



## 3,4-Methylenedioxypropylone (MDPV)

(Street Names: "bath salts," "Ivory Wave," "plant fertilizer," "Vanilla Sky," "Energy-1")

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### Introduction

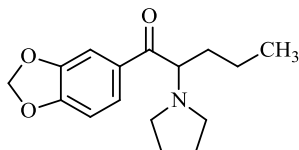
3,4-Methylenedioxypropylone (MDPV) is a designer drug of the phenethylamine class. MDPV is structurally related to cathinone, an active alkaloid found in the khat plant, 3,4-methylenedioxymethamphetamine (MDMA), methamphetamine, and other schedule I phenethylamines. MDPV, like some other substances in this class, is a central nervous system (CNS) stimulant. MDPV is also reported to have hallucinogenic effects. Law enforcement evidence indicates that the abuse of MDPV in the United States is increasing. MDPV has been identified in products that are falsely marketed as "bath salts," "plant food," and "research chemicals" and is sold over the Internet and at local retail shops.

### Licit Uses

MDPV is not approved for medical use in the United States.

### Chemistry

MDPV (1-(1,3-Benzodioxol-5-yl)-2-(1-pyrrolidinyl)-1-pentanone; Chemical Abstract Service Number 687603-66-3) is related in chemical structure to schedule I hallucinogenic substances (MDMA, MDEA) and to schedule I stimulants (cathinone, methcathinone). Its molecular formula is  $C_{16}H_{21}NO_3$  and its molecular weight is 275 g/mol. MDPV has a high melting point (estimated at 200°C) and is a solid at room temperature. The chemical structure is shown below.



### Pharmacology

MDPV has been shown to bind to recombinant human dopamine, norepinephrine and serotonin transporters and to inhibit uptake of the corresponding substrate neurotransmitter in vitro. MDPV has been shown to inhibit the rat brain synaptosomal uptake of dopamine and norepinephrine with high potency but has weak effects on serotonin uptake in vitro. It has been demonstrated that MDPV increases extracellular concentration of dopamine in rodent brain as measured by in vivo microdialysis technique.

MDPV has been shown to increase locomotor activity, heart rate and blood pressure in rodents. In drug discrimination tests, MDPV fully substitutes for methamphetamine in rats trained to discriminate methamphetamine from saline. In mice trained to discriminate MDPV from saline, methamphetamine and MDMA fully substituted MDPV. Intravenous self-administration studies have shown that rats readily and

dose-dependently self-administer MDPV and extended access leads to escalation of drug intake similar to that reported for stimulants such as cocaine and methamphetamine.

MDPV has been reported to induce subjective effects in humans similar to those induced by cocaine, amphetamine, and MDMA. The subjective effects induced by substituted cathinones are feelings of empathy, stimulation, alertness, euphoria, and awareness of senses. Other effects reported from the use of MDPV were tachycardia, hypertension, vasoconstriction, and sweating. MDPV has also been reported to cause intense, prolonged panic attacks in users. Repeat users have reported bouts of psychosis and a craving or a strong desire or urge to use again. There have been reports of deaths in which MDPV was either implicated or ruled as the cause of death.

Users of MDPV anecdotally reported that they take 25 mg or less per session. The duration of the subjective effects is about two to three hours whereas the adverse effects have been reported lasting six to eight hours after administration.

### User Population

User population information in the United States is very limited. There have been reports of MDPV being used predominantly by the youth population. MDPV data are not reported by any national drug study programs.

### Illicit Distribution

MDPV has been identified in a seized product called "Ivory Wave". It has been sold as a "bath salt" in 500 mg packets with the label indicating "for novelty use only" or "not for human consumption" without any instructions for dosage. MDPV has also been identified in the products called "Vanilla Sky" and "Energy 1."

DEA's National Forensic Laboratory Information System (NFLIS) indicates that federal, state and local law enforcement officials encountered MDPV in 49 states and the District of Columbia since 2009. The number of MDPV reports increased from two in 2009 to 380 in 2010 and to 3,625 in 2011. In 2012, the number of MDPV reports decreased slightly to 3,377.

### Control Status

On October 21, 2011, MDPV, its salts, isomers, and salts of isomers were temporarily controlled in Schedule I of the Controlled Substances Act. Control of these compounds became permanent on July 9, 2012, via passage of the Synthetic Drug Abuse Prevention Act of 2012 (Public Law 112-144, Title XI, Subtitle D).

Comments and additional information are welcomed by the Drug and Chemical Evaluation Section, Fax 202-353-1263, Telephone 202-307-7183, or E-mail ODE@usdoj.gov.