

# Cannabis Concentrates

## Overview and Policy Considerations

**Issue:** As state and local governments seek to regulate the cannabis industry, several common misconceptions have led to policy makers either banning or placing undue restrictions on the means and methods of making cannabis concentrates and extracts.

### Policy Recommendations:

- **Allow for cannabis processing utilizing long-existing safety standards from other industries:** With proper health and safety standards, techniques used to process cannabis concentrates are fundamentally safe. Volatile solvent techniques have been utilized to make household items like perfume, vanilla extract, and decaffeinated coffee for generations.
- **Allow the sale of cannabis concentrates to reduce size of illicit markets:** Failure to permit and allow for cannabis processing, including with the use of volatile solvents, will drive a massive underground market. Demand for cannabis concentrates is very high and will continue to grow. Limits in regulated cannabis concentrate supply can cause legal prices to skyrocket while illicit markets can find alternative sources more fluidly.
- **A wide variety of products and processing methods should be allowed:** Many cannabis products and processing methods exist in the cannabis market today. With the growth of the cannabis industry, there have been many advances in product processing techniques. Allowing for innovative products and processing techniques to enter the market not only promotes the responsible growth of the cannabis industry but also is helpful with the development of safer and more consistently dosed products.
- **Laws and regulations should be reasonably tailored and flexible:** The legal cannabis market is still in its early stages of development and continues to evolve rapidly. Particularly in cannabis processing, where new products and technology are emerging. Accordingly, policy should allow new technologies to enter and enable regulators to adjust density and operation of cannabis businesses to quickly respond to spikes in illicit market usage.

## Introduction

Processing of cannabis concentrates is a critical part of the cannabis industry both in terms of medical need and meeting consumer demands. Not only do many patients and consumers prefer to use cannabis concentrates over cannabis flower, concentrates can also be processed into a wide variety of products, like capsules, skin creams, and edibles that are essential for certain medical uses. Standardized processing procedures also allow for consistent dosing in cannabis products, which is crucial for both adult-use and medical users.

News reports of cannabis processing often depict in-home operations using flammable solvents in an unsafe and uncontrolled manner, resulting in explosions, exposure to chemicals, and other outcomes that put public safety at risk. These methods are not utilized in a regulated industry with professional operators. Processing of cannabis products, when done by professional operators under the framework of sound regulatory policy is completely safe and vital to a healthy cannabis market.

## Overview of Cannabis Processing

Cannabis concentrates are made by recovering desirable compounds, like cannabinoids or terpenes, from plant materials through mechanical or chemical means. There are a variety of machinery, solvents, and techniques that can be utilized to safely and effectively concentrate cannabis compounds. Cannabis concentrates can have a wide range of final forms like wax, shatter, kief, crumble, rosin, and tinctures. [Appendix A](#) provides a glossary that defines these terms as well as others relevant to cannabis processing. Concentrates are generally vaporized, but can also be processed into many products like edibles, capsules, topical creams and transdermal patches. There are several methods used to make cannabis concentrates which generally fall into two categories: mechanical and chemical.

### Mechanical Processing

Mechanical processing employs pressure or physical action to remove desirable compounds from the cannabis plant. A common method of mechanical processing involves sieving ground cannabis flowers through a series of screens to delicately remove plant trichomes, resulting in a powder called kief or dry sift. This process can also be performed in a cold-water bath to facilitate the detachment of trichomes from the plant material, resulting in a concentrate called bubble hash. Cold and warm press methods use heat and pressure like an oil press to produce a concentrate known as rosin. These three concentrates can be further manipulated using heat to produce different textures in the final form.

Mechanically Processed Concentrates		
 <p><b>DRY SIFT</b> A cannabis powder rich in trichomes produced by sifting plant material.</p>	 <p><b>BUBBLE HASH</b> A solventless concentrate produced with only water, cannabis and a series of screens.</p>	 <p><b>ROSIN</b> A concentrate process that squeezes the oil from the plant material using heated plates and a hydraulic press.</p>

### Chemical Solvent Processing

Chemical processing refers to practices that utilize a solvent to dissolve trichomes and remove desired compounds from cannabis plants. All solvent extractions are performed using the following workflow:

1. The plant material is washed with a solvent to create a solution.
2. The original solvent is then removed from the solution to leave behind an extract.

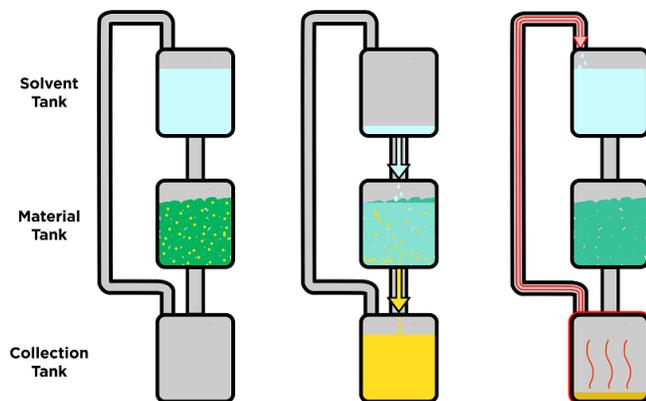
Chemical processing methods are generally more efficient when compared to mechanical processing. A variety of solvents are used in cannabis processing, ranging from ethanol to liquefied petroleum gases and carbon dioxide.

Chemically Processed Extracts		
 <p><b>SHATTER</b></p> <p>An absolute oleoresin extract with a glass like consistency.</p>	 <p><b>BADDER/BUDDER</b></p> <p>An opaque extract with a cake fondant and butter-like consistency made by whipping shatter under heat.</p>	 <p><b>CRUMBLE</b></p> <p>A dry and opaque extract that has a honeycomb texture.</p>

### Butane/Propane

Butane (or the similar use of propane) is the most commonly used solvent in cannabis processing and creates the products that are preferred by the majority of concentrate consumers. Although butane is flammable and potentially explosive, when used by professional cannabis operators in a Class 1 Division 1 room within a closed loop, it is completely safe. Class 1, Division 1 rooms are specifically designed for high-risk areas where ignitable concentrations of flammable gasses may exist during normal operation. A closed loop system refers to a process or machinery where any solvents used follow a single path, or group of paths, that recirculate and reclaim the solvent, preventing solvents from being openly exposed. Most jurisdictions that allow for cannabis processing using volatile solvents require the use of closed loop systems.

Figure 1 depicts the typical workflow for closed-loop processing utilizing butane as a solvent. Liquid butane mixes with the cannabis plant material, dissolving the desired compounds and the resulting solution is deposited into the collection tank. The material column valve is then closed and heat is applied via a hot water jacket to recover the butane solvent.



The butane solvent vapor moves up the vapor column and condenses back into a liquid, refilling the solvent tank. After all the solvent has been recovered from the solution, the solvent tank valve is closed and the concentrates are safely removed from the tank.<sup>1</sup>

Butane is included within the list of chemicals and substances The American Food and Drug Administration designates as Generally Recognized as Safe (GRAS), meaning it has been shown to be safe for food

manufacturing purposes.<sup>2</sup> Butane extraction has been used for foods and flavors over the past several decades, and was approved by international committee in 1981 for extraction of food.<sup>3</sup>

The use of butane as a solvent in cannabis processing is advantageous from both a safety and practical perspective. Butane has a relatively low boiling point meaning it will evaporate completely with minimal effort and it is nontoxic. Butane has a low operating pressure, which is why it is preferred for use in indoor cooking appliances. The lower operating pressure also improves the safety profile for pressurized processing machinery.<sup>4</sup>

Butane usage received a negative stigma due to unlicensed operators doing “open blasting”, a practice not utilized by professional operators. In open blasting, a butane canister is emptied through a tube packed with cannabis in an open environment (e.g. not in a vacuum or closed safe room). Because butane is heavier than air and unlicensed operators often do not take precautions with regard to exhausting or preventing sparks from electrical or static sources, there have been instances of this leading to explosions. This practice is unfortunately more common in jurisdictions where legal production of butane hash is not legally permitted.

Regulated markets have adopted guidelines that allow top brands to utilize closed loop systems that safely recover butane used in cannabis extraction while creating concentrates with little to no residual solvents.

### Supercritical CO<sub>2</sub>

Carbon Dioxide (CO<sub>2</sub>) is the second most used solvent in cannabis processing. When CO<sub>2</sub> is heated and pressurized above its critical point, it becomes “supercritical” and exhibits both gas and liquid properties.<sup>5</sup> The extraction process consists of pumping supercritical CO<sub>2</sub> into a chamber filled with plant material. The CO<sub>2</sub> pulls desirable compounds from the cannabis plant. CO<sub>2</sub> is the preferred solvent for supercritical fluid extraction in cannabis processing and many other industrial applications because of its affordability, low toxicity, safety, and compatibility with processed foods.<sup>6</sup>

### Ethanol

Ethanol extractions require the same equipment that alcohol producers use to refine spirits. While ethanol is highly flammable, it does not easily volatilize and the simple distillation employed is commonly understood by planning commissioners and fire departments. Additionally, the process is performed under vacuum which reduces the likelihood of explosion.

## Safety of Cannabis Processing

State and local governments are often hesitant to allow for cannabis processing utilizing volatile solvents, like butane, because of health and safety concerns. While cannabis concentrates may seem relatively new, practices used to produce these products are well vetted and have a strong and consistent record of safety. Standards for cannabis processing in regulated markets require the use of machinery and protocols that are nationally and internationally recognized as safe, certified by a licensed engineer, and approved by local fire officials. These machines and protocols ensure volatile solvents are safely captured during processing and that facilities are appropriately built-out.

## Use of Solvent Extraction in Other Industries

The volatile solvents and methods used for processing cannabis have been utilized by other industries for generations. These practices have a proven record of safety and are often exercised at a much larger scale in other commercial applications.



Figure 3: Commercial Extraction Plant<sup>7</sup>

➤ **Decaffeinated**

**Coffee:** Supercritical CO<sub>2</sub> is commonly used to extract

caffeine to make decaffeinated coffee. The technique was pioneered in 1963 and has led to a large-scale industrial process for the decaffeination of coffee beans using supercritical CO<sub>2</sub>.<sup>8</sup>

- **Perfume:** Some plant material is too fragile to be distilled and an alternative method must be employed.<sup>9</sup> The fragrance industry uses volatile solvents to extract aromatic materials from plants. Solvent extraction is used for jasmine, tuberose, carnation, gardenia, jonquil, violet leaf, narcissus, mimosa, and other delicate flowers.<sup>10</sup>
- **Vanilla Extract:** Since the 1950s use of volatile solvents to produce vanilla extract has been both a common and recommended practice.<sup>11</sup> Use of these solvents has proved to be a very efficient method for recovering desired compounds from vanilla beans while minimizing safety hazards.<sup>12</sup>

## Safety Codes and Standards for Concentrate Production

Practices utilized by today's regulated cannabis industry have been used for generations and at a much larger scale by other industries. There are several codes, standards, regulations, and statutes to ensure safety and inform policy.

Existing standards are used by industrial hygienist to design and construct processing facilities that employ appropriate engineering and safety controls, like ventilation controls, fire suppression systems, electrical system requirements, solvent handling and storage cabinets, and sanitation standards.

### National Fire Protection Association

The National Fire Protection Association (NFPA) develops and maintains codes and standards to minimize the risk of fire by establishing criteria for building, processing, and installation of hazardous equipment.<sup>13</sup> NFPA currently has regulations for processing practices utilized by the cannabis industry, including use of liquefied petroleum gas (NFPA 58, 30) and carbon dioxide (NFPA 55). In addition to these existing standards, the NFPA is currently drafting specific standards for cannabis cultivation and extraction which will be included in the 2018 edition of the NFPA 1.<sup>14</sup>

### National Electric Code

NFPA 70, the National Electric Code (NEC), establishes safe electrical design, installation, and inspection protocols. Chapter 5 of the NEC covers electrical installation and safety in buildings where flammable solvents are utilized. These standards can be specifically applied to the cannabis industry.

### International Code Council: Building, Fire, Mechanical, and Plumbing Codes

The International Code Council develops building safety and fire prevention standards and codes that have been adopted in all 50 states and across local jurisdictions.

Chapter 61 of the International Fire Code establishes requirements for the safe handling, storing and use of liquefied petroleum gas and Chapter 307 of the International Building Code establishes requirements for buildings or structures that manufacture, process, or store using hazardous materials.<sup>15,16</sup>

The International Mechanical Code (IMC) covers design and installation of mechanical systems, appliances, and ventilation systems. Chapters 4, 5 and 6 of the IMC establish minimum safety standards for ventilation and exhaust systems.

### Occupational Safety and Health Administration Standards

Occupational Safety and Health Administration (OSHA) regulations assure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education and assistance. The Colorado Department of Public Health and Environment issued a guide book outlining the workplace hazards associated with the cannabis industry and applicable OSHA standards.<sup>17</sup>

### American Conference of Governmental Industrial Hygienist Industrial Ventilation Handbook

The American Conference of Governmental Industrial Hygienists (ACGIH) is a professional association of industrial hygienists and practitioners of related professions dedicated to promoting safety and health within the workplace. ACGIH develops operation and maintenance standards for industrial ventilation systems.

## Economic Impact of Cannabis Concentrates

Cannabis concentrates are the fastest growing sector of the cannabis industry. Concentrates are easy to produce and replicate and have a relatively high profit margin, which incentivizes increased production. A significant contributor to this growth is the versatility of cannabis concentrates and their application in a variety of products that require professional extraction.<sup>18</sup>

Additionally, as more states have moved towards legalizing cannabis and establishing regulated points of sale, the cannabis industry has adjusted to provide products that appeal to a wider and more diverse consumer base. Market research demonstrates that consumers are embracing new cannabis products and methods of consumption that only thrive under the innovation and sophistication of a regulated, legitimate industry.<sup>19</sup>

### Growth of Cannabis Concentrates in Regulated Markets

During the first half of 2016 collective sales of cannabis concentrates in Colorado, Oregon, and Washington grew by 122 percent.<sup>20</sup> Concentrates are the fastest and strongest growing product type and have been embraced by consumers in all three states.

## Colorado

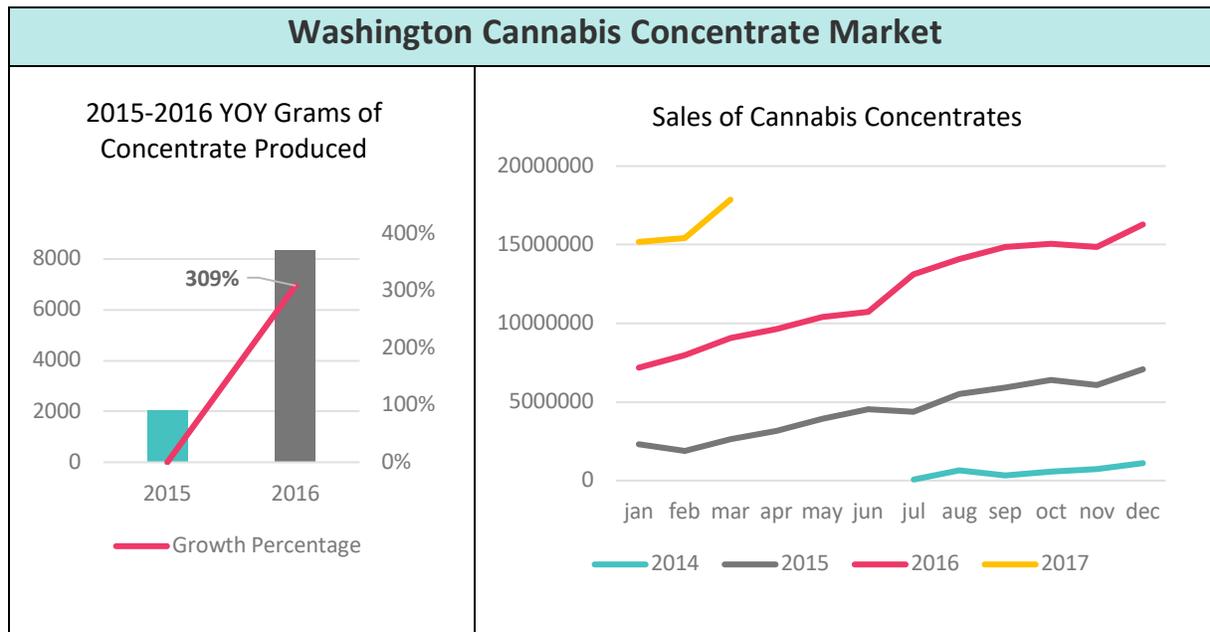
Concentrate sales are booming in Colorado. Retail sales of concentrates in the state’s medical and adult-use markets surged 125 percent in the first quarter of 2016 from the same period in 2015.<sup>21</sup> While cannabis flowers project healthy growth and still have the largest share of the market, at about 58 percent in 2016, concentrates are growing at a much faster pace.<sup>22</sup>

Colorado Concentrate Market Growth			
<i>Dollar amounts in millions</i>			
Year	2014	2015	2016
Total Cannabis Sales	\$699	\$996	\$1,314
Total Concentrate Sales	\$77	\$169	\$285
Concentrate Market Share <sup>23</sup>	11%	17%	23%
Year over Year Growth	N/A	120%	69%

Source: Colorado Department of Revenue

## Washington

Washington state’s cannabis concentrate market has also shown incredibly strong growth in both revenue and production since legal sales started in July of 2014. The number of concentrate producers has steadily increased and grams of concentrate produced between 2015 and 2016 shot up 309 percent.



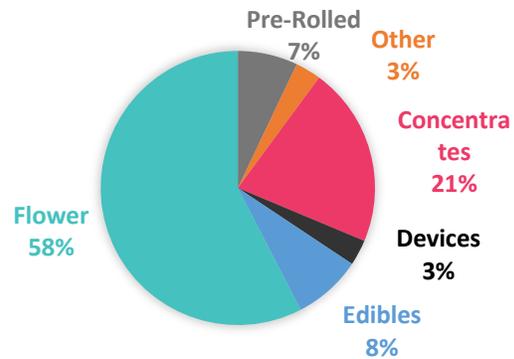
Source: Washington State Liquor and Cannabis Board Marijuana Dash Board

Sales of cannabis concentrates for inhalation (which does not include concentrates used to make infused products) nearly tripled from 2015 to 2016, going from about \$54 million to \$143 million in total sales. 2017 concentrate sales will likely be significantly higher. Figures from the first three months of 2017 show concentrate sales have increased 100 percent compared to the same period in 2016.<sup>24</sup>

## Oregon

While adult-use sales did not start in Oregon until June 2016, concentrates already make up a substantial portion of the total cannabis market. It took some time for concentrate sales to grow in both Colorado and Washington, but in Oregon concentrates made up 17 percent of the adult-use market in just the first month of sales.<sup>25</sup> Concentrate sales make up 30 percent of Oregon’s medical cannabis market and 21 percent of the combined medical and adult-use cannabis market.<sup>26</sup>

What Oregon Consumer Purchased in 2016



Source: BDS Analytics

## Misregulation of Concentrates Inflating Illicit Cannabis Market

While legalization of adult-use and medicinal cannabis has served to reduce the size of the illicit cannabis market, very sizable illicit markets continue to thrive in nearly every legalized jurisdiction. Eliminating illegal sales of cannabis should be a top priority of lawmakers, as illicit markets (i) rob state and local governments of tax revenue, (ii) undermine public health and safety and (iii) make it difficult for legal operators to succeed.

Several state and local governments have sought to ban cannabis concentrates, only to see a steady increase in illicit production and sales via unlicensed and unsafe operators. A significant portion of cannabis users prefer to consume concentrates over edibles or flower and in markets where these products are prohibited a robust illicit market has formed.

For example, in 2014 California considered legislation that would have completely banned physicians from recommending butane hash oil (BHO). The proposal was met with significant opposition from both the industry and patients. At the time, many California dispensaries reported cannabis concentrates accounted for up to 40 percent of their sales.<sup>27</sup> Patients suffering from severe illnesses like cancer and neuro muscular diseases reported that cannabis concentrates are not only their preferred medicine, but have had life-changing effects on their health and wellness.<sup>28</sup> Industry operators also warned that a ban on BHO would not stop sales or production, as concentrates already made up a significant portion of the marketplace in California.

## Reducing the Illicit Market

There are several steps state and local governments can take to neutralize illicit market sales of cannabis concentrates while ensuring these products are made safely.

- **Permit Processing with Both Volatile and Non-Volatile Solvents:** Consumer taste for concentrate products overwhelmingly leans towards BHO and other products utilizing volatile solvents. Additionally, there is a growing body of evidence that the products made using these extraction methods have a more diverse set of therapeutic uses including for the treatment of PTSD and

opioid dependence. Failure to permit and allow for processing using volatile solvents will drive a massive underground market.

- **Provide for Safe and Diverse Supply:** Do not limit the number of cultivation, processing, and distribution licenses. Instead use zoning rules that are narrowly tailored to ensure that those currently operating illegally can enter the legal market and become subject to the inspection, monitoring and taxation rules. Such business types should be permitted to operate in any industrial or warehouse zoned areas. Cities can create a thriving export business to other parts of their state as well as enable operators to become innovators and leaders within the industry.
- **Allow for Technological Innovation:** Concentrates are very much the future of the cannabis industry. Cannabis processing methods are becoming increasingly sophisticated, enabling the production of more targeted and consistent products. To the extent cannabis processing can be done safely and in accordance with best practices from other commercial industries, processing methods and technologies should not be restricted.
- **Look to Existing Codes and Statutes for Guidance:** The *Safety Codes and Standards* section above summarizes several codes and standards that can be referenced to ensure cannabis processing is done safely. Rules and best practices for other industrial uses can be easily adapted to effectively regulate the cannabis industry. Some states that have legalized cannabis have established laws and policies regarding safe cannabis processing methods, with Colorado establishing itself as a leader in this policy space. Examples of state and local laws and regulations can be found in [Appendix B](#).

## Appendix A: Glossary of Cannabis Processing Terms

### Physical Separation: Product Descriptions

**Dry Sift (Kief):** A cannabis powder rich in trichomes produced by sifting plant material.

**Hashish:** Any concentrate produced by pressing trichomes together (e.g. Bubble hash, Rosin).

**Bubble Hash:** A solventless concentrate produced with only water, cannabis and a series of screens. The term refers to the bubbles the concentrate makes when smoked.

**Rosin:** A concentrate process that squeezes the oil from the plant material using heated plates and a hydraulic press.

### Chemical Extraction: Product Descriptions

**Absolutes:** The product that results from removing the fats and waxes from a concrete by dissolving the concrete in ethanol, filtering the solution and reclaiming the ethanol by means of distillation (i.e. Winterized Shatter).

**Concretes:** A crude oleoresin that results from using a non-polar solvent to extract the trichomes from the cannabis plant (e.g. Badder, Crumble).

**Shatter:** An absolute oleoresin extract with a glass like consistency. Contains high amounts of THCA.

**Badder:** An opaque extract with a cake fondant and butter-like consistency made by whipping shatter under heat.

**Crumble:** A dry and opaque extract that has a honeycomb texture.

**Raw Distillate:** A high purity (85-99% Cannabinoids) solventfree concentrate void of all aromatic and flavor qualities. Raw is used to denote that no terpenes have been reintroduced.

### Cannabis Plant: Key Plant Anatomy Terms

**Cannabinoid:** A set of chemical compounds produced by the cannabis plant that interact with a series of receptors in the human body to create euphoric and therapeutic effects.

**Terpenes:** A class of chemical compounds responsible for the complex scent and taste of cannabis flowers.

**Trichomes:** The glandular appendages on the surface of the cannabis plant that both produce and store the therapeutic and psychoactive compounds.

**Fan leaf:** The large leaves that are trimmed off the plant after they have been harvested and dried. These leaves contain small amounts of trichomes that can be further concentrated through multiple extraction techniques.

**Sugar leaf:** The small leaves found throughout the colas and typically trimmed off the flower after harvest. They are Called 'sugar' leaves because of the high concentration of trichomes.

**THCA:** The predominant cannabinoid found in the cannabis plant. It is the non-psychoactive precursor to THC.

**THC:** The psychoactive version of THCA, which is produced when the cannabis plant is exposed to heat.

**Flower:** The part of the plant that contains the highest concentration of trichomes. Commonly referred to as nugs or buds.

## Processing Techniques

**Concentrate:** An accumulation of desirable compounds (i.e. trichomes) achieved through mechanical or chemical means.

**Extract:** A concentrate that was produced using a chemical solvent to remove the desirable compounds from the cannabis plant.

**Solvent:** Any liquid capable of dissolving a compound. Cannabis requires a non-polar solvent to dissolve the non-polar trichomes (e.g. Butane, Propane, Ethanol).

**Butane Hash Oil (BHO):** Informs the consumer that butane was the primary solvent used during the extraction process.

**Propane Hash Oil (PHO):** Informs the consumer that propane was the primary solvent used during the extraction process.

**Ethanol Hash Oil (EHO):** Informs the consumer that ethanol was the primary solvent used during the extraction process.

**RSO:** An extract made by soaking cannabis plant material in ethanol and then boiling off the ethanol in a rice cooker.

**Solventfree:** An extract void of trace amounts of the solvent used for extraction. Commonly referred to as distillate.

**Solventless:** A term used to note the concentrate was produced without the use of a hydrocarbon solvent. Rosin and dry sift are two examples of solventless concentrates.

**Live Resin:** A concentrate produced using butane from a freshly harvested and flash-frozen plant at very low temperatures. This substance is typically far less stable than shatter and tends to have a sappy consistency due to the high terpene concentration.

**Winterization:** A post-processing purification technique that removes fats and waxes that were extracted from the plant. This is achieved by mixing the extract with ethanol, placing it in extremely low temperatures (-40F) for 24 hours and filtering the solution. The ethanol is then reclaimed using a rotary evaporator.

**Decarboxylation:** The process of using heat to remove the carboxyl group from the raw THC-A and CBD-A cannabinoids. This releases a CO<sub>2</sub> and H<sub>2</sub>O molecule, allows your brain to absorb the psychoactive THC molecules and reduces the weight of a concentrate by 13%

**Closed Loop System:** A system that can pass a liquid solvent through plant material to create a solution and then reclaim the solvent from the solution without exposing the system to the ambient environment.

**Vacuum Oven:** An oven that uses heat and vacuum to purge any residual solvents from an extract.

**Molecular Distillation:** A process that uses high temperatures and vacuum distillation to separate and purify extracts. The process separates cannabinoids and terpenes into fractions based on their different boiling points.

### Input Material

**Nug Run:** A term used to denote concentrates produced using only cured nugs from the cannabis plant, as opposed to trim or fresh plant material.

**Trim Run:** A term used to denote concentrates produced using leaves that were trimmed off a dried plant.

**Live Resin:** A term used to denote extracts produced using fresh plant material that was immediately frozen after harvest.

## Appendix B: State and Local Cannabis Processing Regulations

<b>California Draft Medical Cannabis Manufacturing Regulations</b>		
California Code of Regulations, Title 17 Division 1, Chapter 13.	Manufactured Cannabis Safety	<a href="https://www.cdph.ca.gov/Programs/CEH/D FDCS/MCSB/CDPH%20Document%20Library/DPH17010_FinalClean.pdf">https://www.cdph.ca.gov/Programs/CEH/D FDCS/MCSB/CDPH%20Document%20Library/DPH17010_FinalClean.pdf</a>
<b>Colorado Code of Regulations (CCR) – Medical Marijuana Rules</b>		
1 CCR 212-1	Medical Marijuana Rules	<a href="https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-1%2001012019.pdf">https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-1%2001012019.pdf</a>
M 600 Series	Medical Marijuana-Infused Products Manufacturers	<a href="https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-1%2001012019.pdf">https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-1%2001012019.pdf</a> (see pages 130-154)
M 1000-1 Series	Labeling, Packaging, and Product Safety	<a href="https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-1%2001012019.pdf">https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-1%2001012019.pdf</a> (see pages 192-208)
<b>Colorado Code of Regulations – Retail Marijuana Rules</b>		
1 CCR 212-2	Retail Marijuana Rules	<a href="https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-2%2001012019.pdf">https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-2%2001012019.pdf</a>
R 600 Series	Retail Marijuana Products Manufacturing Facilities	<a href="https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-2%2001012019.pdf">https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-2%2001012019.pdf</a> (see pages 129-156)
R 1002.5	Labeling, Packaging, and Product Safety	<a href="https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-2%2001012019.pdf">https://www.colorado.gov/pacific/sites/default/files/1%20CCR%20212-2%2001012019.pdf</a> (see pages 193-210)
<b>Washington State Administrative Code</b>		
Title 314 > Chapter 314-55	Marijuana Licenses, Application Process, Requirements and Reporting	<a href="http://apps.leg.wa.gov/wac/default.aspx?cite=314-55">http://apps.leg.wa.gov/wac/default.aspx?cite=314-55</a>
Section 314-55-077	Marijuana processor license—Privileges, requirements, and fees.	<a href="https://apps.leg.wa.gov/wac/default.aspx?cite=314-55-077">https://apps.leg.wa.gov/wac/default.aspx?cite=314-55-077</a>
Section 314-55-104	Marijuana processor license extraction requirements.	<a href="https://apps.leg.wa.gov/wac/default.aspx?cite=314-55-104">https://apps.leg.wa.gov/wac/default.aspx?cite=314-55-104</a>
<b>Oregon Administrative Rules for Recreational Marijuana</b>		
Chapter 845, Division 25	Recreational Marijuana Rules	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3220	General Processor Requirements	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3230	Processor Policies and Procedures	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3240	Processor Training Requirements	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3250	Cannabinoid Edible Processor Requirements	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>

Section 845-025-3255	Alternating Proprietors	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3260	Cannabinoid Concentrate and Extract Processor Requirement	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3280	Cannabinoid Topical Processor	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3285	Industrial Hemp Processor Requirements	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3290	Processors Recordkeeping	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3300	Processing Marijuana for Medical Purposes	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3305	Processing for Cardholders	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
Section 845-025-3310	Transfer of Medical Marijuana Processing Site Inventory	<a href="https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873">https://secure.sos.state.or.us/oard/displayDivisionRules.action?selectedDivision=3873</a>
<b>City of Denver</b>		
Marijuana Extraction Guideline for Commercial / Licensed Facilities		<a href="https://www.denvergov.org/content/dam/denvergov/Portals/678/documents/FPB/Extraction%20Guideline%20DFD%203-30-2016.pdf">https://www.denvergov.org/content/dam/denvergov/Portals/678/documents/FPB/Extraction%20Guideline%20DFD%203-30-2016.pdf</a>

## Endnotes

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