Synthetic Stimulant Substances
(Cathinone, Methcathinone, Mephedrone, MDPV)

Classification: Stimulant, Entactogen, Hallucinogen

Background: This group consists of several different ”designer” drugs, however they are frequently referred to collectively because they are often indiscriminately prepared together within one dose and because of their similar affects on the body. Designer drugs are so named because they were developed to subvert law enforcement and drug testing agencies and so are advertised as “legal” highs. This group of drugs was designed to produce similar effects as amphetamines, ecstasy and cocaine. They are characterized as central nervous system (CNS) stimulants and dopamine reuptake inhibitors, therefore considered stimulant drugs with psychedelic psychoactive properties. The most common synthetics are Cathinone, Methcathinone, Mephedrone and MDPV. Cathinone is extracted from the shrub plant Catha edulis (khat) and is chemically similar to ephedrine and the amphetamines. Methcathinone, originally prescribed in the Soviet Union in the 1930s as an anti depressant and diet drug, is a recreational drug considered addictive in nature and is similar to Cathinone. Methcathinone is created by “bathtub” chemists by oxidizing the common drug ephedrine, an easily obtainable legal stimulant. Mephedrone belongs to this same group of synthetic Cathinone derivatives. It was first synthesized in 1929 but was rediscovered in 2003 and is reportedly manufactured in China. MDPV (methylenedioxypyrovalerone) started appearing around 2004 as a “research chemical”, with reportedly four times the potency of Ritalin. It has been popularized as a club drug, often used in combination with alcohol, GHB, cannabis and other abused drugs. Most recently it has been established as the primary ingredient of “bath salts”, such as Ivory Wave, and is associated with extreme side effects of psychological disturbances causing the user to mutilate themselves and others while submerged in paranoid hallucinations. There are currently no known prescribed uses for the synthetic stimulants.

Legally obtained with prescription as: None

Legally obtained OTC: None

Street names: Sold as “bath salts”, “plant fertilizers” and “research chemicals” under the names listed below and more; Ivory wave, mcat, lightening, meph, bliss, WIN-35,428, Ivory coast, purple wave, the new “meow meow”, vanilla sky, cat, bathtub speed, stroof, jeff, khat, MDPK, lunar wave, sunshine, recharge, sextacy, magic, super coke, ocean, charge plus, white lightening, cloud 9, PV, scar face, hurricane charlie, aura, red dove, white dove, blue silk, serenity now, etc. Labeled as “Not Meant for Human Consumption” and advertised as a “legal high”.

Mode of Use: Smoked (salt or free basing), oral capsules and tablets, insufflation of powder, rectal, IV

Appearance: Pure white to light brown powders often with slight odors. Tablets and capsules ranging in many colors. Purchased online from sites claiming to be plant feed stores, bath product stores and in smoke/head shops in plastic and foil pouches, typically in 500 mg packets.

Metabolism and Detection in Urine: Current data and literature is limited on the metabolism of the multiple synthetics available. Because of the variability batch-to-batch, due to dosing irregularities and the variable synthetics used, predicting a half life and detection window is complex. Further, the required “effective” dose for synthetic stimulants is much lower than its cocaine/ecstasy/amphetamines counterparts resulting in lower excreted metabolite levels accompanied by higher psychoactive potency. To date, a predicted detection window of 48-72 hours is representative of the metabolism of these drugs, depending on the original dosing and synthetic abused. Despite the lack of data, owing to the lack of pharmacokinetic and pharmacodynamic study of these drugs, detection windows can be predicted based off of the windows of their stimulant counterparts.

Physiological effects: Over stimulation of the cardiovascular system with risk of heart and circulatory problems, overstimulation of the nervous system with risk of agitation and fits, nose bleeds and burns, dangerously raised body temperature, rashes, dilated pupils, altered blood pressure, breathing difficulties, bruxism, loss of appetite, discoloration of the extremities (cold and/or blue fingers), rapid heartbeat, profuse sweating, loss of bowel control, muscle damage, renal failure, myocardial infarction, headaches, nausea, seizures.

Psychological effects: Euphoria, talkativeness, alertness, elevated mood, mild sexual stimulation, increased motivation, severe agitation/aggression, depression, severe paranoia, hallucinations (auditory and visual), delusions, anxiety, tinnitus, prolonged panic attacks, potential for developing personality disorders.

Toxicity: Inter-batch variability due to varying synthetics and dosing allow for a high potential for overdose. Synthetics are active at extremely low doses ~5 mg compared to 100 mg for other common stimulants. Users can inadvertently take larger doses allowing risk for overdose. Use of these drugs are often followed by very painful hangovers > 3days out, causing emotional fragility, diminished cognitive ability, muscle pains, sore jaw, loss of appetite, hallucinations, paranoid delusions, acute agitation and crushing suicidal blackness. Toxicity of these drugs is typically treated with a CNS depressant, such as the benzodiazepine Lorazepam to counteract the stimulant affects.

Screen test: Performed by Liquid Chromatography Tandem Mass Spectrometry (LCMSMS). Synthetic stimulants do not cross react with traditional immunoassay screening techniques and therefore will not receive positive results by traditional screening methods.

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Synthetic Stimulant Substances

Spice/K2 – Synthetic Cannabinoids (Marijuana)

Classification: Hallucinogen

Background: "Spice/K2" is a synthetic cannabinoid (marijuana) functionally similar to .9- tetrahydrocannabinol (THC), the principle active component of cannabis. Synthetic cannabinoids were initially designed over the last 40 years as therapeutic agents, often for the treatment of pain. They compete for the same receptor agonists as THC, CB1 and CB2. These synthetics however, have a much higher and complete binding affinity than THC, reportedly allowing similar, yet far more intense affects over its THC counterpart (3-700 times more powerful). There are currently no known prescribed uses for the synthetic cannabinoids. The DEA has recently declared specific elements of Spice/K2 as a controlled substance.

Legally obtained with prescription as: None

Legally obtained OTC: None

Street names: Sold as herbal incense under the names listed below and more; K2, Spice, Spice Gold, Genie, Dragon's Slice, Black Magic, Spice Silver, Spice Diamond, Yucatan Fire, Mojo, Sence, Chill X, Smoke, Algerian Blend, Spice 99, Pot-pourri, Buzz, Voodoo, Pulse, Hush, Mystery, Earthquake, Black mamba, Stinger, Tropical Synergy.

Mode of Use: Smoked, ingested as an infusion.

Appearance: Herbal mixtures, often vegetable and plant parts, sprayed with the synthetic cannabinoid oil. Purchased on-line and in "smoke/head shops" in small foil/plastic baggies and containers.

Metabolism and Detection in Urine: Little is known about the metabolism of the multiple synthetics available. Because of the variability batch-to-batch, due to dosing irregularities and the variable synthetics used, predicting a half life and detection window is very difficult. Further, the required "effective" dose for spice is much lower than THC resulting in lower excreted metabolite levels accompanied by higher psychoactive potency. To date, a predicted detection window of 72 hours is representative of the metabolism of these drugs.

Physiological effects: Elevated heart rate, vomiting, elevated blood pressure, slurred speech, seizures, reddening of the eyes.

Psychological effects: Severe agitation/aggression, paranoia, hallucinations, anxiety, confusion, impaired sense of time, short term memory defects.

Toxicity: Inter-batch variability due to varying synthetics and doses sprayed allow for a high potential for overdose not associated with traditional THC. These drugs also have a profound affect at the receptor causing desensitization, allowing the user to build a "tolerance" quickly, requiring higher and higher doses to feel the same effect. Additionally, the typical THC user would anticipate comparable activity to synthetic cannabinoids, therefore smoking high doses, which may lead to overdose. Finally, the synthetics have a much stronger and more effective influence on the GABA neurotransmission of the brain than THC, causing anxiety, agitation, seizures and convulsions typically seen with synthetic cannabinoid overdose.

Screen test: Performed by Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS). LC/MS/MS is considered the preferable method of detection as the minor metabolites of this drug support the analytical findings further. Synthetic cannabinoids do not cross react with traditional immunoassay screening techniques and therefore will not receive positive results by THC screening methods.

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