
Synthetics360: Latest Trends, Court Rulings, Direction and Testing

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I. The Basics: What are synthetic cannabinoids?

The National Institute on Drug Abuse reports that synthetic cannabinoids are man-made mind-altering chemicals that are either sold sprayed on dried, shredded plant material so they can be smoked (herbal incense) or as liquids to be vaporized and inhaled in e-cigarettes and similar devices (liquid incense).¹ The chemicals used to produce synthetic cannabis create similar effects to delta-9 tetrahydrocannabinol (THC), the active ingredient in cannabis.² Because of this, synthetic cannabinoids are often misleadingly called “synthetic marijuana.” In reality, synthetic cannabis differs greatly from marijuana and contains powerful chemicals that can cause dangerous health effects including psychotic episodes and seizures.³ Synthetic cannabis is marketed under different brand names, and usually marketed to appear similar to marijuana. It is even marketed as aphrodisiac tea, herbal incense and potpourri.⁴

¹ National Institute on Drug Abuse, *Drug Facts: Synthetic Cannabinoids*, (Revised Nov. 2015) <http://www.drugabuse.gov/publications/drugfacts/synthetic-cannabinoids>

² The Australian Drug Foundation, *Synthetic Cannabis*, http://www.druginfo.adf.org.au/drug-facts/synthetic-cannabis#what_is (last visited Jan. 31, 2016).

³ American Association of Poison Control Centers, *Synthetic Cannabinoids*, (2016) <http://www.aapcc.org/alerts/synthetic-cannabinoids/>

⁴ See *Id.* at n.2



Fig. 1 Examples of Pre-ban Synthetic Cannabinoids

II. A Brief History of Synthetic Cannabinoids

A. “Legal Smoke”

Herbal smoking blends have been advertised in magazines such as *High Times* and *Cannabis Culture* for more than twenty years. These products were sold as legal alternatives to smoking marijuana. The ‘legal smoke’ industry’s goal was to create a product that resembled the appearance, texture, effects, and taste of marijuana.

Sometimes referred to as “synthetic marijuana,” the product is a mixture of dried leaves from various herbal plants. The mixtures can be various colors including green, brown, blonde, and red. Synthetic marijuana is usually sold in small foil or plastic zip bags, approximately 2 by

3 inches in size.⁵ Most of the herbal mixtures sold claim to contain herbs traditionally used for medicinal purposes, including Lion's tail, Indian lotus, and honeyweed. However, at least one study revealed that some of the ingredients listed by manufactures could not be found in the products, noting that they may be nothing more than lawn clippings.⁶ The herbs are usually reshaped and compressed to resemble marijuana buds. These substances have little to no recognized psychoactive effects. 'Legal smoke' products such as these are not the products under contention today. In fact, the legal buds that were once prominently advertised in the major marijuana magazines are rarely advertised today.

B. "Spice" and other "Incense Blends"

The synthetic cannabinoid known as "Spice" was first sold in the United Kingdom in 2004 as a recreation drug.⁷ Just two years later, in 2006, the drug had a considerable hold on the market, and the brand name "Spice" became the generic term for all synthetic cannabis.⁸

In December 2008, synthetic cannabinoids laced on plant material were first reported in United States when a shipment of "Spice" was seized and analyzed by government officials.⁹ Since then, synthetic drugs such as cannabinoids are continuing to gain popularity quickly. 51 new synthetic cannabinoids were identified in 2012, compared to only four in 2009.¹⁰ In 2015, poison centers received reports of 7,779 exposures to synthetic cannabinoids.¹¹

⁵ Buddy T, *Effects of Synthetic Marijuana or "Fake Weed" Unknown*, About Health (Updated Dec. 05, 2015) http://alcoholism.about.com/od/tipsforparents/a/legal_bud.htm

⁶ See Id. at n.5

⁷ Spice Addiction Support, *What is Spice/K2? The Facts on Synthetic Marijuana*, (December 28, 2015), <http://spiceaddictionsupport.org/what-is-spice/>

⁸ See Id. at n.7

⁹ Office of National Drug Control Policy, *Synthetic Drugs (a.k.a. K2, Spice, Bath Salts, etc.)*, <https://www.whitehouse.gov/ondcp/ondcp-fact-sheets/synthetic-drugs-k2-spice-bath-salts> (last visited Jan. 31, 2016)

¹⁰ See Id. at n.9

¹¹ See Id. at n.3

Although these new synthetic cannabinoids are sold under more than 500 names, the most popular brands sold today are “Spice” and “K-2.”¹² The products are sold as “herbal incense” and “potpourri” and are easily found at small convenience stores, head shops, gas stations, and via the Internet from both domestic sources and abroad.¹³ They are often labeled “not for human consumption” in attempt to shield the manufactures and sellers from criminal prosecution.¹⁴ Since 2009, 95 different synthetic cannabinoids that are being sold as “legal” alternatives to marijuana have been encountered by law enforcement.¹⁵ In addition, “vaping” the liquid form of synthetic cannabinoids is becoming more and more of popular trend. The increasing popularity of e-cigarettes, hookah pens, and similar devices, especially in high schools and universities, is the reason behind this movement.¹⁶

C. Synthetic Cannabinoid Manufacture

Most synthetic cannabinoids are manufactured in Asia without manufacturing requirements or quality control standards.¹⁷ The chemical compounds are generally found in bulk powder form, and then dissolved in solvents such as acetone. After they are dissolved, they are applied to plant material to make the “herbal incense” products or left in a liquid form as liquid cannabinoids designed to be vaporized. Distributors then package it for retail distribution, again with no pharmaceutical-grade chemical purity standards.¹⁸ It is common knowledge that

¹² See Id. at n.7

¹³ U.S. Department of Justice Drug Enforcement Administration, *Drugs of Abuse, A DEA Resource Guide*, (2015), http://www.dea.gov/pr/multimedia-library/publications/drug_of_abuse.pdf#page=64

¹⁴ See Id. at n.13

¹⁵ See Id. at n.13

¹⁶ See Id. at n.7

¹⁷ See Id. at n.13

¹⁸ See Id. at n.13

once this product is purchased, it can be easily smoked (using a pipe, water pipe, or rolling the material in cigarette papers) or vaporized through both disposable and reusable e-cigarettes.¹⁹

“Spice” and similar products may contain one of many synthetic cannabinoids such as JWH-018, JWH-073, JWH-200, AM-2201 UR-144, XLR-11, AKB4, cannabicyclohexanol and AB-CHMINACA, AB-PINACA or AB-FUBINACA. Even prescription drugs such as phenazepam, have been found in some of these chemical products.²⁰ The chemicals usually vary from batch to batch because manufactures try to stay ahead of the law, so packets can produce different effects even though the branding and packaging look the same.²¹ These designer drugs are target the cannabinoid type 1 receptor (CB1R) in the brain, which is responsible for the psychoactive effects of THC in cannabis.²² Despite that similarity, the more that researches learn the more it is clear that these products are not even close to being the same drug as marijuana.²³

It is becoming easier for manufactures to modify the molecular structure of the mind-altering chemicals that produces use to make products like “Spice,” which makes these products difficult to identify and study.²⁴ Synthetic cannabinoids that were commonly available during the 2011-2013 were tested and the results showed that the compounds were several times as potent as THC.²⁵ When the latest drugs from 2014-2015 were tested, the results showed

¹⁹ See Id. at n.13

²⁰ See Id. at n.7

²¹ See Id. at n.2

²² Samuel Banister, Ian S McGregor, Roy Gerona, *Labs Make New, Dangerous Synthetic Cannabinoid Drugs Faster Than We Can Ban Them*, Medical Daily (Nov. 8, 2015 9:00 AM) <http://www.medicaldaily.com/labs-make-new-dangerous-synthetic-cannabinoid-drugs-faster-we-can-ban-them-360600>

²³ Alice G. Walton, *Why Synthetic Marijuana Is More Toxic To the Brain than Pot*, Forbes (Aug. 28, 2014 10:40 AM) <http://www.forbes.com/sites/alicegwaltson/2014/08/28/6-reasons-synthetic-marijuana-spice-k2-is-so-toxic-to-the-brain/#29835d2d49eb>

²⁴ Angus Chen, *Chemical Change In Synthetic Marijuana Suspected of Causing Illnesses*, NPR (April 27, 2015 11:53 AM) <http://www.npr.org/sections/health-shots/2015/04/27/402052478/chemical-change-in-synthetic-marijuana-suspected-of-causing-illnesses>

²⁵ See Id. at n.22

that they were up to 700 times more potent.²⁶ In addition, most synthetic cannabinoids that were tested fully activated CB1R, whereas THC does not fully activate the receptor.²⁷

The earliest preparation of “Spice” contained JWH-018, and that chemical remains to be one of the most common chemicals found in synthetic cannabis.²⁸ John W. Huffman, the man who created JWH-018 and more than 450 other synthetic chemicals that mimic marijuana, said that JWH-018 “can be made by a halfway decent undergraduate chemistry major in three steps using commercially available materials.”²⁹

Synthetic cannabinoid recipes have been found to contain basic, often little used foliage herbs such as Mugwort, Lemongrass, Chamomile, Lavender, Hops, Muellin, Damiana, Marshmallow leaves, Skullcap, Wild Dagga, Wild Opium, Spearmint, Dream Herb, and Chamomile.³⁰

The inundated herbs usually return to their typically dry state, usually a green color reminiscent of either low-grade or high-grade marijuana. Different combinations of foliage leaves will produce different tastes and visual appeal. Various flavorings can also be added to broaden the spectrum from both taste and aesthetics.³¹ Collateral ingredients consist of flavoring herbs such as clove, passion flower, pine flavoring, orange zest, honey, cinnamon, and other ingredients.³²

²⁶ See Id. at n.22

²⁷ See Id. at n.22

²⁸ Leaf Science, *The Surprising Origins of Synthetic Marijuana* (Sep. 25, 2013), <http://www.leafscience.com/2013/09/25/the-surprising-origins-of-synthetic-marijuana/>

²⁹ See Id. at n.28

³⁰ Wolfwine, *Extreme Herbal Smokers* (July 16, 2012), <https://makeherbalblends.wordpress.com/>

³¹ See Id. at n.30

³² See Id. at n.30

Foliage Herbs in Natural State



Mugwort



Lemongrass



Chamomile



Hops



Muellin



Damiana

Foliage Herbs in Dried State



Dried Mugwort



Dried Lemongrass



Dried Chamomile



Hops



Muellin



Daimana

Typical Recipe for Synthetic Cannabinoids

“Mountain Mist Mix”



Ingredients:

- 1 bottle of 100% pure Acetone
- 2 oz. foliage leaves, Mullein or Marshmellow is fine
- 1 gram - choice of JWH-018, JWH-073, JWH-200, or any other type of JWH

Materials:

Materials:

- 1 digital scale
- 1 milliliter measuring beaker
- 1 HDPE spray bottle
- 1 small mixing bowl
- 1 glass baking dish
- 1 pair of rubber gloves

Procedure:

1. Measure out 5 milliliters of Acetone and pour it into a small mixing bowl.
2. Weigh out 1 gram of quality JWH substance and pour it carefully into the mixing bowl.
3. Mix the JWH and Acetone until JWH is complete liquid.
4. Carefully pour Acetone JWH mixture into spray bottle.
5. Weigh out 2 oz. of foliage leaves and pour foliage into baking dish and spread it

evenly.

6. Spray the tops of the foliage with your JWH mixture.
7. Use your gloves and mix the foliage around and re spread it out over the entire dish.
8. Spray the JWH mixture evenly throughout the dish until all the JWH mixture is gone.
9. Let the incense dry over night for best results.
10. Add your flavor extracts and drops only after incense has dried.³³

D. Commercial Quantities

Scaling the manufacture scale does not change the overall approach to synthetic cannabinoids. Large operations utilize the same ingredients, but often soak the foliage in the Acetone solution rather than spraying it manually. Many of the chemicals are produced in cheap basement labs in China or Russia.³⁴ They are usually sold inexpensively in foil packets with constantly changing brand names such as Spice, K2, Black Mamba, Cloud Nine, Mr. Nice Guy, and countless others.³⁵ Spice manufactures continue to develop new varieties of chemicals in order to try and maneuver around the new laws against synthetic cannabis.

E. The Dangers of Synthetic Cannabinoids

The contents and effects of synthetic cannabinoids and cathinones are unpredictable due to a constantly changing variety of chemicals used in manufacturing processes devoid of quality controls and government regulatory oversight. The DEA reports that overdose deaths have been attributed to the abuse of synthetic cannabinoids, including death by heart attack. They also report that kidney injury requiring hospitalization and dialysis in several patients who have smoked synthetic cannabinoids.³⁶ Emergency Room doctors are seeing synthetic cannabinoid users showing up with sever symptoms including high blood pressure, clenched muscles,

³³ How to JWH, *How to make JWH-018 / JWH-073 Incense Blends*, (2010), <https://howtojwh.wordpress.com/>

³⁴ See Id. at n.7

³⁵ See Id. at n.22

³⁶ See Id. at n.13

seizures, hallucinations and psychosis.³⁷ Additionally, the American Association of Poison Control Centers warns that synthetic marijuana can cause serious and dangerous health effects including psychotic episodes and seizures.³⁸ They note that the drug is becoming more popular, as the number of exposures keep growing. Poison centers received 2,668 calls about exposures to these drugs in 2013, 3,680 exposures in 2014, and 7,779 exposures in 2015.

III. The Synthetic Chemicals

A. The Huffman Chemicals

John W. Huffman, Ph.D, is a retired Clemson University chemist who became famous with his research and development of cannabinoids.³⁹ Huffman began his research on cannabinoids in 1984. Funded by the National Institute on Drug Abuse (NIDA), Huffman and his team developed more than 450 different synthetic cannabinoids over the course of 20 years.⁴⁰ The research goal was to develop medications to treat a host of illnesses from AIDS, multiple sclerosis, chemotherapy sickness, and Alzheimer's. At first, this development was medically helpful, providing scientists with a way of studying marijuana without trying to get ahold of the real illegal substance. One of the compounds Huffman created, JWH-133, was even shown to fight brain tumors and non-melanoma skin cancers in mice in 2011.⁴¹

³⁷ See Id. at n.24

³⁸ See Id. at n.3

³⁹ See Id. at n.28

⁴⁰ See Id. at n.28

⁴¹ See Id. at n.28

In 1993, Huffman synthesized JWH-018 and published the formula in series of papers called “The Cannabinoid Receptors.”⁴² Soon after, synthetic marijuana sprung up in Europe. Huffman didn’t become aware of people using JWH-018 and other synthetic cannabinoids he developed to get high until 2008, after someone sent him an article from a German magazine.⁴³ After that, the popularity of synthetic marijuana spread across the globe with an alarming speed.⁴⁴

B. The Hebrew University Chemicals

Raphael Mechoulam, Ph.D., known as the “Father of THC,” is a retired organic chemist and professor of Medicinal Chemistry at the Hebrew University of Jerusalem in Israel. He is known as a pioneer in the field of cannabis research and as a discoverer of the endocannabinoid system.⁴⁵ Similar to Hoffman, Mechoulam has developed synthetic cannabinoids to advance medical treatments including cannabidiol, cannabigerol, and others.⁴⁶ Mechoulam has spent four decades studying and observing the effects of cannabis on many of the most pressing medical conditions of our time, including epilepsy, cancer, pain management, and Alzheimer’s disease.⁴⁷ Mechoulam explains that some cannabinoids are good for certain types of pain, but stresses that we need clinical trials in order to advance.

C. The Makriyannis Chemicals

⁴² Terrance McCoy, *How this chemist unwittingly helped spawn the synthetic drug industry*, The Washington Post (Aug. 9, 2015) https://www.washingtonpost.com/local/social-issues/how-a-chemist-unwittingly-helped-spawn-the-synthetic-drug-epidemic/2015/08/09/94454824-3633-11e5-9739-170df8af8eb9_story.html

⁴³ See Id. at n.28

⁴⁴ See Id. at n.28

⁴⁵ Kalytera Therapeutics, Inc., *Dr. Raphael Mechoulam, Ph.D.*, <http://kalytera.co/dr-raphael-mechoulam/> (last visited Jan. 31, 2016)

⁴⁶ See Id. at n.45

⁴⁷ Sativa Von Teese, *Raphael Mechoulam, Makes Impassioned Call for Clinical Trials*, High Times (Dec. 16, 2015) <http://www.hightimes.com/read/cannabis-research-pioneer-dr-raphael-mechoulam-makes-impassioned-call-clinical-trials>

Alexandros Makriyannis, Ph.D., is also a prominent figure in cannabinoid research. Supported by the National Institute of Health grants, his research focus on drug design and synthesis, chemical/biochemical approaches for studying drug receptor interactions, and the role of membranes in drug action using biophysical methods.⁴⁸ Makriyannis developed AM1241, a new synthetic molecule belonging to the class of chemicals of cannabinoids. AM1241 is unusual from other cannabinoids because it only activates one type of cellular receptor, CB2, while most activate both CB1 and CB2. AM1241 has shown to reduce rats' sensitivity to acute pain induced by heat. While AM1241 has not been subject to human testing, Makriyannis and his researches are continuing to study its ability to reduce various types of pain.⁴⁹

IV. Drug Testing

A. Drug Testing the Body

It's a common misconception that synthetic cannabinoids are undetectable in urine and blood testing. In 2015, companies such as Drugscreen.com introduced the introduction of its advanced screening process for the detection of K2 and other synthetic cannabinoids.⁵⁰ New processes have been developed that can identify many of the new synthetic cannabinoid compounds being sold on the street. The companies claim that the process is highly successful in detecting the presence of the drug as compared to previous protocols. The test can be conducted using donor urine specimens, and can detect some of the most popular versions including XLR-11 and UR-144.⁵¹ Synthetic cannabinoids can be difficult to detect, so

⁴⁸ Northeastern University, *Alexandros Makriyannis*, <http://www.northeastern.edu/cos/faculty/alexandros-makriyannis/> (last visited Jan. 31, 2016).

⁴⁹ Robert Mathias, *Novel Cannabinoid Appears Promising for Treatment of Chronic Pain*, National Institute on Drug Abuse (2004) http://archives.drugabuse.gov/NIDA_Notes/NNVol19N2/Novel.html

⁵⁰ West Caldwell, *Drugscreen.com Introduces New K2 Screening With Advanced Detection Capability*, PR Newswire (Oct. 12, 2015) <http://www.prnewswire.com/news-releases/drugscreencom-introduces-new-k2-screening-with-advanced-detection-capability-300157491.html>

⁵¹ See Id. at n.50

companies like Drugscreen.com are continuing to research and create newer versions of these types of tests.

B. Field Testing Synthetic Marijuana

Field (presumptive) testing kits have also been developed for testing substances believed to contain synthetic cannabinoid. Some of the kits available to law enforcement contain no dangerous liquids and do not require the use of an acid neutralizer.⁵² New designs such as these eliminate potential danger to officers when using a kit in the field. The most common “positive” on synthetic cannabis for these types of tests are JWH-018, JWH-073, or JWH-081.⁵³

V. Synthetic Marijuana and the Law

A. Federal Statutes

In 2011, the DEA used its emergency scheduling authority to control five types of synthetic cannabinoids and three of the synthetic substances used to manufacture synthetic cathinones.⁵⁴ Soon after, in 2012, President Obama signed into law the Synthetic Drug Abuse Prevention Act (SDAPA) in 2012, which amended the Controlled Substance Act (CSA) of 1970 to add “cannabimimetic agents” in Schedule I, the most restrictive regulatory category.⁵⁵ The SDAPA classified 26 types of synthetic cannabinoids and cathinones as Schedule I designer drugs.⁵⁶ However, none of the newest synthetic are explicitly covered by SDAPA.⁵⁷ The SDAPA also doubled the maximum period of time that the DEA can administratively schedule substance under its emergency scheduling authority (from 18 to 36 months). In 2013, the DEA

⁵² Arrowhead Forensics, *Synthetic Cannabinoids Test*, (2015), <http://www.crime-scene.com/store/A-MMC-SCAT0110-presumptive-k2-test-for-police.shtml>

⁵³ See Id. at n.52

⁵⁴ See Id. at n.9

⁵⁵ See Id. at n.22

⁵⁶ See Id. at n.9

⁵⁷ See Id. at n.22

again utilized its emergency scheduling authority to schedule three more types of synthetic cannabinoids, temporarily designating them as Schedule I substances.⁵⁸

B. The Controlled Substance Analogue Enforcement Act (CSAEA)

Once a specific synthetic cannabinoid is placed into Schedule I, related molecules may be considered illegal due to the Controlled Substance Analogue Enforcement Act (CSAEA; a.k.a. the Federal Analogue Act.)⁵⁹ The Act mandates that any substance that is “substantially similar” to a Schedule I chemical can be treated as such. In practice, however, the similarity needs to be demonstrated in court, which is an expensive and time consuming practice. The result means that chemists can modify molecular structures faster than law enforcement can demonstrate they are illegal or add them to Schedule I.⁶⁰

Even if the the process wasn’t expensive and time consuming, the ambiguous language of the CSAE creates problems in the Court system, and the statute gives little guidance. The text of 18 U.S.C.A §813 reads “A controlled substance analogue shall, to the extent intended for human consumption, be treated, for the purposes of any Federal law as a controlled substance in schedule I.” 21 U.S.C.A. § 813 (West).

One problem exists because the courts are split on which test to apply when determining whether a drug qualifies as an analogue for the purposes of the CSAEA. Additionally, the circuit courts are split on whether the law imposes a scienter, or knowledge, requirement.⁶¹

1. Does the drug qualify as an analogue under the CSAEA?

⁵⁸ See Id. at n.9

⁵⁹ See Id. at n.22

⁶⁰ See Id. at n.22

⁶¹ Kathryn E. Brown, *Stranger Than Fiction: Modern Designer Drugs and the Federal Controlled Substances Analogue Act*, 47 Ariz. St. L.J. 449, 459 (2015)

Under the CSAEA, a substance is an analogue when its chemical structure is “substantially similar” to the chemical structure of a Schedule I or II, and it must have an effect on the user’s central nervous system that is substantially similar to, or greater than, the effect of a controlled substance in Schedule I or II.⁶² The CSAEA, however, does not provide any guidance regarding how courts should determine “substantial similarity.” In *United States v. Washam*, 312 F. 3d 926 (8th Cir. 2002), the court held that testifying experts do not have to unanimously agree that structures are substantially similar to satisfy the requirement. The court noted that “substantially similar” as used in the statute does not mean “exactly the same.” *Id.* at 930-931. In an attempt to decide this question, the courts have developed two tests: the “same core arrangement of atoms” test and the “structure and effect” test.⁶³

The “same core arrangement of atoms” test focuses on the chemical makeup of the substance. In *United States v. Klecker*, 228 F. Supp. 2d 720 (E.D. Va. 2002), *aff’d*, 348 F. 3d. 69 (4th Cir. 2003), the court employed this test to hold that the chemical structure known as “Foxy” was similar to that of DET, a controlled substance, so as to support treatment of “Foxy” as a controlled substance analogue under the CSAEA. The court noted that “Foxy” and DET share the same core arrangement of atoms, known as tryptamine. *Id.* at 728. They explained that the test was passed because tryptamine core is “intact” and “therefore identical in the two compounds.” *Id.* The Fourth Circuit also took up a challenge to the CSAEA’s “substantial similarity” prong in *United States v. McFadden*. In that case, the court relied on *Klecker* and held that the state’s expert satisfied the same core arrangement of atoms test. The expert had

⁶² See 21 U.S.C. § 802(32)(A)(i) (2012).

⁶³ See *Id.* at n.61, 460

presented evidence that changes in the drugs' chemical makeup were simply peripheral and inconsequential.⁶⁴

The other test employed by courts, the “structure and effect” test looks to the chemical composition of the drug along with its effects on users. This test seems to combine both prongs of the CSAEA into one test, and is essentially a test of composition plus effect.⁶⁵ The court in *United States v. Forbes*, 806 F. Supp. 232 (D. Colo. 1992), employed this test and accepted the government's expert's testimony that a drug's structure and its effects are related. The court noted that “[b]ecause structurally similar substances have similar pharmacological effects on the central nervous system, a finding of such similar effects is some indication that the molecular structures should be classified as substantially similar.”⁶⁶ Then, in 2002, the Eleventh Circuit made a similar holding in *United States v. Fisher*, 289 F. 3d 1329 (11th Cir. 2002). There, the court considered the body's reaction GBL, the substance in question, after it was ingested by the user. *Id.* at 1339. The court ultimately held that because the body metabolizes GBL into GHB, a controlled substance, upon ingestion, GBL must have a substantially similar structure and effects.⁶⁷ In this case, it was enough to demonstrate that the drugs were substantially similar.

Additionally, some courts have applied the “structure and effect” differently than others. For example, the Eleventh Circuit in *United States v. Brown*, 415 F. 3d 1257 (11th Cir. 2005), the court applied the test, but also affirmed a method of showing similarities in chemical composition.⁶⁸ There, a DEA forensic chemist and a National Institute of Environmental Health Sciences biochemist both applied a “visual assessment method” to determine whether the drug in

⁶⁴ See *Id.* at n.61, 461

⁶⁵ See *Id.* at n.61, 462

⁶⁶ See *Id.* at n.65

⁶⁷ See *Id.* at n.65

⁶⁸ See *Id.* at n.65

question, 1,4-butanediol, was substantially similar in chemical composition to GHB.⁶⁹ The court determined that the drugs were substantially similar, despite the fact that the drugs had different functional groups attached to the end of the molecules by relying on the experts' visual inspection comparisons and testimony, which demonstrated that the body metabolized the drug in question into GHB once ingested.⁷⁰

2. Scierter Requirement?

Questions about ignorance of the law arise once a drug is deemed an analog, and the courts have formed a three-way split when it comes to this issue. The Second Circuit has applied what might be the strictest scierter requirement. In *United States v. Roberts*, 363 F. 3d 118 (2nd Cir. 2004), the court asserted that it is not required that defendants know the “exact nature” of the drug, but that it was sufficient if they are aware they possessed “some controlled substance.”

The Seventh and Eighth Circuits also apply a similar requirement, but it is somewhat less stringent than the Second Court’s holding in *Roberts*. For example, in *United States v. Turcotte*, 405 F. 3d 515 (7th Cir. 2005), the Court held that in order to be convicted of possessing with intent to distribute mixtures containing a controlled substance, the government must show that the defendant “knew the substance at issue had a chemical structure substantially similar to that of a controlled substance,” and also required that he know it has “similar physiological effects” or intended or represented that it had such effects. *Id.* at 526. The Eight Circuit later implicitly adopted the *Turcotte* court’s reasoning when they found a scierter requirement was built into the law in *United States v. Bamberg*, 478 F. 3d 934 (8th Cir. 2007).

⁶⁹ See *Id.* at n.65

⁷⁰ See *Id.* at n.65

The remaining courts who have been confronted with the issue did not find a scienter requirement at all in the CSAEA.⁷¹ The Fifth Circuit visited the issue in *United States v. Desurra*, 865 F. 2d 651 (5th Cir. 1989). There, the court held that the intent requirement for conviction of violated the CSAEA did not require the government to show that the Defendant understood the substance in question, MDMA, to be a chemical analogue of MDA. *Id.* at 653. The court noted that it suffices that he know what drug he possesses, and that he possesses it with the statutorily defined “bad purpose.” *Id.* This holding is similar to the district court’s holding in *Forbes*, where the court held that the CSAEA did not require any scienter. *U.S. v. Forbes*, 806 F. Supp. at 238.

C. Texas Synthetic Marijuana Laws

On September 01, 2015, a new law took effect in Texas that expands provisions of the Texas Controlled Substances Act, outlawing more of the chemicals used to make substances like “Spice” and “K-2.”⁷² The new law is said to have been brought about due to concerns about reports of K-2 exposures increasing statewide.⁷³ In 2013, the Texas Poison Center reported 464 exposures to synthetic marijuana. By 2014, the figure increased to 782.⁷⁴ This number was among the higher statistics in America, trailing only New York and Mississippi.⁷⁵ These new amendments to the Texas Health and Safety Code Chapter 481 make illegal all forms of the constantly changing synthetic marijuana. In addition, the changes eliminate the affirmative defense of packaging containing the “not for human consumption” disclaimer.⁷⁶ This new law,

⁷¹ See *Id.* at n.61, 465

⁷² Domingo Ramirez Jr., *New Texas Law Fights Synthetic Marijuana*, Star-Telegram (Sep. 2, 2015 8:10 AM) <http://www.star-telegram.com/news/local/community/fort-worth/article33366684.html>

⁷³ See *Id.* at n.72

⁷⁴ See *Id.* at n.72

⁷⁵ See *Id.* at n.72

⁷⁶ Nicole DeBorde, *2015 Legislative Update: Criminal Law Highlights*, Hous. Law. 12, 13 (2015)

however, also makes it legal to prescribe low-THC cannabis to patients with intractable epilepsy under certain, complex circumstances.⁷⁷

D. Conclusion

Without Supreme Court direction, Courts across the board are struggling to handle CSAEA issues. The CSAEA is ambiguous as written, but could be amended to serve as a better model for subsequent laws and Court holdings by declaring the proper test to use when determining whether a substance is a CSAEA “analogue” and by clarifying whether there is a scienter requirement. Production of synthetic cannabinoids are soaring both in America and across the globe, and the DEA and Courts are viciously trying to keep up with this growing market and the new laws that follow.

⁷⁷ See Id. at n.76

Appendix

FACTS ABOUT “SYNTHETIC MARIJUANA”

Synthetic Cannabinoids

With names like Spice, K2, No More Mr. Nice Guy, and hundreds of others, the drugs often called “synthetic marijuana” are – in reality – very different from marijuana. They contain powerful chemicals called cannabimimetics and can cause dangerous health effects. The drugs are made specifically to be abused. Like many other illegal drugs, synthetic marijuana is not tested for safety, and users don’t really know exactly what chemicals they are putting into their bodies.

Are these drugs harmful?

These synthetic drugs can be extremely dangerous and addictive. Health effects from the drug can be life-threatening and can include:

- Severe agitation and anxiety.
- Fast, racing heartbeat and higher blood pressure.
- Nausea and vomiting.
- Muscle spasms, seizures, and tremors.
- Intense hallucinations and psychotic episodes.
- Suicidal and other harmful thoughts and/or actions.

Poison center experts – as well as many federal, state, and local government officials – have called synthetic drug use a risk to the public’s health and a hazard to public safety.



Photo courtesy DEA

Are these drugs popular?

Marketed as a “legal high,” these drugs gained popularity quickly. They also were said to be undetectable on drug tests, which is not true. The harmful effects from these products were first reported in the U.S. in 2009. Since then, the drugs have spread throughout the country. Poison centers received nearly 7,000 calls about exposures to these drugs in 2011 alone.

What should you do if someone has used synthetic marijuana?

Call your local poison center at 1-800-222-1222. Fifty-seven poison centers around the country have experts waiting to answer your call. These experts can help you decide whether someone can be treated at home, or whether he or she must go to a hospital.

Dial 9-1-1 immediately if someone:

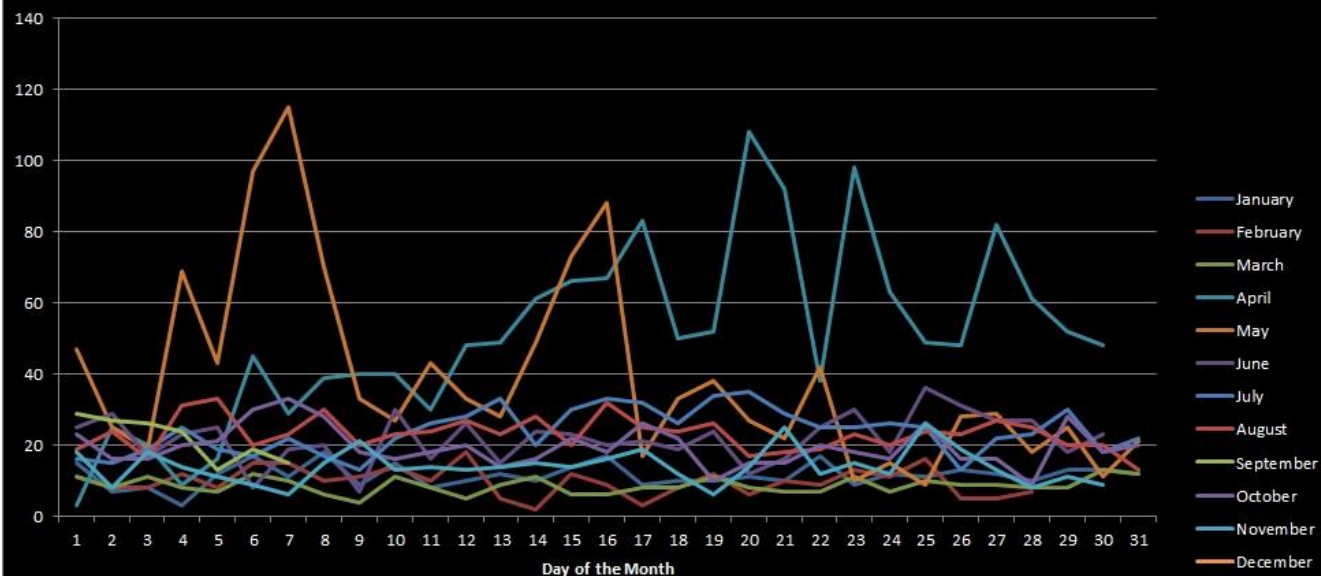
- Stops breathing.
- Collapses.
- Has a seizure.



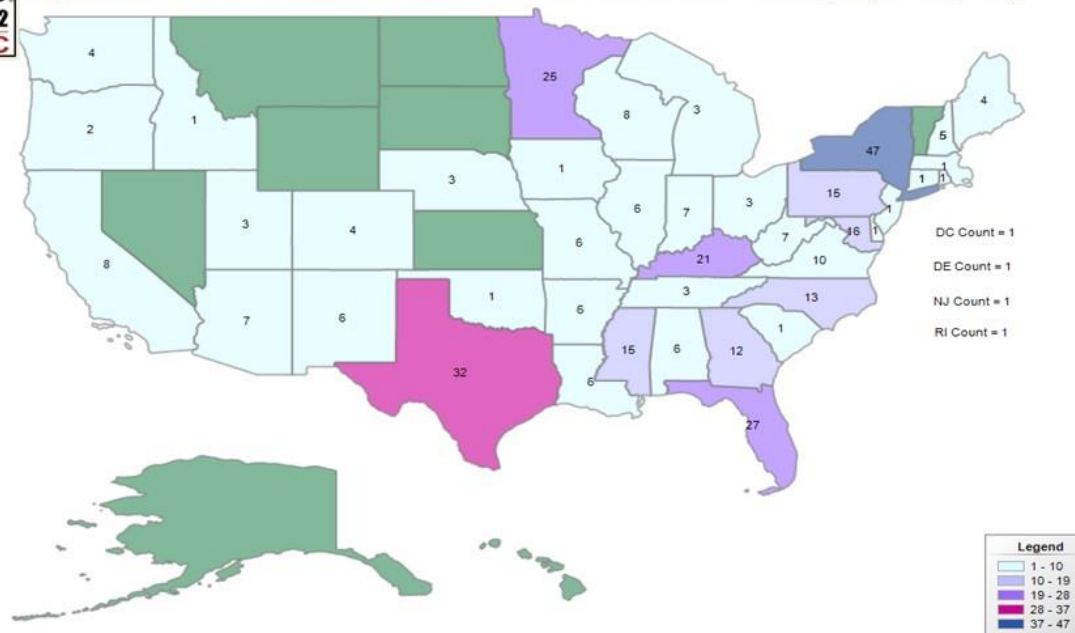
Where can you find more information?

Call your local poison center at 1-800-222-1222. Poison centers are open 24 hours a day, seven days a week, every day of the year for poisoning emergencies and for informational calls, too.

AAPCC Poison Center Synthetic Cannabinoids Exposure Calls by Day of the Month (2015)



Synthetic Cannabinoid Calls to U.S. Poison Centers (12/1-31/15)



PLEASE NOTE:

- These data are only representative of calls received by the poison centers and may not reflect the actual severity of the problem in the U.S. or any specific geographic location.
- As there is no mandatory reporting, there may be emergency room presentations and hospital admissions of which poison centers are unaware.
- Subject to the above bullets, these numbers are largely reflective of those users/abusers who have experienced adverse effects from the use of these products significant enough to warrant poison center or other health professional intervention; not all individuals who use/abuse such products call poison centers or visit emergency rooms...
- Nevertheless, the data are a good surrogate marker for rising use/abuse patterns and patterns of adverse medical outcomes associated with their use.
- For more information about the American Association of Poison Control Centers (AAPCC) data, please visit: <http://www.aapcc.org/data-system/>