



A142 Detection and Simultaneous Quantitation of β -Naphyrone and 3,4-Methylenedioxypropylone by Gas Chromatography-Mass Spectrometry

Gina M. Parada, BS*, and Thomas A. Brettell, PhD, Cedar Crest College, 100 College Drive, Allentown, PA 10104; Michelle Dawes, MSFS, 2217 Polo Run Drive, Yardley, PA 19067

After attending this presentation, attendees will have a better understanding of the use of Gas Chromatography-Mass Spectrometry (GC-MS) to identify and simultaneously quantify β -naphyrone and 3,4-methylenedioxypropylone (MDPV) in solid-dosage samples.

This presentation will impact the forensic science community by providing a simple method for screening, identification, and quantitation of the target cathinone analogues in illicit powders.

Naphyrone and MDPV are synthetic cathinone analogues which are part of a group of newly emerging “designer drugs” originating in the United Kingdom and have been recently advertised for purchase on a number of websites. Naphyrone and MDPV, derivatives of pyrovalerone, are psychoactive drugs that act as norepinephrine-dopamine reuptake inhibitors producing stimulant and psychoactive effects related to those of amphetamine and cathinone. Both compounds have been misrepresented as a so-called “legal high.” Naphyrone, the naphthyl analogue of cathinone, bears a close structural resemblance to mephedrone and MDPV. This substituted cathinone contains a phenethylamine core whose alpha carbon contains an alkyl group and beta carbon contains a ketone group. Naphyrone has been known to users under the various street names and sold as “bath salts” and pond cleaner, and have been referred to as a “legal high” that is stronger than cocaine, amphetamine, and MDMA. Published analytical studies on the bath salts reported the presence of naphyrone, cathinones, caffeine, MDPV, flephedrone, mephedrone, butylone, and other constituents.

MDPV, first seized in Germany in 2007, has reportedly been sold as a legal drug alternative and marketed as “bath salts” under various names. Other reports also indicate it is being sold with labels indicating “for novelty use only” and typically sold in 500mg packets on internet sites based in Europe. MDPV has been controlled (Schedule I) in some states.

This study identifies MDPV in a product sold as a “bath salt” not for human consumption. The unlabeled clear plastic baggie contained 0.32 grams of a light tan powdery substance. A small portion of the powder tested inconclusive with two color spot tests, Chen’s and Simon’s reagent. A UV/Vis spectrum recorded at a scan rate of 1200nm/min in methanol with a 1cm cell path length in the range of 200-800nm resulted in a $\lambda_{\text{max}} = 232\text{nm}$ and peaks at 282nm and 315nm. Infrared analysis using attenuated total reflectance (ATR) accessory compared to a MDPV HCl certified standard. The spectrum was collected using 32 scans between 4000 cm^{-1} and 400 cm^{-1} . GC-MS data was acquired using a quadrupole mass-selective detector (MSD). A GC-MS method has been developed and validated where Naphyrone and MDPV can be simultaneously analyzed and quantified using phenyltoloxamine as an internal standard. Calibration curves obtained from a working standard of naphyrone and MDPV exhibited a favorable R^2 value (> 0.99) with a linear dynamic range between 900 – 3.00 ug/mL. The most abundant ion, $m/z = 126$, present in the mass spectrum of both compounds was used in the SIM mode for quantification. Naphyrone and MDPV were well separated from other related drugs using a 30 m x 0.25 mm x 0.25 μm phenylmethylsilicone capillary column using Helium as a carrier gas with a linear gas velocity of 38 cm/sec. Methanol was used as the solvent and a sample volume of 1 μL was injected in the split mode with a split ratio of 56.4:1. The gas chromatographic oven program was the following: 130°C for 2.00 min, 15°C/minute ramp up to 250°C, and hold for 10 minutes for a total run time of 20 minutes. A retention time optimization study provided the optimum separation conditions. Quantitative analysis indicated the bath salt sample was nearly pure MDPV hydrochloride.

Forensic Science, Naphyrone, MDPV