YAKIMA CHIEF HOPS®

# $CO_2$ HOP EXTRACT

PRODUCT DATA SHEET

## PACKAGED BY

Yakima Chief Hops
306 Division Street, Yakima, WA 98902 USA
Phone (509) 457-3200

## DESCRIPTION

$CO_2$ hop extract products are produced from soft, hop pellets by supercritical $CO_2$ extraction. $CO_2$ hop extract is the pure resin extract of hops containing alpha acids, beta acids, and hop oils, and is designed to deliver clean bitterness and hop aroma in the kettle boil. $CO_2$ hop extract typically contains 35-65% alpha acid, 15-35% beta acid and 5-15% oil. $CO_2$ hop extract can be produced from any hop variety but is typically available in several high alpha varieties. Informational summaries for these hop varieties are available at yakimachief.com.

## PACKAGING & STORAGE

Standard packaging is available in 55-gallon steel drums, or in 0.5 kg, 1 kg, 2 kg, 3 kg and 4 kg tins containing 200 g to 2.4 kg alpha acids. Uniformity of $CO_2$ hop extract can be achieved with lot sizes up to 10,000 kg. The inner coating of metal tins and drums are approved by the FDA for use with food products and meet the requirements of Food Additive Regulation 21 CFR 175.300. Tins are marked with 16-9000 food grade ink. $CO_2$ hop extract may be stored at room temperature, preferably between 41°F and 77°F (5°C and 25°C) or in cold storage conditions, preferably between 30°F and 41°F (-1°C and 5°C). $CO_2$ hop extract will remain stable in closed containers for three (3) years when stored at room temperature and five (5) years when stored in cold storage.

## APPLICATION AND USAGE

$CO_2$ hop extract is primarily used as a kettle hop ingredient to provide clean bitterness and hop character to beer. It also improves physical stability and contributes to consistency. Traditionally, kettle hopping with extract will also lead to improved trub formation and improved antimicrobial and anti-foaming properties. Add $CO_2$ hop extract in wort early during kettle boil for bitterness and late during kettle boil for aroma. Based on quantity required, $CO_2$ hop extract packaged in custom tins can be directly flushed with hot wort in the brew kettle or in specific by-pass dosing systems or heated to 122°F - 140°F (50°C - 60°C) and poured directly into the kettle. Heating temperature and time may depend on variety. Addition rates depend on the alpha concentration of the extract.

## USE RATE CALCULATIONS

Addition during early kettle boil to achieve average bitterness in high gravity wort/beer will typically lead to the isomerisation of 35% (by HPLC) of the iso-alpha acids in the finished beer. Addition rate is thus calculated as follows: **kg product = IBU / 35 x hl / Alpha%**
Where: IBU = international bitterness unit desired, hl = is hector liters of finished beer (1 barrel = 1.173 hectoliter), Alpha % = equals alpha %w/w content from CofA as a whole number. Use rates may vary depending on the brewing process and the desired hopping level.

## AROMA

The aroma of the $CO_2$ hop extract is variety specific. Perception of hoppy character and various related notes in beer are also variety specific in some instances and will depend on the quantity of extract added and the time of addition during kettle boil. $CO_2$ hop extract is primarily utilized in bittering applications with high alpha varieties so aroma is limited.

YAKIMA CHIEF HOPS®

# $CO_2$ HOP EXTRACT

SPECIFICATION SHEET

$CO_2$ HOP EXTRACT CONCENTRATED

nqa. ISO 9001 ISO 14001 Registered

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306 Division Street, Yakima, WA 98902 USA
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| DESCRIPTION | METHOD | TYPICAL ANALYSIS |
|---|---|---|
| Identification | UV absorption curve is similar to that of reference standard | |
| Alpha Acids* | UV Spectro. by ASBC HOPS-6A, HPLC - EBC 7.7 or ASBC HOPS-14 (ICE-3 Std.) | 35 - 65% (w/w) |
| Beta Acid* | UV Spectro. by ASBC HOPS-6A, HPLC - EBC 7.7 or ASBC HOPS-14 (ICE-3 Std.) | 15 - 35% (w/w) |
| % Oils By Distillation* | EBC 7.10 or ASBC HOPS-13 | 5 - 15% (v/w) |
| Lead | | < 0.6 ppm |
| Arsenic | | < 0.4 ppm |
| Cadmium | | < 0.1 ppm |
| Mercury | | < 0.05 ppm |
| Total Heavy Metals (as Pb eq.) | | < 10 ppm |
| Pesticides | Comply with US Regulations & EC Directive 396/2005 Amendments | |

** NOTE: Concentration dependent upon variety of hops and crop year*

YAKIMA CHIEF HOPS®

# $CO_2$ HOP EXTRACT

SAFETY DATA SHEET

$CO_2$ HOP EXTRACT · CONCENTRATED

nqa. ISO 9001 ISO 14001 Registered

## 1. PRODUCT IDENTIFICATION

| | |
|---|---|
| 1.1 Product Name | CO2 Hop Extract<br>(Pure Resin CO2 Hop Extract, Kettle Extract, Liquid CO2 Extract, Supercritical CO2 Extract, Pure Resin Extract, Standardized Extract, Extract PRE)<br>Made from Hop Pellets |
| 1.2 Supplier | Yakima Chief Hops Inc.<br>306 Division St. Yakima, WA 98902 (USA) Phone: +1.509.457.3200<br>Email: quality@yakimachief.com<br>Website: yakimachief.com |
| 1.3 Recommended Use | Ingredient used in brewing beer. |
| 1.4 Restrictions on Use | None |

## 2. HAZARD IDENTIFICATION

| | |
|---|---|
| 2.1 Hazard Classification | Not Applicable<br>Product is natural, unrefined and contains no additives. |
| 2.2 Label Elements | Not Applicable |
| 2.3 Other Hazards | Prolonged skin contact could cause dermatitis in some individuals. |

## 3. COMPOSITION, INGREDIENT INFORMATION

| | |
|---|---|
| 3.1 Composition | A slightly acidic solid or resinous phase; concentrate of alpha acids, beta acids, oils and uncharacterized resins produced by CO2 extraction.<br>**Name** **CAS-No.** **EC-No.** **Ingredient Percent**<br>Hop Extract 8060-28-4 232-504-3 100% |
| 3.2 Hazard Components | Not Applicable<br>Product is natural, unrefined and contains no additives. |

## 4. FIRST AID MEASURES

| | |
|---|---|
| 4.1 Oral Ingestion | Not Applicable |
| 4.2 Eye Contact | Wash with copious amounts of water. Seek medical attention if irritation persists. |
| 4.3 Skin Contact | Wash with warm, soapy water. Seek medical attention if irritation persists. Launder contaminated clothing before reuse. |
| 4.4 Inhalation | Remove affected person to fresh air. Administer oxygen if necessary. |
| 4.5 Symptoms | None Known |

## 5. FIRE FIGHTING MEASURES

| | |
|---|---|
| 5.1 Extinguishing Media | Dry Powder, Foam, Water, CO2 |
| 5.2 Hazards from Fire | None Known |

## 6. ACCIDENTAL RELEASE MEASURES

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|---|---|
| 6.1 Procedure | Scoop, shovel spilled material into recovery container. Flush area with hot soapy water to remove final traces. |
| 6.2 Protective Equipment | Use adequate ventilation or a respirator if in a confined area. Use rubber gloves. Wear Safety Glasses. |

## 7. HANDLING AND STORAGE

| | |
|---|---|
| 7.1 Handling Equipment | Closed Container of Food Grade Quality. Stainless Steel, Lacquered Steel, Laminated Aluminum Foils or PET Pouches. |
| 7.2 Precautions | Avoid generating excessive dust and prolonged skin contact. Use personal protective equipment (Section 8) |
| 7.3 Storage Conditions | Store at room temperature or at a temperature range of -3°C to 5°C (25°F to 41°F). |

## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

| | |
|---|---|
| 8.1 Permissible Exposure Limits (PELs) | Not Applicable |
| 8.2 Threshold Limit Values (TLVs) | Not Applicable |
| 8.3 Engineering Controls | Provide adequate ventilation |
| 8.4 Personal Protective Equipment (PPE) | Skin Protection: wear rubber gloves if prolonged exposure<br>Eye Protection: wear safety glasses<br>Respiratory Protection: wear face mask if dust will be generated |

## 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| 9.1 Appearance & Odor | Yellow, green or brown resin concentrate with a pungent odor. |
| 9.2 Odor | Typical hoppy, depends on variety |
| 9.3 Odor Threshold | No data available |
| 9.4 pH | 4 - 6 |
| 9.5 Freezing Point | 40 – 60° (104 – 140°F), depending on variety |
| 9.6 Boiling Point | > 100°C |
| 9.7 Flash Point | > 100°C |
| 9.8 Evaporation Point | < 1 |
| 9.9 Flammability | No data available |
| 9.10 Upper/Lower Flammability | No data available |
| 9.11 Vapor Pressure | No data available |
| 9.12 Vapor Density | No data available |

| | |
|---|---|
| 9.13 Density | 0.85 – 1.10 |
| 9.14 Solubility in Water | Insoluble |
| 9.15 Partition coefficient | No data available |
| 9.16 Auto-ignition Temperature | No data available |
| 9.17 Decomposition Temperature | No data available |
| 9.18 Viscosity | No data available |

## 10. STABILITY AND REACTIVITY

| | |
|---|---|
| 10.1 Reactivity | Product is sensitive to oxidation in open containers, and/or under excessive temperatures |
| 10.2 Stability | Product is stable under appropriate storage conditions, in closed containers and/or under inert atmosphere. (Section 7.3) |
| 10.3 Possibility of Hazardous Reactions | None known |
| 10.4 Conditions to Avoid | See Section 7.3 |
| 10.5 Incompatible Materials | None Known |
| 10.6 Hazardous Decomposition Products | None Known |

## 11. TOXICOLOGICAL INFORMATION

| | |
|---|---|
| 11.1 Acute Toxicology | None Known. Product is "Generally Recognized As Safe" (GRAS 21 CFR 182.20) |
| 11.2 Routes of Exposure | Inhalation: No data available<br>Ingestion: No data available<br>Skin contact: No data available<br>Eye contact: No data available |
| 11.3 National Toxicology Program | Not listed on Report of Carcinogens |

## 12. ECOLOGICAL INFORMATION

| | |
|---|---|
| 12.1 Toxicity | No data available |
| 12.2 Potential for Persistence and Degradation | No data available. Product is all natural and biodegradable. |
| 12.3 Bioaccumulation | No data available. Product is all natural. |
| 12.4 Mobility in Soil | No data available |
| 12.5 Other Effects | No data available |

## 13. DISPOSAL CONSIDERATIONS

| | |
|---|---|
| 13.1 Product Disposal | According to regulations in force. |
| 13.2 Packaging Disposal | According to regulations in force; for paper/cardboard, steel and PET. |

## 14. TRANSPORTATION INFORMATION

| | |
|---|---|
| 14.1 UN Number | Non-hazardous product |
| 14.2 Shipping Name | CO2 Hop Extract |
| 14.3 Hazard Class | Non-hazardous product |
| 14.4 Packing Group | Non-hazardous product |
| 14.5 Environmental Hazards | Non-hazardous product |
| 14.6 Other | Product is not classified as ADR and should not be transported along with ADR classified Cargo.<br>Product should be stored away from engines or any heat source during transportation. |

## 15. REGULATORY INFORMATION

| | |
|---|---|
| 15.1 Regulations | Food Safe<br>Heavy Metals, Pesticides/Herbicides/Fungicides, Nitrates, Radioactivity: Below tolerance levels. Allergenic-Free, Non GMO, Traceable |
| 15.2 REACH | Not Applicable (No EINECS Ref.) |

## 16. OTHER INFORMATION

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|---|---|
| 16.1 Safety Data Sheet Issue Date | 2015-05May-26 |
| 16.2 Safety Data Sheet Revision Date | 2025-12Dec-04 |
| 16.3 Safety Data Sheet Other | Safety Data Sheet reviewed 2025-12Dec-04 |