

What exactly is hemp-derived THC? And how is it different from marijuana?

Your guide to demystifying all things cannabis in Minnesota.

By [Brooks Johnson](#) Star Tribune

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BRIAN PETERSON, STAR TRIBUNE

A flowering hemp plant at Carpe Diem's 80-acre farm in Elk River, Minn., ready for harvest in September.

Minnesota's cannabis industry is going through an awkward phase.

The state waded into uncharted territory this summer by [legalizing food and drink infused with low doses of high-producing THC](#).

But this first attempt at regulating hemp-derived THC edibles — which were already being sold around the state for several years in a legal gray area — [lacks licensing](#), targeted taxation and [funding for enforcement](#).

As a result, the state Legislature is all but certain to take on the issue again next year and usher in another new era of cannabis regulation in Minnesota.

In the meantime, Minnesotans 21 and older can legally get high from products sold at local retailers.

Here's a helpful guide to making sense of what is showing up on shelves and how it gets there.

Cannabis — The catch-all term and genus of a plant with spiky leaves, resinous flower buds and often potent concentrations of psychoactive chemicals. There are two major species: Cannabis sativa is taller and thinner and may provide a more uplifting high, while cannabis indica is shorter, bushier and is associated with a more "stoned" high.

Hemp and marijuana are legally distinct variations of cannabis sativa that differ solely based on the concentration of THC. Industrial hemp, [according to the 2018 Farm Bill](#), must contain less than 0.3% of delta-9 THC by dry weight.

Hemp — Of the [2,800 acres of hemp grown in Minnesota](#) in 2021, about half was used for food and fiber, according to the Minnesota Department of Agriculture.

Hemp seed is one of the few plant-based sources of a complete protein — soy and quinoa are as well. Hemp seed contains all nine essential amino acids and does not cause intoxication.

Fabric and textiles made from hemp are stronger than cotton and require far less water to grow per pound of fabric produced, making it a favored material for eco-conscious producers and consumers.

A hemp-based building material — [hempcrete](#) — is gaining popularity for its insulating properties.

Cannabinoid — Most of the chemicals derived from cannabis are called cannabinoids. CBD and THC are the most well-known of the more than 100 cannabinoids found in the plant. These chemicals interact in various ways with receptors in [the human endocannabinoid system](#), which helps to regulate everything from movement and memory to mood and appetite.

CBD — Cannabidiol has become a hugely popular nonintoxicating cannabinoid — it does not get a user high — and reached \$5.3 billion in U.S. sales in 2021, according to Brightfield Group. CBD has been marketed for anxiety relief when ingested and as a balm for sore muscles when applied topically, among other benefits. Though anecdotal accounts of its efficacy abound, scientific backing for these claims is often lacking, as is research into side effects.

"Some observational and clinical studies lead to CBD's effectiveness and safety in chronic pain; however, the evidence is not strong enough to obtain a proper recommendation," states a [review of available research published by Cureus in July](#). "Pure CBD extract is a strong candidate as an alternative to opioid medication since it is nonintoxicating and dependence is less." More research is underway; results of a relatively large study focused on psychological benefits will be published by the Psychological Assessment journal in early 2023.

The U.S. Food and Drug Administration has approved one drug using CBD — Epidiolex — which treats seizures related to several diseases. No other CBD products are allowed to make health claims.

THC — Delta-9 tetrahydrocannabinol (THC) is the most potent and well-known cannabinoid naturally occurring in high concentrations in cannabis plants, namely the flower buds. THC causes a high by bonding with and overwhelming the body's endocannabinoid receptors. Humans have been getting high on and medicating with THC for at least 2,500 years, [according to findings published in the journal Science Advances](#). It is used at least occasionally by 16% of American adults, according to a Gallup poll released in July. To compare, about 60% of American adults drink alcohol on occasion.

[Studies have concluded](#) THC is effective for pain relief and [boosting appetite](#), and 37 states have adopted medical marijuana programs.

While nearly impossible to ingest a fatal dose of THC, long-term and high-dose usage of the drug [can cause negative physical and mental health outcomes](#), though more research is needed to determine causation vs. correlation.

Delta-8 THC — Despite a slew of states legalizing it, federal law still bans the sale and possession of delta-9 THC. But there are related chemicals that have a similar chemical structure and effect that are federally legal. Since the 2018 Farm Bill legally separated hemp and its extracts from marijuana, high-inducing delta-8 THC has been converted from hemp-derived CBD and sold in a legal gray area. It produces a similar but milder high compared to delta-9 THC.

An important note for Minnesota: The state's THC edible law applies to all forms of THC. This means vapes and cannabis buds with more than 0.3% of any THC are illegal, as are edibles and drinks with more than 5 mg of any THC. CBD-only vapes and buds can be legally sold in Minnesota.

Extraction — Turning CBD-rich hemp flower into an increasingly concentrated extract, distillate or isolate requires [a trip to the chemistry lab](#).

Usually the first step involves heating plant material to activate cannabinoids, a process known as decarboxylation — though this can follow the extraction process.

At commercial operations, extraction happens when hemp buds are packed into canisters with carbon dioxide or ethanol. This causes CBD, fats, terpenes and some other organic material to separate from the plant and provides a crude CBD oil.

The crude oil is then filtered and distilled — and often "winterized" with ethanol or another solvent — to reach a nearly pure CBD end product. The product must be tested to ensure it is free of residual solvents or byproducts.

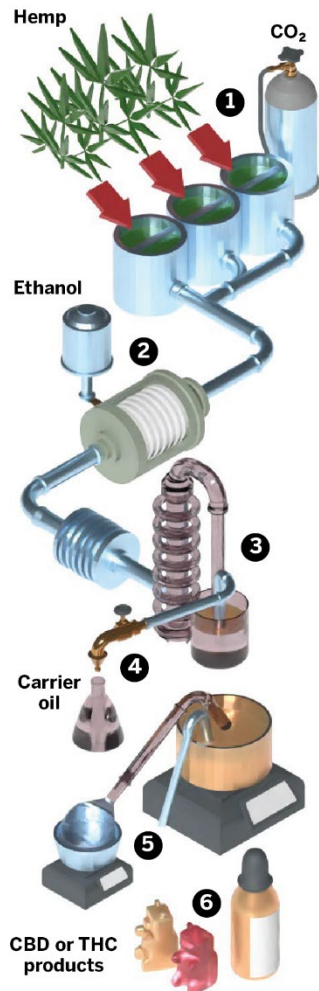
CBD is then added to coconut oil or another "carrier" oil in various doses to be used in a range of products.

Conversion — Once CBD is extracted and purified to an acceptable level, [it can be chemically converted to other cannabinoids](#) — including delta-9 THC. This conversion is the source of most hemp-derived THC on the market, since hemp plants by definition have very little naturally occurring THC.

The conversion process involves combining pure CBD with a solvent, such as toluene or heptane, and a strong acid. The resulting THC is then purified and cleansed of solvents, acids and byproducts and must be tested to prove no unwanted materials are in the finished product.

How to get from hemp to THC gummies

Since hemp by legal definition has a minuscule amount of naturally occurring THC, it must be converted from CBD (cannabidiol) via chemical reaction.



- 1. An unrefined oil is extracted** by running carbon dioxide or ethanol through canisters packed with hemp flower. The buds are often heated before extraction to activate chemicals like CBD.
- 2. The oil is filtered** and often "winterized" with ethanol to separate CBD from fats, organic matter and other compounds found in cannabis.
- 3. Ethanol or other solvents are removed** and the oil is distilled to purify and isolate the CBD.
- 4. CBD is added to a carrier oil**, like coconut, to be used in a variety of products and quantities.
- 5. CBD is converted to THC** by combining a solvent with the CBD and a strong acid. The resulting THC is purified and cleansed of solvents, acids and byproducts.
- 6. The final CBD or THC product** is tested to ensure unwanted chemicals aren't present and to determine precise amounts of cannabinoids present.

Third-party testing — Minnesota state law requires cannabis products undergo third-party testing to ensure there are "no more than trace amounts of any mold, residual solvents, pesticides, fertilizers or heavy metals." The end CBD or THC product, not the hemp from which it is derived, must undergo the testing, and products on shelves are legally required to provide consumers a link to test results.

HHC — Hexahydrocannabinol is another intoxicating cannabis compound that, like delta-8 THC, gained prominence after the 2018 Farm Bill legalized industrial hemp and its extracts. While HHC is not specifically allowed or outlawed in Minnesota, as it is not a type of THC, it remains unregulated and largely unstudied.

THC-O — THC-O acetate, or more commonly THC-o, is said to produce a high more akin to psychedelic drugs. It is not found naturally in cannabis plants — it must be synthesized from extracted or converted THC — and thus its legality is murky.

"Given the lack of human studies surrounding delta-9 THC-O acetate, caution should be advised for any individuals who choose to synthesize, sell or use this product," [the National Poison Control Center says](#).

Medical — Like Minnesota's legal THC market, the medical marijuana program in the state is an outlier. A regulated duopoly of companies — [RISE Minnesota and Vireo Health/Green Goods](#) — are allowed to run a specific number of dispensaries for a relatively limited set of conditions. As of Sept. 8, 37,568 people were [registered as patients](#) in Minnesota, according to the Department of Health. [Smokeable marijuana and infused gummies only recently joined oils as allowed uses](#).

Terpenes — The characteristic dank or skunky smell of cannabis buds is due to the presence of terpenes. These are molecules made of carbon and hydrogen found in a variety of plants but have high concentrations in cannabis and its cousin, hops. Different varieties of terpenes impart different flavors and aromas — pine, citrus, diesel — though [research has thrown water on the idea](#) that cannabis terpenes affect the high caused by THC.

Minnesota law

On THC: Food and drink with up to 5 milligrams of hemp-derived THC per serving — and 50 mg per package — are legal for those 21 and older to purchase. No other products with THC above 0.3% are legal in the state, including vapes and smokeable flower, outside the medical program.

Legal THC products must be in child-proof packaging, be clearly labeled with dosage and content warnings and contain information on who manufactured the product and test results — or a QR code that links to that data. [The Minnesota Board of Pharmacy oversees THC-infused edibles and drinks](#).

On CBD: Like with THC products, Minnesota law now restricts sales of CBD and any cannabinoid "extracted or otherwise derived from hemp" to those 21 and older. Products must

also bear a disclaimer stating it "does not claim to diagnose, treat, cure, or prevent any disease and has not been evaluated or approved by the United States Food and Drug Administration unless the product has been so approved."

Federal law

Marijuana — cannabis with more than a 0.3% concentration of delta-9 THC — remains a Schedule I drug under federal law and its possession, sale and cultivation is a crime. Rules around banking, credit card processing and income taxes can all pose problems for cannabis-based businesses as a result.

The possession, sale and cultivation of hemp — cannabis with less than 0.3% delta-9 THC — has been federally legal since 2018. Some states have different rules regarding extracts like delta-8 THC.

Medical marijuana has some federal protections. Every year since 2014, a budget amendment has passed that prevents the U.S. Justice Department from spending money to go after states with medical marijuana programs.