K36 Stability of 68 Stimulant/Hallucinogenic Drugs in Biological Samples Under Various Storage Conditions

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After attending this presentation, attendees will be able to use information about the stability of 68 stimulant and hallucinogenic drugs in blood, serum/plasma, and urine matrices under various storage conditions.

This presentation will impact the forensic science community by providing information to allow forensic science practitioners to choose the optimal storage conditions to ensure the least degradation of a wide variety of stimulant and hallucinogenic compounds, including several synthetic cathinones and designer drugs.

Synthetic stimulant and hallucinogenic drugs have seen highly increased popularity in the United States since 2009. Drugs in the phenethylamine, cathinone, pyrrolidophenone, tryptamine, and miscellaneous other categories present analytical challenges to forensic toxicologists in the development and validation of screening and confirmation methods. Due to the potential for degradation, it further complicates a laboratory's ability to successfully confirm the presence of these compounds in biological samples, and the client's ability to interpret the analytical findings. Knowing the stability of some of the most prominent drugs in this category is essential to ensuring that accurate results are obtained and reported. The objective of this presentation is to demonstrate the stability for each of 68 compounds of interest including novel and established drugs with stimulant and hallucinogenic effects in various matrices and storage conditions. This will allow attendees to use the most appropriate conditions to maintain drug stability in blood, serum/plasma, and urine.

Stability controls were prepared containing mixtures of the target analytes in blood, serum, and urine. All controls were analyzed in triplicate at room temperature (dark and light), refrigerated, and frozen at days 1, 3, 7, 14, and 30. Compounds of interest included: cocaine; 2C-H; 3-FMC; flephedrone; psilocin; 4-MEC; 7-OH mitragynine; buphedrone; cathinone; 3,4-DMMC; mephedrone; methcathinone; bufotenine; methylone; penytlone; ethylone; butylone; naphyrone; pyrovalerone; MDPV; 2C-T-7; 2C-T-2; LSD; TFMPP; atropine; and Bromo-dragonfly. Analytes were considered stable in the matrix under given storage conditions if two of three replicates were positive at a given time point. All samples were analyzed using a Liquid Chromatograph-Time Of Flight (LC/TOF) mass analyzer (Agilent® 1200 HPLC system Agilent TOF 6230 with Jet Stream Technology). The criterion for positivity was acceptable retention time, accurate mass, signal-to-noise ratio, and abundance within 20% of the hand-spiked calibrator.

Drugs were, in general, most stable in urine, with only psilocin, 3-FMC, and 4-FMC failing stability even at room temperature by day 7. Drugs were less stable in blood collected in gray top tubes maintained refrigerated or frozen. Exceptions to this were cocaine and 2C-H, which failed under refrigerated conditions after two days. Other compounds failed stability in blood at room temperature after two days including 3-FMC, 4-FMC, and psilocin. 4-MEC, buphedrone, cathinone, 3,4-DMMC, mephedrone, and methcathinone failed at seven days at room temperature in blood. Drugs were least stable in serum/plasma, with 3-FMC, flephedrone, naphyrone, and pyrovalerone all failing under refrigerated conditions on day 1, with additional compounds 7-OH mitragynine, 4-MEC, MDPV, mephedrone, and methcathinone also failing on day 7 under refrigerated conditions.

Establishing the stability of drugs intended for inclusion in new analytical procedures is critical as part of validation as many newly emerging drugs are now known to be unstable in certain specimen types and storage conditions after only one to two days. Without information about stability, efforts to interpret toxicological findings can be compromised.

Stability, Stimulant Compounds, Hallucinogenic Compounds

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