

IKE

PRODUCT DATA SHEET

PACKAGED BY

Yakima Chief Hops
306 Division Street, Yakima, WA 98902 USA
Phone (509) 456-4792, Fax (509) 453-1551

DESCRIPTION

IKE is a pure resin extract of hops containing hop oils, beta acids and iso-alpha acids. It is made from pure resin CO₂ Hop Extract, in which alpha acids have been converted into iso-alpha acids in their free acid form, in a way that it preserves the vital hop compounds. YCH's isomerization process concentrates the soft resin portion of hop extract to deliver clean bitterness and hop aroma. Isomerization parameters are defined to best protect aroma, flavor and bittering characteristics. IKE is virtually free of Nitrates and polyphenols. Typical analysis of the product: 35-65% iso-alpha acids, 10-30% beta acids, and <2% alpha acids. IKE can be made from any available hop variety. Detailed technical data sheets for these hop varieties are available at www.yakimachief.com. Fresh hop aroma and flavor characteristics will not change after extended periods of storage.

PACKAGING & STORAGE

Standard packaging is available in bulk 55-gallon steel drums or in 0.5 kg, 1 kg, 2 kg, 3 kg and 4 kg tins containing from 200 gr. iso-alpha acids to 2.4 kg iso-alpha acids. A complete list of packaging information can be obtained upon request. 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. IKE should be stored at a temperature under 50°F (10°C). Under these conditions, IKE will remain stable in closed containers for two (2) years.

APPLICATION & USAGE

IKE is primarily used as kettle hop ingredient to provide "clean" bitterness and hop character to beer. Also, it will improve physical stability and will contribute to a more consistent beer. Traditionally, kettle hopping with extract will also lead to improved trub formation and improved antimicrobial and antifoaming properties.

Add the IKE in wort early during kettle boil for bitterness and late during kettle boil for bitterness and aroma. IKE packaged in bulk drums has to be heated up to 122 - 140°F (50 - 60°C) for some hours to be melted prior to injecting it into the brew kettle. Heating temperature and time may depend on hop variety and addition rate will depend on the iso-alpha concentration in the extract. IKE is considered as a thicksotropic product and stirring at room temperature should alternatively homogenize the product and reduce viscosity to a level allowing pouring of the resin. IKE packaged in custom tins can be directly flushed with hot wort in the brew kettle or in specific by-pass dosing systems.

USE RATE CALCULATIONS

Addition during early kettle boil to achieve average bitterness in high gravity wort/beer will typically lead to the utilization of 65% (by HPLC) of the iso-alpha acids in the finished beer. Addition rate is thus calculated as follows: **kg product = IBU / 65 x hl / Alpha%**

Where: IBU = international bitterness unit desired, hl = is hector liters of finished beer (1 barrel = 1.173 hectoliters), Alpha % = equals alpha %w/w content from CofA as a whole number. Use rates may vary from 50-80% depending on the brewing process, the addition method and the desired hopping level.

AROMA

The aroma of the extract will be varietal specific. Perception of hoppy character and various related notes in beer will also be varietal specific in some instances and will depend on the quantity of extract added and the time of addition during kettle boil.



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SPECIFICATION SHEET

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| | METHOD | TYPICAL ANALYSIS |
|---------------------------------------|---|------------------|
| Identification | UV absorption curve is similar to that of reference standard. | |
| Iso-Alpha-Acids* | HPLC - EBC 7.8 or ASBC HOPS-16 (Iso Std.) | 35 - 65% (w/w) |
| Residual Alpha Acids | HPLC - EBC 7.8 or ASBC HOPS-16 (Iso Std.) | < 2.0% (w/w) |
| Beta Acids* | HPLC - EBC 7.8 or ASBC HOPS-16 (Iso Std.) | 10 - 30% (w/w) |
| Lead | | < 1.0 ppm |
| Arsenic | | < 0.5 ppm |
| Cadmium | | < 0.03 ppm |
| Total Heavy Metals (as Pb eq.) | | < 10 ppm |
| Magnesium | | < 200 ppm |
| Iron | | Not detectable |

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



IKE

SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

| | |
|-------------------------|--|
| 1.1 Product Name | IKE (Isomerized Kettle Extract, Iso Kettle Extract) Made from CO2 Hop Extract |
| 1.2 Supplier | Yakima Chief Hops, Inc. 306 Division St. Yakima, WA 98902 (USA) Phone: 1.509.453.4792 Email: Quality@Yakimachief.com 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 Product is natural. |
| 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 iso-alpha acids, beta acids, oils and uncharacterized resins produced by CO2 extraction. |
| 3.2 Hazard Components | Not Applicable Product is natural. |

4. FIRST AID MEASURES

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|--------------------|---|
| 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 or PET |
| 7.2 Precautions | Avoid prolonged skin contact. Use personal protective equipment (Section 8) |
| 7.3 Storage Conditions | Store at room temperature or at a temperature < 50°F (10°C). |

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 Eye Protection: wear safety glasses |

9. PHYSICAL AND CHEMICAL PROPERTIES

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|--------------------------------|---|
| 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 Melting Point | 40 – 60° (104 – 140°F), depending on variety |
| 9.6 Boiling Point | > 100°C |
| 9.7 Flash Point | > 100°C |
| 9.8 Evaporation Rate | < 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

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

12. ECOLOGICAL INFORMATION

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|--|--|
| 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

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|-------------------------|--|
| 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

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|----------------------------|-----------------------|
| 14.1 UN Number | Non-hazardous product |
| 14.2 Shipping Name | IKE |
| 14.3 Hazard Class | Non-hazardous product |
| 14.4 Packing Group | Non-hazardous product |
| 14.5 Environmental Hazards | Non-hazardous product |

15. REGULATORY INFORMATION

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|------------------|---|
| 15.1 Regulations | Food Safe 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 Issue Date | 2015-05May-26 |
| 16.2 Revision Date | 2018-08Aug-20 |
| 16.3 Other | |