Safety Data Sheet
Dewatered Kraft Lignin

Section 1. Identification

Product: Dewatered Kraft Lignin
Trade Name: BioChoice Lignin
Other Means of identification: Not available
Product Type: Solid
Supplier Manufacturer: Domtar
395 de Maisonnauve Blvd. West
Montreal, QC
H3A 1L6 Canada
Manufacturing Location: Plymouth, NC
Tel (252) 793-8111
Emergency Telephone: CHEMTREC USA: 1-800-424-9300
International: 1-703-527-3887 (24/7)
CANUTEC 1-613-996-6666 *666 (cellular) (24/7)
DOMTAR 514-848-5888 Mon-Fri, 8am-5pm Eastern Time

Recommended Use: Includes, but not limited to, research and development, and manufactured products

Section 2. Hazards Identification

Classification of the Substance or Mixture: Skin Corrosion/ Irritation – Category 3 (Mild Irritation)
Other Hazards which do Not result in classification: May pose a combustible dust hazard if dried and suspended in air in proximity to ignition source
**Section 3. Composition / Information on Ingredients**

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kraft Lignin</td>
<td>8068-05-01</td>
<td>60-100%</td>
</tr>
<tr>
<td>Sulfur</td>
<td>7704-34-9</td>
<td>0-3%</td>
</tr>
</tbody>
</table>

Synonyms: Kraft lignin powder, lignin, BioChoice lignin.

**Section 4. First Aid Measures**

**Eye Contact:** May cause irritation and redness. Immediately flush with running water. Treat powder in eyes as a foreign object.

**Skin Contact:** May cause mild skin irritation in some people. May cause an allergic reaction in some people. Wash contaminated skin with water. Seek medical attention if condition persists.

**Inhalation:** Avoid inhalation of dust. May cause obstruction in the nasal passages resulting in dryness of nose, dry cough, sneezing and/or headaches. Move to fresh air. Seek medical help if condition persists, or if severe coughing or breathing difficulties occur.

**Ingestion:** If irritation occurs rinse mouth out with water. Seek medical attention if condition persists.

**Section 5. Fire Fighting Measures**

**Suitable Extinguishing Media:** Water and Dry Chemical

**Unsuitable Extinguishing Media:** None known.

**Special Firefighting Procedures:** Avoid dispersing dust. Use water to wet dust to reduce likelihood of ignition. Remove burned or wet dust to open area after fire is extinguished.

**Specific Hazards:** Risk of dust explosion in dust-raising operations. Decomposition products may include sulfur oxides and/or carbon oxides.

**Caution:** Kraft lignin dust may be explosive under certain conditions. Caution should be taken in the processing, shipping, handling and use of kraft lignin. Dry powder or residues should not be allowed to accumulate and dust should be kept away from ignition sources. Risk is reduced if the material is kept moist.
Section 6. Accidental Release Measures

Sweep or vacuum spills for recovery or disposal. Provide adequate ventilation. Avoid creating dusty conditions and sources of ignition as lignin dust may pose a combustible dust hazard.

Section 7. Handling and Storage

Avoid eye contact, prolonged contact with skin, and prolonged breathing of dust. Eating, drinking and smoking should be prohibited in areas where material is handled. Workers should wash hands and face before eating, drinking, smoking or using the lavatory after handling. Avoid accumulation of dust. Use NIOSH-approved filtering face piece (dust mask) and goggles when ventilation is not possible.

Keep away from direct heat and ignition sources. Dried lignin dust may pose a combustible dust hazard.

Section 8. Exposure Controls / Personal Safety

**Personal Protective Equipment**

- **Respiratory:** Use NIOSH approved filtering face piece (dust mask) if ventilation is not possible.
- **Eye Protection:** Tight fitting chemical goggles are recommended.
- **Protective Gloves:** Nitrile or other protective chemical gloves are recommended.
- **Other Protective Clothing or Equipment:** If extremely dusty use chemical protective clothing.

- **Ventilation:** Adequate exhaust or natural ventilation should be provided to keep airborne concentrations of lignin dust to an acceptable level. Dust control ventilation should be used where potential explosive concentrations and ignition sources are present. The design and operation of ventilation systems should address the possibility of explosive concentrations within the system. Ventilation systems should utilize explosion relief vents or suppression systems if conditions justify their use.

Section 9. Physical and Chemical Properties

- **Appearance:** Brown fine powder
Odor: Vanilla, weak
Odor Threshold: Not available
pH: 2 to 7
Melting Point: Not available
Freezing Point: Not available
Initial Boiling Point: Not available
Boiling Range: Not available
Flash Point: Closed cup. Not ignitable.
Evaporation Rate: Not available
Flammability: Not available
Upper/Lower Flammability or Explosive Limits: Not available
Vapor Pressure: Not available
Vapor Density: Not available
Relative Density: Bulk density at 60% dry solids content is 348 kg/m$^3$
Solubility: Not soluble under acidic and neutral conditions. Soluble under alkaline conditions. Soluble in DMSO. Partly soluble in acetone and methanol.
Partition Coefficient: Not available

Auto-ignition Temperature:

**Explosive Severity- 20L Sphere**
- Maximum Explosion Pressure (bar) 7.6
- Maximum rate of Pressure Rise (bar/s) 684
- Kst Value (bar.m/s) 186
a. Minimum Ignition Energy- Dust Cloud (mJ) 500-1000
b. Minimum Ignition Temperature- Dust Cloud (C) 470-480
a. Limiting Oxygen Concentration (% by volume) ***
b. Minimum Explosible Concentration (g/m$^3$) 70-80
*** Indicates test was not performed on the sample

Decomposition Temperature: Not available
Viscosity: Not available

**Section 10. Stability and Reactivity**

Reactivity: No specific test data related to reactivity available for this product or its ingredients.

Chemical Stability: The product is stable.

Possibility of Hazardous Reactions: Under normal conditions of storage and use, hazardous reactions will not occur.
Conditions to Avoid: Dust raising conditions, static electricity conditions.

Incompatible Materials: Reactive or incompatible with the following materials: oxidizing materials, reducing materials, drying oils and organic materials.

Hazardous Decomposition Products: Thermal decomposition of Kraft Lignin produces irritating and toxic fumes and gases including acrid smoke, carbon oxides (CO, CO₂), nitrogen oxides (NO, NO₂, etc.), sulfur oxides (SO₂, SO₃, etc.), aldehydes and organic acids. Natural decomposition of organic materials such as wood may produce toxic gases and an oxygen deficient atmosphere in enclosed or poorly ventilated areas.

Section 11. Toxicological Information

Information on Toxicological Effects

Acute Toxicity: No data available
Irritation/Corrosion
  Skin: No data available
  Eyes: No data available
  Respiratory: No data available

Sensitization
  Skin: Skin sensitization may occur
  Respiratory: No data available
Mutagenicity: No data available
Carcinogenicity: No data available
Reproductive Toxicity: No data available
Teratogenicity: No data available

Specific Target Organ toxicity
  Single Exposure: No data available
  Repeated Exposure: No data available
Aspiration Hazard: No data available

Routes of Exposure: Dermal, Oral, Inhalation, Eye

Symptoms related to the physical, chemical and toxicological characteristics
  Eye Contact: Pain or irritation, watering, redness.
  Inhalation: No known significant or critical hazards.
  Skin Contact: Irritation, redness.
  Ingestion: No known significant or critical hazards.

Delayed and immediate effects and chronic effects from short and long term exposure
Short Term Exposure: Potential Effects
Immediate: No known significant or critical hazards.
Delayed: No known significant or critical hazards.

Long Term Exposure: Potential Effects
Immediate: No known significant or critical hazards.
Delayed: No known significant or critical hazards.

Potential Chronic Health Effects
General: Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.
Carcinogenicity: No known significant or critical hazards.
Mutagenicity: No known significant or critical hazards.
Teratogenicity: No known significant or critical hazards.
Developmental Effects: No known significant or critical hazards.
Fertility Effects: No known significant or critical hazards.

Numerical Measures of Toxicity
Acute Toxicity Estimates: No data available.

Section 12. Ecological Information

Toxicity

<table>
<thead>
<tr>
<th>Product/Ingredient Name</th>
<th>Result</th>
<th>Species</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur</td>
<td>Acute EC &gt; 5000 ppm</td>
<td>Daphnia- Daphnia magna- &lt;24 hrs</td>
<td>48 hours</td>
</tr>
<tr>
<td></td>
<td>Fresh Water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acute LC50 &gt;180 ppm</td>
<td>Fish- Lepomis macrochirus- Juvenile (Fledgling, Hatchling, Weanling)</td>
<td>96 hours</td>
</tr>
<tr>
<td></td>
<td>Fresh Water</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Persistence and Degradability

<table>
<thead>
<tr>
<th>Product/Ingredient Name</th>
<th>Test</th>
<th>Result</th>
<th>Dose</th>
<th>Inoculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dewatered Lignin</td>
<td>BOD</td>
<td>11,600 mg/l</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>COD</td>
<td>19,600 mg/l</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Bioaccumulative Potential: No data available.
Mobility in Soil
Soil/water partition coefficient (Koc): No data available.
Other Adverse Effects: No data available

Section 13. Disposal Considerations

Disposal Methods: Significant quantities of waste product residues should not be disposed of in process sewers or wastewater treatment facilities. Dispose of surplus and non-recyclable products in approved landfills or via a licensed waste disposal contractor. Unused product is not a RCRA hazardous waste. Disposal of this product, solutions and any by-products should comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Note that lignin dust may pose a combustible dust hazard.

Section 14. Transport Information

Not regulated as a hazardous material by the US DOT, IMDG or IATA. No environmental hazards. No special precautions for user.

Section 15. Regulatory Information

No known specific national and/or regional regulations applicable to this product (including its ingredients).

US Federal Regulations:

TSCA 8(a) IUR Exempt/Partial Exemption: Not determined

United States Inventory (TSCA 8b): All components listed or exempted.

SARA 302/304 emergency planning and notification: No products found.
SARA 302/304/311/312 hazardous chemicals: Sulfur
SARA 311/312 MSDS distribution- chemical inventory- Hazardous identification:
   Sulfur: Fire hazard, immediate (acute) health hazard, delayed (chronic) health hazard.
Not listed in any of the following:
- Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)
- Clean Air Act Section 602 Class I Substances
- Clean Air Act Section 602 Class II Substances
- DEA List I Chemicals (Precursor Chemicals)
- DEA List II Chemicals (Essential Chemicals)

State Regulations:
- Massachusetts: The following components are listed: Sulfur.
- New York: None of the components are listed.
- New Jersey: The following components are listed: Sulfur
- Pennsylvania: The following components are listed: Sulfur
- California Prop 65: No products were found.

Section 16. Other Information

HMIS Rating (Scale 0-4):
- Health: 2
- Fire: 2
- Physical hazards: 1

NFPA Rating (Scale 0-4):
- Health: 1
- Fire: 2
- Reactivity: 0

History
- Date of issue (mm/dd/yyyy): 06/10/2015
- Date of previous issue: 09/15/2012
- Version: 2.0

Notice to the reader:
To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.