	0.4	0.2
8	-3.2	-4.6	0.2	-2.3	0.7	-0.8
9	-2.0	-4.3	-2.4	-4.7	-2.7	-3.5
10	-2.2	-3.3	0.0	-2.5	0.4	0.0
11	-2.7	-3.9	-0.8	-2.6	0.5	-0.3
12	-2.0	-3.3	-1.6	-2.1	1.3	1.6

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Table 4. Percent Weight Change of Plastic Bag Stored Samples.

Month	20°C Dry	20°C Fresh	5°C Dry	5°C Fresh	(-5°C) Dry	(-5°C) Fresh
1	-1.8	-2.2	-0.5	-1.3	0.2	-0.3
2	-2.6	-3.3	-1.0	-2.8	0.0	-0.2
3	-2.5	-2.6	-1.0	-2.6	0.3	-0.5
4	-3.0	-3.8	-1.2	-2.1	-0.8	-1.0
5	-2.8	-4.0	-1.2	-2.9	0.0	-0.3
6	-3.2	-4.6	-1.2	-2.5	-0.2	-1.1
7	-2.7	-3.7	-1.4	-2.9	0.0	-0.7
8	-2.8	-4.2	-1.7	-2.7	0.0	-0.7
9	-3.0	-4.4	-1.9	-1.7	0.2	-2.3
10	-2.8	-4.2	-1.6	-2.9	-0.5	-1.3
11	-2.9	-4.4	-1.8	-1.9	-0.2	-0.3
12	-2.7	-4.7	-2.1	-3.5	-0.5	1.6

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Table 5. Tropacocaine Percent in HSEE Stored Samples.

Month	20°C Dry	20°C Fresh	5°C Dry	5°C Fresh	(-5°C) Dry	(-5°C) Fresh
0	**0.10**	**0.09**	**0.10**	**0.09**	**0.10**	**0.09**
1	0.11	0.10	0.11	0.11	0.11	0.11
2	0.10	0.10	0.11	0.11	0.10	0.10
3	0.10	0.09	0.10	0.10	0.10	0.10
4	0.09	0.09	0.10	0.10	0.10	0.10
5	0.09	0.09	0.10	0.10	0.10	0.10
6	0.09	0.10	0.10	0.10	0.09	0.10
7	0.09	0.10	0.10	0.10	0.10	0.10
8	0.09	0.08	0.09	0.10	0.10	0.10
9	0.09	0.08	0.09	0.09	0.10	0.09
10	0.09	0.09	0.09	0.10	0.10	0.10
11	0.09	0.08	0.09	0.09	0.10	0.10
12	0.09	0.09	0.09	0.09	0.10	0.09

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Table 6. Comparison of Sealed and Unsealed "Crack" Cocaine Stored at 65ºC (Summary of Results from Accelerated Study).

Accelerated Results (%) by weight	Unsealed Time = 0	Unsealed Time = 1 Month	Sealed Time = 0	Sealed Time = 1 Month
Weight Loss	N/A	37.3% loss	N/A	32.5% loss
Cocaine Purity	64.3%	78.1%	57.3%	< 1%
Benzoylecgonine	0.12%	0.10%	0.06%	44.4%
Cinnamoylcocaines	4.41%	5.47%	3.67%	0.11%
Cinnamoylecgonines	0.05%	0.01%	0.01%	1.98%
Tropacocaine	0.07%	0.09%	0.06%	0.08%
Trimethoxycocaine	0.31%	0.39%	0.26%	0.06%

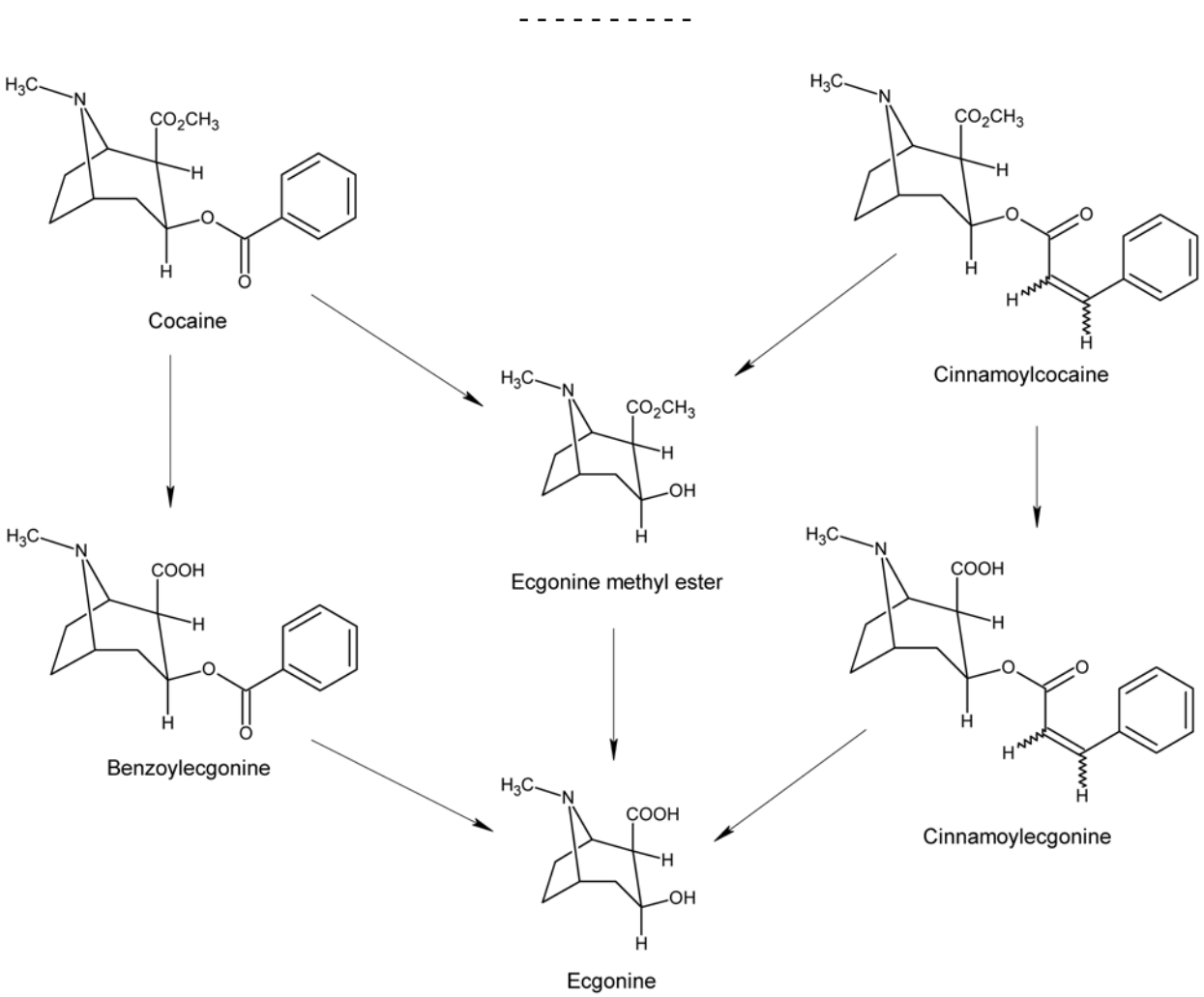

Figure 1. Cocaine and Cinnamoylcocaine Degradation Products.

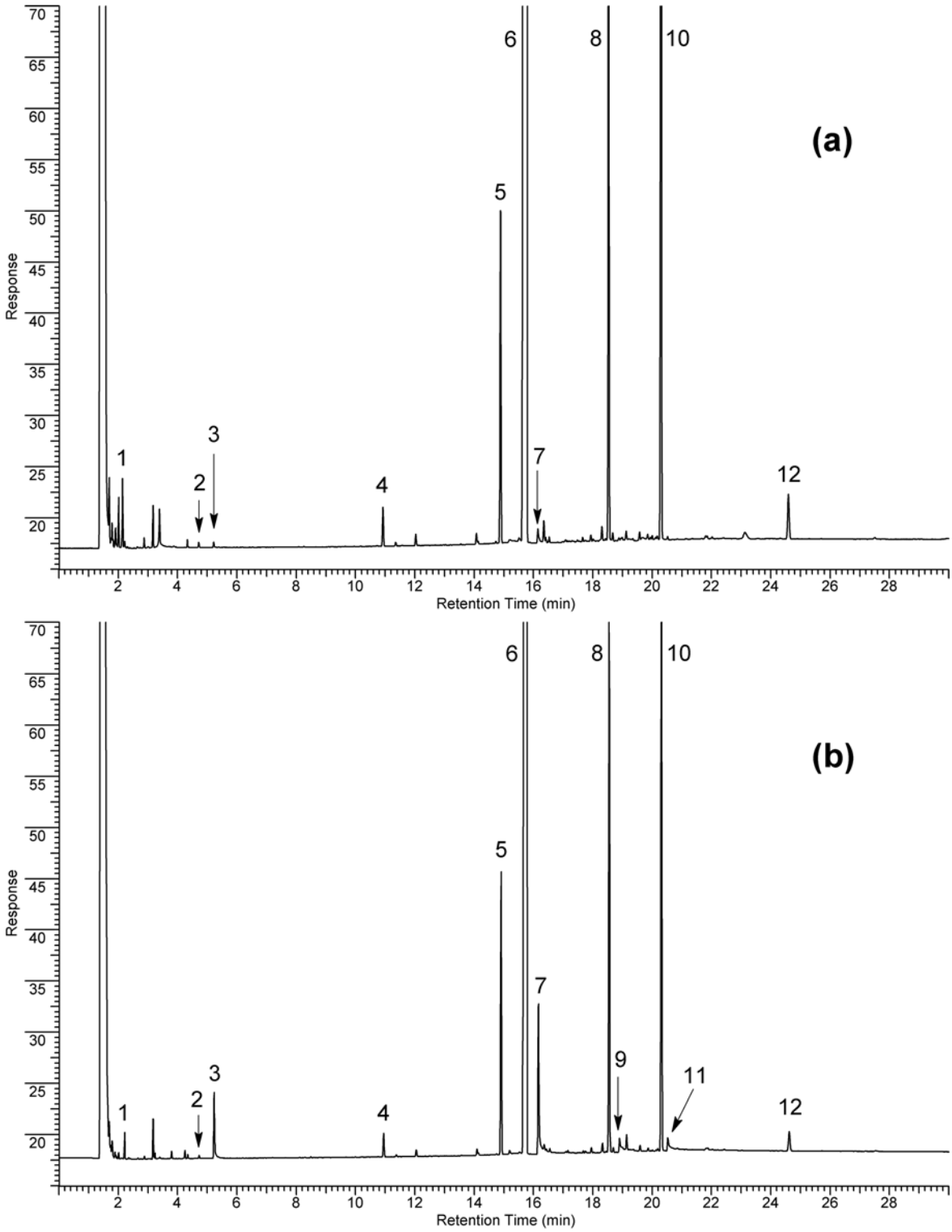

Figure 2. Chromatographic Profiles of "Crack" Cocaine Stored at Room Temperature in HSEE: (A) Time = 0; and (B) Time = 12 Months. Peak Identification: 1 = Benzoic Acid-TMS; 2 = Ecgonine Methyl Ester-TMS; 3 = Ecgonine-di-TMS; 4 = Tropacocaine; 5 = *para*-Fluorococaine (ISTD); 6 = Cocaine; 7 = Benzoylecgonine-TMS; 8 = *cis*-Cinnamoylcocaine; 9 = *cis*-Cinnamoylecgonine-TMS; 10 = *trans*-Cinnamoylcocaine; 11 = *trans*-Cinnamoylecgonine-TMS; and 12 = Trimethoxycocaine.

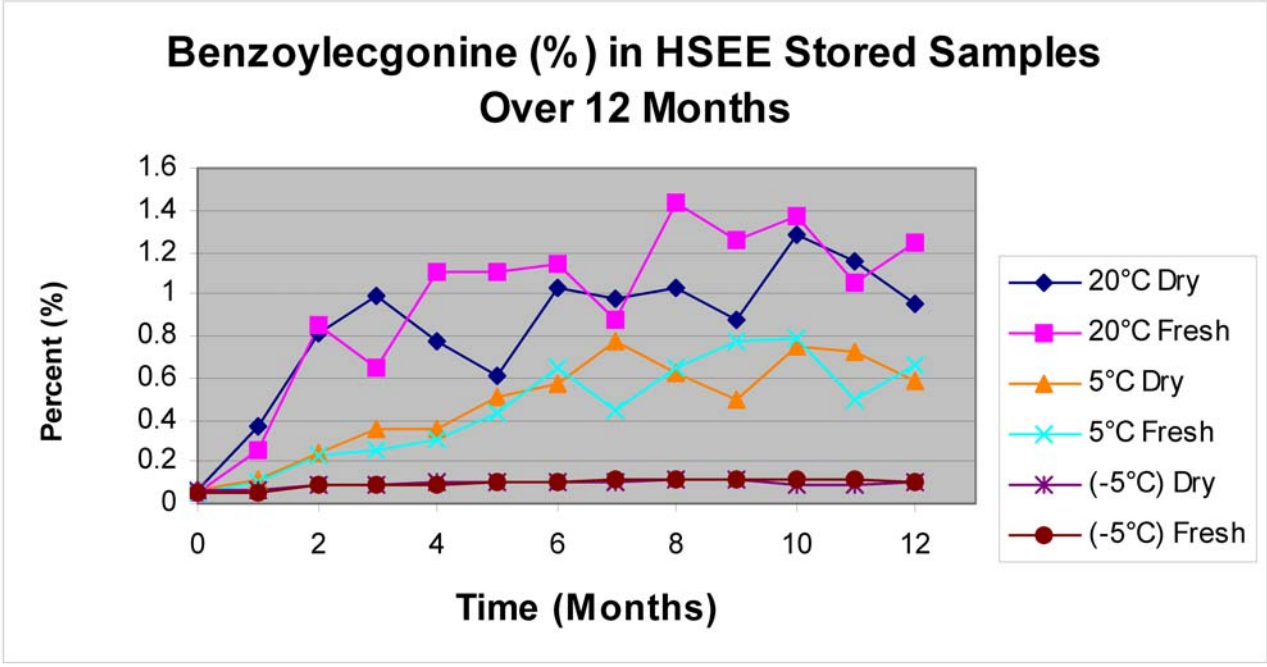

Figure 3. Benzoylecgonine Percent in HSEE Stored Samples.

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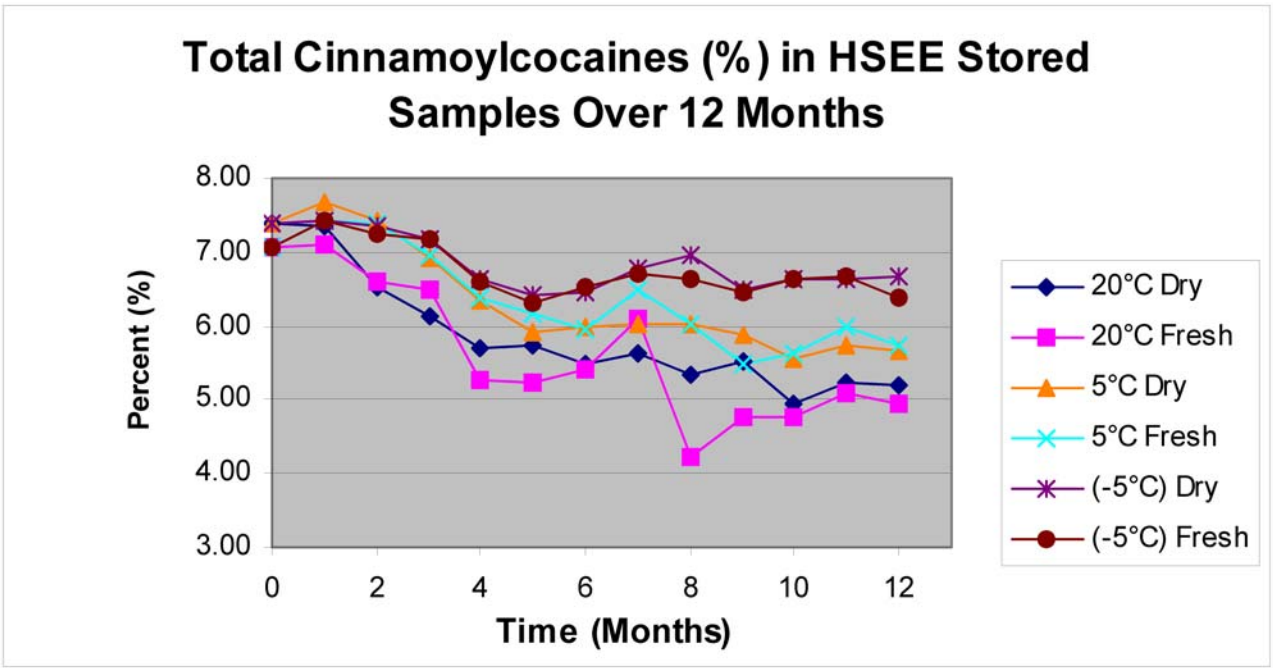

Figure 4. Total Cinnamoylcocaines Percent in HSEE Stored Samples.

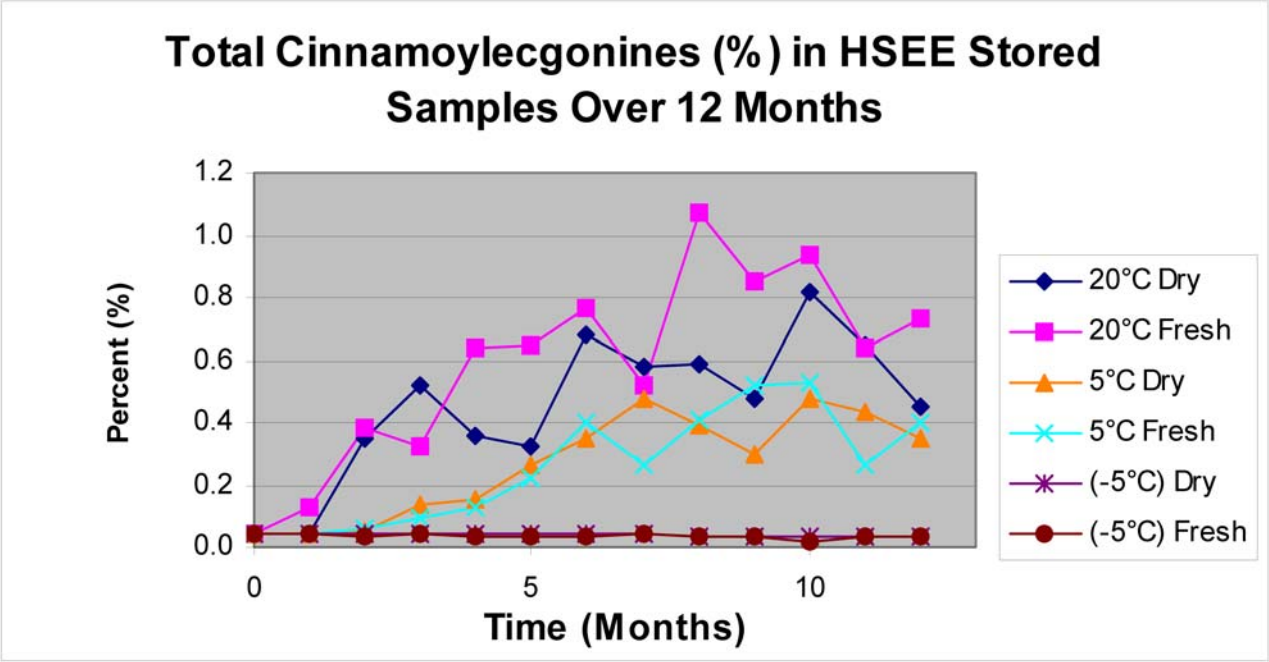

Figure 5. Total Cinnamoylecgonines Percent in HSEE Stored Samples.

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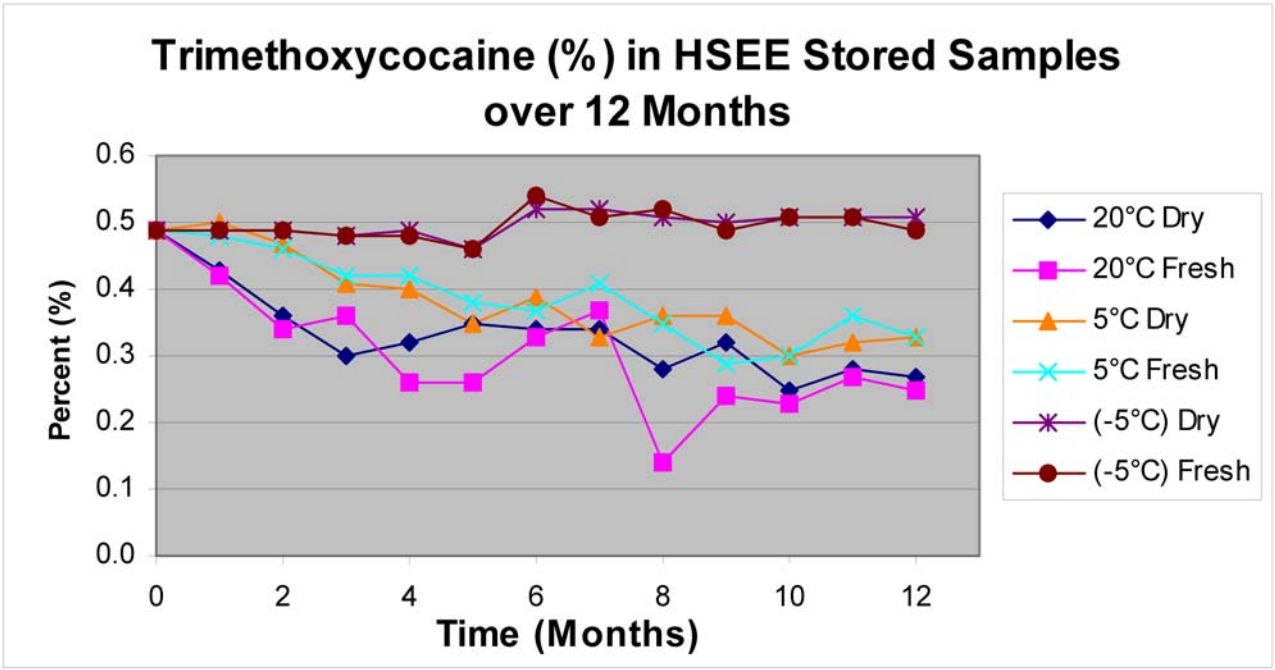

Figure 6. Trimethoxycocaine in HSEE Stored Samples.

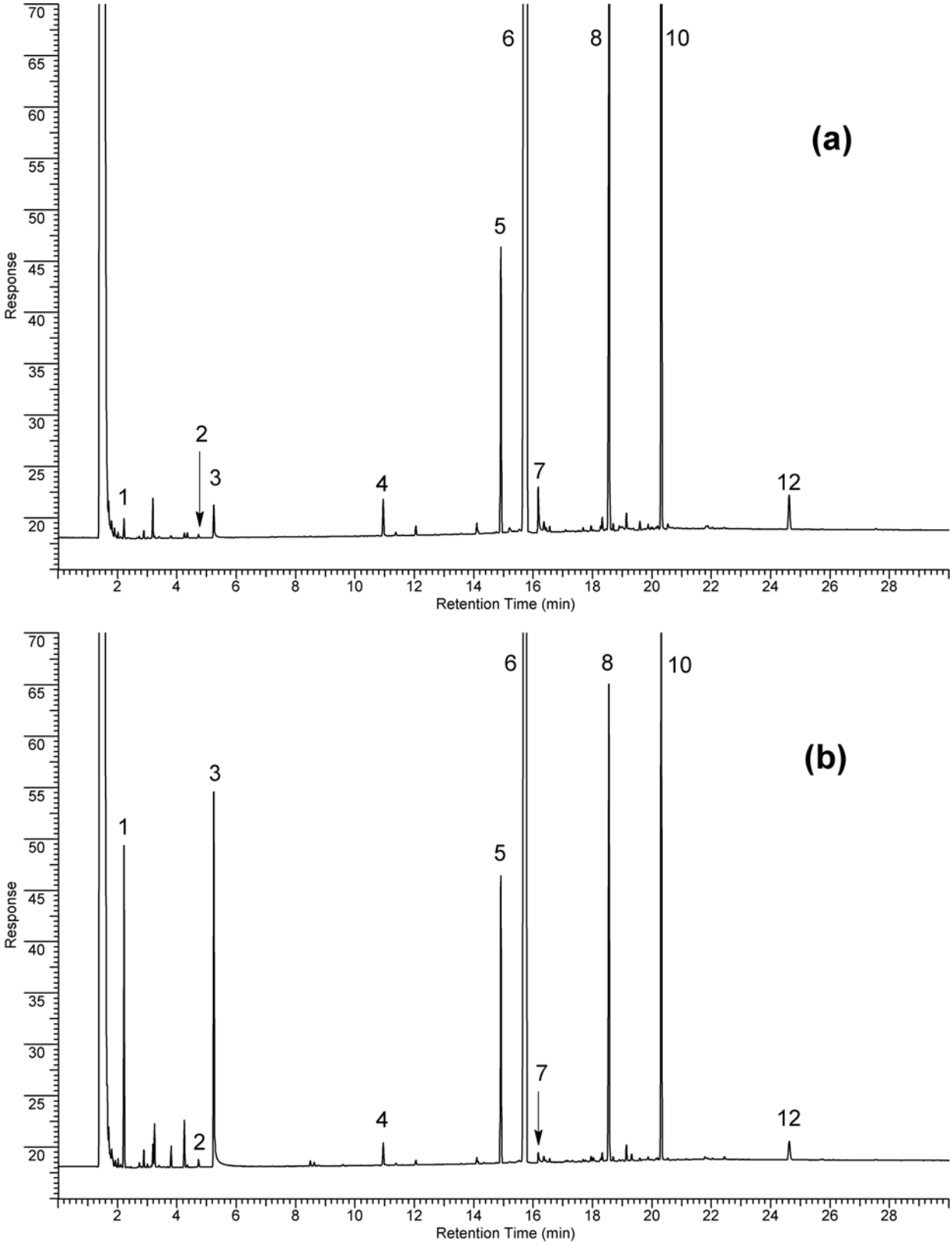

Figure 7. Chromatographic Profiles of "Crack" Cocaine Stored Unsealed in the Accelerated Study: (A) Time = 0; and (B) Time = 1 Month. Peak Identification: See Figure 2.

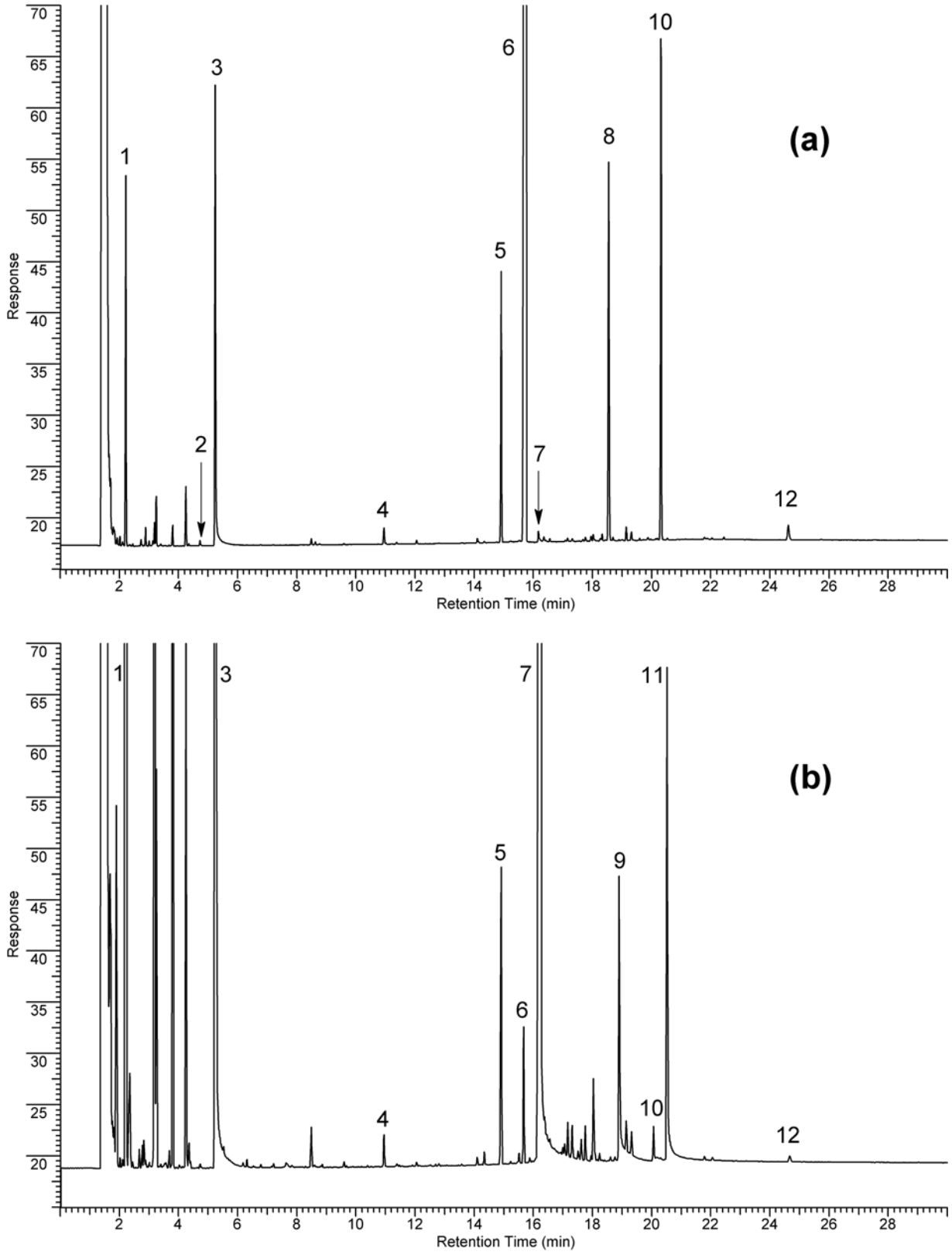

Figure 8. Chromatographic Profiles of "Crack" Cocaine Stored Sealed in Accelerated Study: (A) Time = 0; and (B) Time = 1 Month. Peak Identification: See Figure 2.