

# EVALUATION OF COMMERCIALY AVAILABLE SMOKE SHOP PRODUCTS MARKETING AS “7-HYDROXY MITRAGYNE” & RELATED ALKALOIDS

TEST  
PURCHASE

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**PURPOSE:** The objective of this report is to detail our findings from forensic testing of “7-Hydroxy Mitragynine” marketed commercial products for notification to public health, public safety, clinicians, medical examiners, coroners, forensic laboratories, and other related communities regarding this emerging topic of concern.

**BACKGROUND:** Mitragynine is a plant alkaloid and the primary psychoactive component of *Kratom* (*Mitragyna speciosa*). 7-Hydroxy mitragynine is a structurally similar alkaloid found naturally in *Kratom* but in smaller amounts. Recreational uses of *Kratom* date back centuries, with consumption in Southeast Asia by laborers and farmers looking to combat fatigue, increase productivity, and alleviate pain. *Kratom* can be prepared in many forms, including dried leaf, brewed tea, powders, capsules, concentrates, and extracts. In 2016, the U.S. Drug Enforcement Administration (DEA) issued a notice of intent to schedule mitragynine and 7-hydroxy mitragynine; however, the DEA ultimately withdrew their proposed rule, leaving these *Kratom* alkaloids, which are scheduled in other countries worldwide, unscheduled and uncontrolled in the U.S. In recent years, concurrent with the rise of “smoke shops”, commercial sale of *Kratom* products, high dose mitragynine preparations, and now marketed 7-hydroxy mitragynine products have surged. These marketed products include chewable tablets, concentrates, extracts, edible materials (e.g., gummies, ice cream cones), and beverages, with highly elevated 7-hydroxy mitragynine contents compared to *Kratom* products. It is unclear how *Kratom* is being processed in these settings to make 7-hydroxy mitragynine dominant products.

Mitragynine is a pharmacologically complex drug, exhibiting stimulant-like effects at low doses and sedative effects at higher doses. Mitragynine exhibits opioid-like effects through its partial agonism of opioid receptors and interacts with adrenergic and serotonergic receptors. Mitragynine use is associated with antinociceptive, anti-inflammatory, anti-depressant, and anxiolytic effects. Mitragynine is metabolized to 7-hydroxy mitragynine and further to **mitragynine pseudoindoxyl**; however, the *in vivo* presence of these alkaloids is often unclear as both can arise from *Kratom* itself. 7-Hydroxy mitragynine and mitragynine pseudoindoxyl are reportedly more potent than mitragynine, on the order of 10x and 100x, respectively. Testing for these two alkaloids is extremely limited based on published reports, and, of note, mitragynine and 7-hydroxy mitragynine exhibit poor stability, especially in biological matrix.

**SUMMARY:** Due to increased sale and availability of *Kratom* products marketed as “7-hydroxy mitragynine”, our laboratory collected samples for comprehensive forensic drug analysis. Samples included one powder and several pressed pills, some of which were purchased legally from a local smoke shop. Pills were crushed and the powder was sampled for methanol dilution. Analysis was performed by gas chromatography mass spectrometry (GC-MS) and liquid chromatography quadrupole time-of-flight mass spectrometry (LC-QTOF-MS). Data processing included targeted, concurrent spectral identification of mitragynine, 7-hydroxy mitragynine, and mitragynine pseudoindoxyl, and suspect screening was performed for mitragynine isomers (e.g., speciogynine, speciociliatine, mitraciliatine) and additional *Kratom* alkaloids (e.g., paynantheine, ajmalicine, mitraphylline, corynantheidine). 7-Hydroxy mitragynine and mitragynine pseudoindoxyl were **indistinguishable** by GC-MS; therefore, analysis via LC-QTOF-MS was required for identification and differentiation.

**CONCLUSION:** All products contained 7-hydroxy mitragynine (most as the primary component). All products contained at least detectable amounts of mitragynine and mitragynine pseudoindoxyl, as well as some other *Kratom* alkaloids.

## “7-HYDROXY MITRAGYNE” MARKETING PRODUCTS



## LAB RESULTS

- 7-Hydroxy Mitragynine (1p)
- Mitragynine Pseudoindoxyl (0.3p)
- Mitragynine (0.2p)
- Paynantheine (0.1p)



- 7-Hydroxy Mitragynine (1p)
- Mitragynine Pseudoindoxyl (0.03p)
- Mitragynine (0.03p)
- Speciogynine, Speciociliatine, & Mitraciliatine (all >0.01p)
- Paynantheine (0.1p)



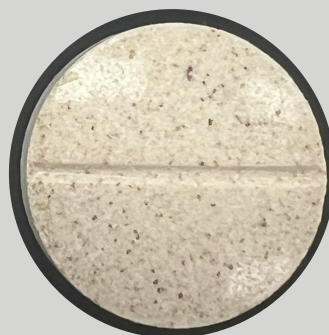


### “7-HYDROXY MITRAGYNINE” MARKETING PRODUCTS



### LAB RESULTS

- ▶ 7-Hydroxy Mitragnine (1p)
- ▶ Mitragnine Pseudoindoxyl (0.2p)
- ▶ Mitragnine (0.3p)
- ▶ Paynantheine (0.1p)

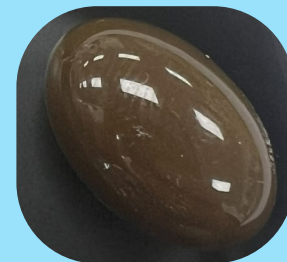


### LAB RESULTS

- ▶ 7-Hydroxy Mitragnine (1p)
- ▶ Mitragnine Pseudoindoxyl (1.7p)
- ▶ Mitragnine (0.4p)
- ▶ Speciognine, Speciociliatine, & Mitraciliatine (all >0.01p)
- ▶ Paynantheine (0.8p)



- ▶ 7-Hydroxy Mitragnine (1p)
- ▶ Mitragnine Pseudoindoxyl (0.2p)
- ▶ Mitragnine (0.1p)
- ▶ Speciognine, Speciociliatine, & Mitraciliatine (all >0.05p)
- ▶ Paynantheine (1.9p)



- ▶ 7-Hydroxy Mitragnine (1p)
- ▶ Mitragnine Pseudoindoxyl (0.1p)
- ▶ Mitragnine (0.02p)
- ▶ Speciognine, Speciociliatine, & Mitraciliatine (all >0.01p)
- ▶ Paynantheine (0.3p)

