B19 Stability Study of Heroin in Four Common Solvents

Melanie A. Schade, 443 Daniel Street, Allentown, PA 18104; and Thomas A. Brettell, PhD, Cedar Crest College, 100 College Drive, Allentown, PA 18104*

After attending this presentation, attendees will have a better understanding of the stability of heroin in common solvents.

This presentation will impact the forensic science community by providing information about the stability of heroin in common solvents and recommending the best storage conditions for heroin samples and standards in these solvents.

The stability of heroin in four different solvents (acetonitrile, chloroform, methanol, and a 1:9 mixture of methanol:chloroform) was studied. The degradation of heroin in the different solvents under various storage conditions was monitored for 13 weeks. Samples of heroin (100ug/mL) in the four solvents were stored at different conditions, including at room temperature (25°C, +/-3°C), in the refrigerator (7°C, +/-3.0°C), in the freezer (-8°C, +/-3.0°C), and on the autosampler of a gas chromatograph (26°C, +/-3°C). The samples were analyzed in triplicate over a 13-week period using Gas Chromatography/Mass Spectrometry (GC/MS). GC/MS was performed using an Agilent® 7890B gas chromatograph interfaced with an Agilent® 5877A mass spectrometer and an Agilent® 7693 autosampler. The column used was a 30m x 0.25mm x 0.25µm HP-5MS UI. Helium was used as the carrier gas with a flow of 1.0mL/min and linear gas velocity set at 38cm/sec. The inlet, detector, and auxiliary temperatures were 250ºC. The mass scan range was set at 40m/z-500m/z for all samples.

Methanol experiments were repeated and confirmed by GC/MS on a Hewlett Packard 5890 gas chromatograph, GC/MS Agilent® Technologies 6890N Network GC System/5973 Network Mass Selective Detector. The column used was a 30m x 0.25mm x 0.25µm Rxi®5Sil MS. The helium carrier gas flow and linear velocity, temperature settings for column inlet, detector, and auxiliary as well as the mass range were the same as above. The column temperature program was optimized for both columns to ensure baseline resolution of heroin and 6-Monoacetylmorphine (6-MAM). The initial column temperature was 130ºC with a hold time of 2.0 minutes, then the oven temperature was increased @15ºC/min to 250ºC without a hold time and increased again @15ºC/min to 320ºC with a final hold time of 3.0 minutes. 1-µL injections of samples were performed in split mode and with a 50:1 split ratio.

Relative concentration ratios of the degradation products to the heroin concentrations were measured semi-quantitatively using the ratio of area counts of the respective chromatographic peaks. Degradation products were identified through spectral analysis and comparison to known certified standards. It was found that heroin breaks down into 6-MAM in methanol. No breakdown products were observed in acetonitrile, chloroform, or the 1:9 mixture of methanol:chloroform at any of the storage conditions. The percent concentration of heroin in methanol decreased as the temperature of the storage condition increased. For the most part, no breakdown was observed for the heroin in methanol stored in the freezer (-8°C, +/-3.0°C). The methanolic samples stored on the autosampler (26°C, +/-3°C) and at room temperature (25°C, +/-3°C) had the greatest decomposition rate with the lowest percent heroin concentrations and respective highest 6-MAM concentrations. The samples stored in the refrigerator (7°C, +/-3.0°C) had higher percent heroin concentrations than the samples stored at room temperature and on the autosampler of the gas chromatograph. Heroin samples stored in methanol at room temperature were degraded by 10% within a few days and totally degraded in 12 weeks. Based on these results, heroin should not be stored in methanol.

Heroin, Diacetylmorphine, GC/MS