B55 Degradation of Heroin in Solid and Biological Samples

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After attending this presentation, attendees will learn about the rate at which heroin breaks down into 6-acetyl-morphine and morphine, as a function of the containers in which the samples are stored, the temperature and the humidity. An indispensable aspect of such information will help toxicologists and drug chemists more accurately determine the age of the heroin sample.

This presentation will impact the forensic community and/or humanity by demonstrating a more accurate concentration of heroin originally in the sample can be found by determining the rate of degradation of heroin and studying the ratio of heroin to these products,. This will also help toxicologists calculate a more accurate value for the amount of heroin present in biological fluids.

Heroin is a controlled substance that degrades over time. The breakdown of heroin has been explored previously with the intention of monitoring the change in heroin concentration. Previous experiments have monitored the change by varying the temperature. As heroin degrades, the increasing concentration of 6-acetyl-morphine and morphine become more apparent and more dominant in spectral analysis. Specific analytical techniques have previously been geared to focus only on the degradation of heroin in its pure, solid form. This information, while informative, provides little “real case” insight into the true concentration of heroin in samples obtained in either drug seizures or biological fluids. By studying the degradation products created in this process at varied temperatures, a relationship can be made between the decrease in heroin and the relative amount of 6-acetyl- morphine and morphine. High performance liquid chromatography (HPLC) with ultra-violet and fluorescent light detection provides complementary information about the pure drug and its degradation products.

Weather conditions, humidity, and packaging all influence the aging process of heroin. The samples analyzed in this study consisted of pure heroin, pure lactose, and a 20/80 weight percent heroin/lactose mixture. The three samples were placed in two types of containers: Teflon balloons and plastic bags. Each package was then aged in four different environments of varying temperature and humidity. A control sample of pure heroin was placed in a glass vial and kept at -80^{o} C to prevent any change in the standard. The 100 ug of each sample was analyzed by HPLC. The analysis was carried out in an ammonium acetate buffer at pH 6.00. Fluorescence and ultra-violet light detectors were used in tandem to help establish the relationship between heroin and its degradation products. Samples were taken every 6 hours for the first 3 days to establish an initial base line, and additional samples were then taken every 12 hours.

As previously demonstrated in other works, the increase in the temperature of the environment increases the rate of heroin degradation. The humidity and packaging used also contributed to the breakdown process.

The goal of this project was to develop a method to quantify the aging process of heroin in seized samples and in biological fluids. By determining the ratio of heroin to one or both of its degradation products, a more accurate heroin concentration in both drug samples and biological samples can be calculated.

Heroin, Degradation, Degradation Products

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