1 Identification

1. Product identifier
   - Trade name: Grain Fusel Oil natural

2. Application of the substance / the mixture: Food flavorings

3. Details of the supplier of the safety data sheet
   DISCLAIMER: The information in this Safety Data Sheet (SDS) is believed to be correct as of the date issued. Advanced Biotech makes NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE. User is responsible for determining whether the Advanced Biotech product is fit for a particular purpose and suitable for user's method of use or application. Given the variety of factors that can affect the use and application of an Advanced Biotech product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the Advanced Biotech product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.
   - Manufacturer/Supplier:
     Advanced Biotech
     10 Taft Road
     Totowa, NJ 07512 USA
   - Information department:
     Product Safety Department
     productsafety@adv-bio.com
   - Emergency telephone number:
     1(800)353-5053 (Info Trac)
     1(352)323-3500 (International)
     During normal business hours: 1(973)339-6242

2 Hazard(s) identification

Classification of the substance or mixture

- GHS02 Flame
  Flam. Liq. 3 H226 Flammable liquid and vapor.

- GHS05 Corrosion
  Eye Dam. 1 H318 Causes serious eye damage.

- GHS07
  Acute Tox. 4 H332 Harmful if inhaled.
  Skin Irrit. 2 H315 Causes skin irritation.

(Continued on page 2)
Safety Data Sheet
acc. to OSHA HCS

Trade name: Grain Fusel Oil natural

STOT SE 3  H335  May cause respiratory irritation.

- **Label elements** Harmful in contact with skin or if inhaled.
- **GHS label elements**
  Pictograms on label shall be in the shape of a square set at a point and shall include a black hazard symbol on a white background with a red frame sufficiently wide to be clearly visible.
  The product is classified and labeled according to the Globally Harmonized System (GHS).
- **Hazard pictograms**
  ![GHS02](image1) ![GHS05](image2) ![GHS07](image3)

- **Signal word** Danger

- **Hazard-determining components of labeling:**
  Isoamyl alcohol
  Isobutanol
  2-Methyl-1-Butanol
  1-propanol

- **Hazard statements**
  H226 Flammable liquid and vapor.
  H332 Harmful if inhaled.
  H315 Causes skin irritation.
  H318 Causes serious eye damage.
  H335 May cause respiratory irritation.

- **Precautionary statements**
  P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
  P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
  P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  P310 Immediately call a poison center/doctor.
  P321 Specific treatment (see on this label).
  P362+P364 Take off contaminated clothing and wash it before reuse.
  P405 Store locked up.
  P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

- **Classification system:**
  - **NFPA ratings (scale 0 - 4)**
    ![NFPA Ratings](image4)
    Health = 3
    Fire = 2
    Reactivity = 0
Trade name: Grain Fusel Oil natural

- HMIS-ratings (scale 0 - 4)
  - Health = *3
  - Fire = 2
  - Reactivity = 0

- Other hazards
  - Results of PBT and vPvB assessment
    - PBT: Not applicable.
    - vPvB: Not applicable.

3 Composition/information on ingredients

- Description: Mixture of the substances listed below with nonhazardous additions.

  - Dangerous components:
    - Isoamyl alcohol
      - Flam. Liq. 3, H226; Acute Tox. 4, H332; Skin Irrit. 2, H315; Eye Irrit. 2A, H319; STOT SE 3, H335
    - 2-Methyl-1-Butanol
      - Flam. Liq. 3, H226; Acute Tox. 4, H302; Acute Tox. 4, H332; STOT SE 3, H335
    - Isobutanol
      - Flam. Liq. 3, H226; Eye Dam. 1, H318; Skin Irrit. 2, H315; STOT SE 3, H335-H336
    - Ethyl alcohol
      - Flam. Liq. 2, H225
    - 1-propanol
      - Flam. Liq. 2, H225; Eye Dam. 1, H318; Acute Tox. 4, H302; STOT SE 3, H336

4 First-aid measures

- Description of first aid measures
  - General information:
    - Immediately remove any clothing soiled by the product.
    - Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.
  - After inhalation:
    - Supply fresh air. If required, provide artificial respiration. Keep patient warm. Consult doctor if symptoms persist.
    - In case of unconsciousness place patient stably in side position for transportation.
  - After skin contact:
    - Immediately rinse with water.
  - After eye contact:
    - Rinse opened eye for several minutes under running water. Then consult a doctor.
  - After swallowing:
    - If symptoms persist consult doctor.
  - Information for doctor:
    - Most important symptoms and effects, both acute and delayed
      - No further relevant information available.

(Continued on page 4)
5 Fire-fighting measures

· Extinguishing media
  · Suitable extinguishing agents:
    CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· Special hazards arising from the substance or mixture No further relevant information available.
· Advice for firefighters
  · Protective equipment: Mouth respiratory protective device.
· Additional information
  Cool endangered receptacles with water spray.
  Collect contaminated fire fighting water separately. It must not enter the sewage system.

6 Accidental release measures

· Personal precautions, protective equipment and emergency procedures
  Wear protective equipment. Keep unprotected persons away.
· Environmental precautions:
  Dilute with plenty of water.
  Do not allow to enter sewers/surface or ground water.
· Methods and material for containment and cleaning up:
  Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
  Use neutralizing agent.
  Dispose contaminated material as waste according to item 13.
  Ensure adequate ventilation.
· Reference to other sections
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.

· Protective Action Criteria for Chemicals

<table>
<thead>
<tr>
<th>PAC-1:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoamyl alcohol</td>
<td>125 ppm</td>
</tr>
<tr>
<td>Isobutanol</td>
<td>150 ppm</td>
</tr>
<tr>
<td>Ethyl alcohol</td>
<td>1,800 ppm</td>
</tr>
<tr>
<td>1-Propanol</td>
<td>250 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PAC-2:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoamyl alcohol</td>
<td>1,700 ppm</td>
</tr>
<tr>
<td>Isobutanol</td>
<td>1,300 ppm</td>
</tr>
<tr>
<td>Ethyl alcohol</td>
<td>3,300 ppm</td>
</tr>
<tr>
<td>1-Propanol</td>
<td>670 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PAC-3:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Isoamyl alcohol</td>
<td>10,000 ppm</td>
</tr>
</tbody>
</table>

(Continued on page 5)
47.0.11

<table>
<thead>
<tr>
<th>Component</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isobutanol</td>
<td>8000* ppm</td>
</tr>
<tr>
<td>Ethyl alcohol</td>
<td>15000* ppm</td>
</tr>
<tr>
<td>1-Propanol</td>
<td>4000* ppm</td>
</tr>
</tbody>
</table>

7 Handling and storage

· Handling:
· Precautions for safe handling
  Ensure good ventilation/exhaustion at the workplace.
  Prevent formation of aerosols.
· Information about protection against explosions and fires:
  Keep ignition sources away - Do not smoke.
  Protect against electrostatic charges.
· Conditions for safe storage, including any incompatibilities
  · Storage:
    · Requirements to be met by storerooms and receptacles: No special requirements.
    · Information about storage in one common storage facility: Not required.
    · Further information about storage conditions: Keep receptacle tightly sealed.
  · Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

· Additional information about design of technical systems: No further data; see item 7.
· Control parameters
  · Components with limit values that require monitoring at the workplace:
    The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit.
    At this time, the remaining constituent has no known exposure limits.

<table>
<thead>
<tr>
<th>Isoamyl alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL</td>
</tr>
<tr>
<td>REL</td>
</tr>
<tr>
<td>TLV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Isobutanol</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL</td>
</tr>
<tr>
<td>REL</td>
</tr>
<tr>
<td>TLV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ethyl alcohol</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEL</td>
</tr>
</tbody>
</table>
Safety Data Sheet
acc. to OSHA HCS

Trade name: Grain Fusel Oil natural

<table>
<thead>
<tr>
<th></th>
<th>REL Long-term value: 1900 mg/m³, 1000 ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TLV Short-term value: 1880 mg/m³, 1000 ppm</td>
</tr>
<tr>
<td>1-propanol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PEL Long-term value: 500 mg/m³, 200 ppm</td>
</tr>
<tr>
<td></td>
<td>REL Long-term value: 500 mg/m³, 250 ppm</td>
</tr>
<tr>
<td></td>
<td>Long-term value: 500 mg/m³, 200 ppm</td>
</tr>
<tr>
<td></td>
<td>Skin</td>
</tr>
<tr>
<td></td>
<td>TLV Long-term value: 246 mg/m³, 100 ppm</td>
</tr>
</tbody>
</table>

**Additional information:** The lists that were valid during the creation were used as a basis.

- **Exposure controls**
- **Personal protective equipment:**
- **General protective and hygienic measures:**
  - Keep away from foodstuffs, beverages and feed.
  - Immediately remove all soiled and contaminated clothing.
  - Wash hands before breaks and at the end of work.
  - Avoid contact with the eyes.
  - Avoid contact with the eyes and skin.
- **Breathing equipment:**
  - In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure use respiratory protective device that is independent of circulating air.
- **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation. Due to missing tests no recommendation to the glove material can be given for the product/ the preparation/ the chemical mixture. Selection of the glove material should be based on consideration of the penetration times, rates of diffusion and the degradation.

- **Material of gloves**
  - The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
- **Penetration time of glove material**
  - The exact break through time has to be determined by the manufacturer of the protective gloves and has to be observed.
Trade name: Grain Fusel Oil natural

- **Eye protection:**
  - Tightly sealed goggles

### 9 Physical and chemical properties

- **Information on basic physical and chemical properties**
  - **General Information**
    - **Appearance:** Liquid
    - **Color:** According to product specification
    - **Odor:** According to product specification
    - **Odor threshold:** Not determined.
  - **pH-value:** Not determined.
  - **Change in condition**
    - **Melting point/Melting range:** Undetermined.
    - **Boiling point/Boiling range:** 131 °C (267.8 °F)
  - **Flash point:** 43 °C (109.4 °F)
  - **Flammability (solid, gaseous):** Not applicable.
  - **Ignition temperature:** 340 °C (644 °F)
  - **Decomposition temperature:** Not determined.
  - **Auto igniting:** Product is not selfigniting.
  - **Danger of explosion:** Product is not explosive. However, formation of explosive air/vapor mixtures are possible.
  - **Explosion limits:**
    - **Lower:** 1.2 Vol %
    - **Upper:** ~8 Vol %
  - **Vapor pressure at 20 °C (68 °F):** 2.7 hPa (2 mm Hg)
  - **Density at 20 °C (68 °F):** 0.83 g/cm³ (6.92635 lbs/gal)
  - **Relative density**
  - **Vapor density**
  - **Evaporation rate**
  - **Solubility in / Miscibility with Water:** Fully miscible.
  - **Partition coefficient (n-octanol/water):** Not determined.
  - **Viscosity:**
    - **Dynamic:** Not determined.
Trade name: Grain Fusel Oil natural

Kinematic: Not determined.

- Solvent content:
  - Organic solvents: 89.0 %
  - Water: 8.0 %
  - VOC content: 89.00 %
  - Other information: No further relevant information available.

10 Stability and reactivity

- Reactivity: No further relevant information available.
- Chemical stability
- Thermal decomposition / conditions to be avoided:
  No decomposition if used according to specifications.
- Possibility of hazardous reactions: No dangerous reactions known.
- Conditions to avoid: No further relevant information available.
- Incompatible materials: No further relevant information available.
- Hazardous decomposition products: No dangerous decomposition products known.

11 Toxicological information

- Information on toxicological effects
- Acute toxicity:
- LD/LC50 values that are relevant for classification:

  ATE (Acute Toxicity Estimate)

<table>
<thead>
<tr>
<th>Route</th>
<th>LD50</th>
<th>LD50 (rat)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral</td>
<td>8.734</td>
<td>mg/kg</td>
</tr>
<tr>
<td>Dermal</td>
<td>3.967</td>
<td>mg/kg (rabbit)</td>
</tr>
<tr>
<td>Inhalative</td>
<td>14.7</td>
<td>mg/l</td>
</tr>
</tbody>
</table>

  Isoamyl alcohol

<table>
<thead>
<tr>
<th>Route</th>
<th>LC50</th>
<th>LC50 (rabbit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermal</td>
<td>3.212</td>
<td>mg/kg</td>
</tr>
<tr>
<td>Inhalative</td>
<td>11</td>
<td>mg/l (ATE)</td>
</tr>
</tbody>
</table>

- Primary irritant effect:
  - on the skin: No irritant effect.
  - on the eye: Strong irritant with the danger of severe eye injury.
  - Sensitization: No sensitizing effects known.

  Additional toxicological information:
  The product shows the following dangers according to internally approved calculation methods for preparations:
  Harmful
  Irritant

(Continued on page 9)
12 Ecological information

- Toxicity
  - Aquatic toxicity: No further relevant information available.
  - Persistence and degradability: No further relevant information available.
  - Behavior in environmental systems:
    - Bioaccumulative potential: No further relevant information available.
    - Mobility in soil: No further relevant information available.
  - Additional ecological information:
    - General notes:
      - Water hazard class 1 (Self-assessment): slightly hazardous for water
      - Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
      - Must not reach bodies of water or drainage ditch undiluted or unneutralized.
- Results of PBT and vPvB assessment
  - PBT: Not applicable.
  - vPvB: Not applicable.
- Other adverse effects: No further relevant information available.

13 Disposal considerations

- Waste treatment methods
  - Recommendation: Must not be disposed of together with household garbage. Do not allow product to reach sewage system.
- Uncleaned packagings:
  - Recommendation: Disposal must be made according to official regulations.
  - Recommended cleansing agent: Water, if necessary with cleansing agents.

14 Transport information

- UN-Number
- DOT, ADR, IMDG, IATA: UN1201
<table>
<thead>
<tr>
<th><strong>Trade name: Grain Fusel Oil natural</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UN proper shipping name</strong></td>
</tr>
<tr>
<td>· DOT</td>
</tr>
<tr>
<td>· ADR</td>
</tr>
<tr>
<td>· IMDG, IATA</td>
</tr>
<tr>
<td><strong>Transport hazard class(es)</strong></td>
</tr>
<tr>
<td>· DOT</td>
</tr>
<tr>
<td><strong>Class</strong></td>
</tr>
<tr>
<td>· ADR, IMDG, IATA</td>
</tr>
<tr>
<td><strong>Class</strong></td>
</tr>
<tr>
<td><strong>Packing group</strong></td>
</tr>
<tr>
<td>· DOT, ADR, IMDG, IATA</td>
</tr>
<tr>
<td><strong>Environmental hazards:</strong></td>
</tr>
<tr>
<td>· Marine pollutant:</td>
</tr>
<tr>
<td><strong>Special precautions for user</strong></td>
</tr>
<tr>
<td>· Warning: Flammable liquids</td>
</tr>
<tr>
<td><strong>Stowage Category</strong></td>
</tr>
<tr>
<td>· A</td>
</tr>
<tr>
<td><strong>Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code</strong></td>
</tr>
<tr>
<td>· Not applicable.</td>
</tr>
<tr>
<td><strong>Transport/Additional information:</strong></td>
</tr>
<tr>
<td>· DOT</td>
</tr>
<tr>
<td><strong>Quantity limitations</strong></td>
</tr>
<tr>
<td>· On passenger aircraft/rail: 60 L</td>
</tr>
<tr>
<td>· On cargo aircraft only: 220 L</td>
</tr>
<tr>
<td>· ADR</td>
</tr>
<tr>
<td><strong>Excepted quantities (EQ)</strong></td>
</tr>
<tr>
<td>· Code: E1</td>
</tr>
<tr>
<td>· Maximum net quantity per inner packaging: 30 ml</td>
</tr>
<tr>
<td>· Maximum net quantity per outer packaging: 1000 ml</td>
</tr>
<tr>
<td>· IMDG</td>
</tr>
<tr>
<td><strong>Limited quantities (LQ)</strong></td>
</tr>
<tr>
<td>· 5L</td>
</tr>
<tr>
<td>· Code: E1</td>
</tr>
<tr>
<td>· Maximum net quantity per inner packaging: 30 ml</td>
</tr>
<tr>
<td>· Maximum net quantity per outer packaging: 1000 ml</td>
</tr>
</tbody>
</table>
15 Regulatory information

· Safety, health and environmental regulations/legislation specific for the substance or mixture
  · Section 355 (extremely hazardous substances):
    None of the ingredients is listed.
  · Section 313 (Specific toxic chemical listings):
    None of the ingredients is listed.
  · TSCA (Toxic Substances Control Act):
    All ingredients are listed.
  · Proposition 65
    · Chemicals known to cause cancer:
      None of the ingredients is listed.
    · Chemicals known to cause reproductive toxicity for females:
      None of the ingredients is listed.
    · Chemicals known to cause reproductive toxicity for males:
      None of the ingredients is listed.
    · Chemicals known to cause developmental toxicity:
      ethyl alcohol
  · Carcinogenic categories
    · EPA (Environmental Protection Agency)
      None of the ingredients is listed.
    · TLV (Threshold Limit Value established by ACGIH)
      ethyl alcohol A3
      1-propanol A4
  · NIOSH-Ca (National Institute for Occupational Safety and Health)
    None of the ingredients is listed.
  · GHS label elements
    Pictograms on label shall be in the shape of a square set at a point and shall include a black hazard symbol on a white background with a red frame sufficiently wide to be clearly visible. The product is classified and labeled according to the Globally Harmonized System (GHS).
  · Hazard pictograms
    GHS02  GHS05  GHS07
Safety Data Sheet
acc. to OSHA HCS

Trade name: Grain Fusel Oil natural

· Signal word Danger

· Hazard-determining components of labeling:
  - Isoamyl alcohol
  - Isobutanol
  - 2-Methyl-1-Butanol
  - 1-propanol

· Hazard statements
  - H226 Flammable liquid and vapor.
  - H332 Harmful if inhaled.
  - H315 Causes skin irritation.
  - H318 Causes serious eye damage.
  - H335 May cause respiratory irritation.

· Precautionary statements
  - P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
  - P303+P361+P353 If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
  - P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
  - P310 Immediately call a poison center/doctor.
  - P321 Specific treatment (see on this label).
  - P362+P364 Take off contaminated clothing and wash it before reuse.
  - P405 Store locked up.
  - P501 Dispose of contents/container in accordance with local/regional/national/international regulations.

· Chemical safety assessment: A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· Relevant phrases
  - H225 Highly flammable liquid and vapor.
  - H226 Flammable liquid and vapor.
  - H302 Harmful if swallowed.
  - H315 Causes skin irritation.
  - H318 Causes serious eye damage.
  - H319 Causes serious eye irritation.
  - H332 Harmful if inhaled.
  - H335 May cause respiratory irritation.
  - H336 May cause drowsiness or dizziness.

· Department issuing SDS: Product Safety Department

· Contact:
  - Product Safety Department
  - productsafety@adv-bio.com

· Date of preparation / last revision 08/25/2018 / -
· Abbreviations and acronyms:
  ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
  IMDG: International Maritime Code for Dangerous Goods
  DOT: US Department of Transportation
  IATA: International Air Transport Association
  ACGIH: American Conference of Governmental Industrial Hygienists
  EINECS: European Inventory of Existing Commercial Chemical Substances
  ELINCS: European List of Notified Chemical Substances
  CAS: Chemical Abstracts Service (division of the American Chemical Society)
  NFPA: National Fire Protection Association (USA)
  HMIS: Hazardous Materials Identification System (USA)
  VOC: Volatile Organic Compounds (USA, EU)
  LC50: Lethal concentration, 50 percent
  LD50: Lethal dose, 50 percent
  PBT: Persistent, Bioaccumulative and Toxic
  vPvB: very Persistent and very Bioaccumulative
  NIOSH: National Institute for Occupational Safety
  OSHA: Occupational Safety & Health
  TLV: Threshold Limit Value
  PEL: Permissible Exposure Limit
  REL: Recommended Exposure Limit
  Flam. Liq. 2: Flammable liquids – Category 2
  Flam. Liq. 3: Flammable liquids – Category 3
  Acute Tox. 4: Acute toxicity – Category 4
  Skin Irrit. 2: Skin corrosion/irritation – Category 2
  Eye Dam. 1: Serious eye damage/eye irritation – Category 1
  Eye Irrit. 2A: Serious eye damage/eye irritation – Category 2A
  STOT SE 3: Specific target organ toxicity (single exposure) – Category 3