



### A163 The Stability of Cathinone in Dried Khat

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After attending this presentation, attendees will understand the long term stability of cathinone, the principal psychoactive component of the khat plant (*Catha edulis*), in the dried plant material.

This presentation will impact the forensic community by explaining how a quantitative study of dried khat samples has found cathinone concentrations to be relatively stable for a period of two years, and cathinone has remained at an identifiable level for over eight years. The study also determined simple drying techniques to be an effective means to preserve khat evidence for long term storage.

A primary concern with the forensic analysis of khat evidence has been the need to identify cathinone, which converts to other compounds, and predominantly to the less-active substance cathine in the harvested plant. The loss of cathinone has serious legal implications since cathinone is a schedule I controlled substance under federal regulations in the United States, while cathine is schedule IV. The propensity of cathinone to convert into cathine is regarded as the primary reason that cathinone was not isolated and identified from khat until the 1970's, following nearly one hundred years of chemical investigation. Early quantitative studies on the alkaloid content of khat found that the biosynthetic pathway for the plant is to produce cathinone in the rapidly growing plant tissues, and to reduce the cathinone to cathine via an enzymatic process in the more matured regions of the plant. The young shoots and tender leaves are consequently prized by khat consumers as they are the most actively growing portion of the plant and contain the highest concentration of cathinone. The conversion to cathine occurs in the young shoots after harvesting, and was once believed to occur rapidly upon drying and to continue with storage. However, the loss of cathinone upon drying is a matter of degree and is not necessarily complete. The drying of plant material by air or freeze-drying techniques has been frequently used in the research of khat to preserve the cathinone content in the short term for future analyses. Further, air-dried and freeze-dried samples of khat have been found to contain consistent amounts of cathinone after several months in storage at room temperature, indicating that longer time periods of preservation are possible. Unfortunately, the misconception persists for some in the forensic community that cathinone is undetectable in dried or fresh khat after 48 hours of harvesting.

The current study employed high-performance liquid chromatography (HPLC) to quantitate cathinone, as well as the khat alkaloids cathine ((+)-norpseudoephedrine) and (-)-norephedrine. Two khat samples that were seized as dried plant material in 1999 were initially examined. Khat encountered in this dried form has been called "graba" in the United States. The cathinone concentration exhibited a measurable decrease over a two-year period, although the rate of decline was minor and has allowed cathinone to be readily detected for over eight years while stored at room temperature. The cathine and norephedrine levels remained essentially the same over this time period, suggesting that a reduction reaction is not responsible for the slow loss of cathinone. Additional study considered the drying of fresh plant material at room temperature and by the application of heat with either convection or microwave ovens. The dried preparations exhibited similar cathinone stability as the seized dried materials. The cathinone concentration in the heated materials were lower (approximately 30%) than in the air-dried preparation, but remained at a detectable level.

A forensic laboratory should make an attempt to preserve drug evidence such that reanalysis by another analyst or laboratory can confirm the same findings at a later time. While a crime laboratory may be able to make the identification of cathinone on relatively fresh samples of the khat plant, a concern has remained whether cathinone may be preserved in khat evidence for long term storage. The analytical findings of this study demonstrate that cathinone may persist in dried khat for a time frame of several years, and simple drying techniques and ordinary storage conditions may serve as an effective means of preserving seized khat evidence. The precise length of time that cathinone may remain detectable requires further study.

#### Khat, Cathinone, Stability