



3,4-Methylenedioxyamfetamine (Methylone)

[“Bath salt,” bk-MDMA, MDMC, MDMCAT, “Explosion,” “Ease,” “Molly”]

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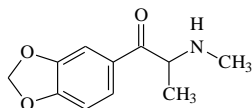
Introduction

3,4-Methylenedioxyamfetamine (methylone) is a designer drug of the phenethylamine class. Methylone is a synthetic cathinone with substantial chemical, structural, and pharmacological similarities to 3,4-methylenedioxyamfetamine (MDMA, ecstasy). It is the β -keto analogue of MDMA. Animal studies indicate that methylone has MDMA-like and (+)-amphetamine-like behavioral effects. When combined with mephedrone, a controlled Schedule I substance, the combination is called “bubbles.” Other names are given in the above title.

Licit Uses

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

Chemistry



Methylone
Molecular Formula $C_{11}H_{13}NO_3$

The core chemical structure of methylone identifies it as a phenethylamine, and it is related in chemical structure to MDMA differing only by an oxygen atom on the phenethylamine side chain. Methylone is a solid at room temperature. The Chemical Abstract Service (CAS) number is 186028-79-5 and the Chemical Abstract index name is 1-(1,3-benzodioxol-5-yl)-2-(methylamino)-1-propanone.

Pharmacology

There are substantial pharmacological similarities between methylone and MDMA. Methylone and MDMA, similar to cocaine and methamphetamine, inhibit *in vitro* the neuronal reuptake of the monoamines dopamine and serotonin and increase concentrations of these monoamines in the synaptic cleft. Similar to methamphetamine, methylone and MDMA also increase *in vitro* the neuronal release of these monoamines. An increase in monoamine concentrations in the central nervous system is thought to be involved in the pharmacological effects of these substances. Methylone also resembles MDMA in drug discrimination assays. Methylone fully substitutes (>80%) for MDMA in rats trained to discriminate MDMA from saline. Methylone (ED₅₀=6.9 μ mol/kg) was about half as potent as MDMA (ED₅₀=3.5 μ mol/kg) in these studies. In rats trained to discriminate (+)-amphetamine from saline, both methylone (ED₅₀=10.1 μ mol/kg) and MDMA (ED₅₀=7.5 μ mol/kg) completely (>80%) substituted for amphetamine with similar potencies.

Furthermore, methylone, similar to MDMA, does not substitute for 4-methyl-2,5-dimethoxyamphetamine (DOM), a Schedule I hallucinogen, in rats trained to discriminate DOM from saline.

Because of the structural and pharmacological similarities between methylone and MDMA, the psychoactive effects, adverse health risks, and signs of intoxication resulting from methylone abuse are likely to be similar to those of MDMA.

Several chat rooms discussed pleasant and positive effects of methylone when used for recreational purpose.

User Population

Methylone, like other synthetic cathinones, is a recreational drug that emerged on the United States' illicit drug market in 2009. It is perceived as being a ‘legal’ alternative to drugs of abuse like MDMA, methamphetamine, and cocaine. Evidence indicates that youths and young adults are the primary users of synthetic cathinone substances which include methylone. However, older adults have also been identified as users of these substances.

Illicit Distribution

Law enforcement has encountered methylone in the United States as well as in several countries including the Netherlands, United Kingdom, Japan, and Sweden. The National Forensic Laboratory Information System (NFLIS) is a DEA database that collects scientifically verified data on drug items and cases submitted to and analyzed by state and local forensic laboratories in the United States. The System to Retrieve Information from Drug Evidence (STRIDE) provides information on drug seizures reported to and analyzed by DEA laboratories. Methylone was first identified by forensic laboratories in 2009, with four drug reports. In 2011, there were 1,857 methylone reports. The methylone reports more than doubled to 4,066 in 2012. From January to June 2013, laboratories have already identified 3,976 methylone reports. Methylone has been found in products falsely marketed as research chemicals, plant food, or bath salts. These products are often sold at smoke shops, head shops, convenience stores, adult book stores, and gas stations and can also be purchased on the Internet. Recently, methylone has been identified in law enforcement seizures that were initially suspected to be MDMA and marketed as “Molly”.

Control Status

On October 21, 2011, methylone, its salts, isomers, and salts of isomers were temporarily controlled in Schedule I of the Controlled Substances Act (76 FR 65371). On April 12, 2013, the DEA published a Final Rule in the Federal Register permanently placing methylone in Schedule I.

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.