GHS SAFETY DATA SHEET

AMERICAN CRYSTAL SUGAR COMPANY

Prepared to U.S. OSHA Standards in compliance with the GHS system (29 CFR 1910.1200(g), rev. 2012

Section 1	**Identification**	**Liquid Total Invert Sugar (92%)** Manufacturer's Name **American Crystal Sugar Co.** **101 North 3rd Street** **Moorhead, MN 56560** Emergency Telephone Number: **(218) 236-4400** Telephone Number for Information **(218) 236-4324**	food additive, beverage sweetener, flavor enhancer, baking ingredient, intended for human consumption No restrictions on use Preparation Date: 20 Nov 2014 Revised: 05 Dec 2014
Section 2	**Hazard(s) Identification**	**No Hazardous Components** Liquid sugar is non-hazardous under normal conditions. **Very rarely, hot sugar products and their syrups have been known to exhibit "runaway behavior"; explosions have been known to occur under a combination of specific conditions. (Please see: *§VII – Handling and Storage, "Conditions to Avoid."***	**Liquid Sugar that has dried** supports combustion only poorly and is not by itself a hazard unless it is involved as a **secondary fuel** in an existing fire. **However, the relative explosion hazard of the fugitive dust generated by the transportation and handling of dried sugar is severe.**
Section 3	**Composition / Information on Ingredients**	**Sugar (Sucrose, $C_{12}H_{22}O_{11}$), CAS 57-50-1**	**5.0 – 5.9 %**
		Glucose (Dextrose, $C_6H_{12}O_6$), CAS 50-99-7	**32.9 – 34.2 %**
		Fructose (Levulose, $C_6H_{12}O_6$), CAS 57-48-7	**32.9 – 34.2 %**
		Water (H_2O), CAS 7732-18-5	**26.5 – 28.5%**
		[1] Material is **71.5 – 73.5 % solids**; percentage data based upon calculations of data from Pennnington, N. and Baker, C. (1990): ***Sugar: A User's Guide to Sucrose***. Van Nostrand Rheinhold, New York, p 90.	

Section 4	**First Aid Measures**	**INHALED dust:** not expected to require first aid, but inhalation of high concentrations of the dust may cause coughing and upper respiratory tract irritation; asthmatics may be particularly susceptible. Remove to fresh air. Get medical attention for any breathing difficulty; asthmatics may need to use personal rescue inhaler. Because sugars are prime feedstock for molds and yeasts, it is conceivable spore-formers could grow under conditions required for their growth. In the event of exposure to these spores, susceptible individuals may require specialized medical attention.	**EYES**: Mechanical irritation of eyes: immediately flush with running water, holding eyelids open. Get medical help if symptoms persist. **SKIN**: Redness and/or blistering of skin. If hot material gets on skin, flush affected area with cool water; seek medical attention in case of thermal burns.
Section 5 ***Section 5***	**Fire-Fighting Measures**	**Use water or other approved media. If material has solidified, avoid creating airborne dust with high pressure water streams; use fine spray to saturate spill.** **Thermal decomposition or burning will produce carbon dioxide, carbon monoxide.** **Normal fire dept SOP for precautions and PPE.**	Sugar **dust** is **explosive**, similar to flour and grain products. Though sugar itself supports combustion poorly, the **relative explosion hazard of the dust is severe**. As with any finely divided organic (carbon-based) solid, dust **may be explosive if mixed with air in critical proportions and in the presence of an ignition source possibly resulting in chain reaction-style, serial explosions.**
Section 6	**Accidental Release Measures**	Since material is non-toxic and biodegradable, it may be washed down with water. Clean-up personnel should wear proper protective equipment: goggles or face shield, thermal insulating gloves and non-slip boots. Material may be hot and is slippery. Spilled material may be pumped into a closed tank for recovery or disposal. Whatever cannot be saved for recovery may be discarded as permitted by applicable regulations.	In case material has solidified and may become dusty: • **remove ignition sources** • **use non-sparking tools** • **ventilate area of spill** • **avoid dispersing dust into the air.**

Section 7	**Handling and Storage**	**Conditions to Avoid:** Very rarely, hot sugar products and their syrups have been known to exhibit **"runaway behavior"** under the *combined conditions* of (1) presence of amino acids; (2) enclosed space including piping where pressure can build up; (3) temperatures above 110 °C; (4) extended periods of time (generally less than 5 hours); (5) lowered pH; (6) increased viscosity; (7) lack of adequate thermal transfer. Though extremely rare, explosions have been known to occur under these *combined conditions*. See Platje, T. et al. (2006): "Study of the 'Runaway Behavior' of Technical Sucrose Solutions." *Zuckerindustrie* 131, 231 – 238. Therefore, ***Avoid using steam to loosen material in plugged piping under those conditions listed above without proper pressure relief devices.***	**Maintain material in original liquid state and do not allow liquid to evaporate in order to prevent solidification formation and collection of fugitive dust. Avoid conditions and handling techniques which might create dust. Avoid dispersing dust into the air; remove ignition sources**
Section 8	**Exposure Controls / Personal Protection**	None normally required. Inhalation of high concentrations of the dust may cause coughing and upper respiratory tract irritation. In dusty situation, a NIOSH-approved respirator for dust may be worn. **Pre-existing respiratory conditions: use a NIOSH-approved respirator.** **PEL (OSHA) =** 5 mg/m3 (Respirable fraction) (Table Z-3 in 29 CFR 1910.1000) **Dilution ventilation is a satisfactory control if there is dust.**	In cases of water being used to flush spilled material, floors and steps may become sticky. Use proper footwear when negotiating floors and steps. Wearing of contact lenses when handling product should be avoided. In case of hot material, wear goggles, and thermal-protective gloves and boots.

<table>
<tr><td rowspan="8">Section 9</td><td rowspan="8">Physical and Chemical Properties</td><td>Melting Point</td><td>N/A</td><td>Flash Point</td><td>N/A</td></tr>
<tr><td>Boiling Point</td><td>N/A</td><td>Flammable Limits</td><td>N/A</td></tr>
<tr><td>Specific Gravity (H2O = 1)</td><td>1.348 – 1.385</td><td>LEL</td><td>dust 20 g/m^3</td></tr>
<tr><td>Evaporation Rate (Butyl Acetate = 1)</td><td>N/A</td><td>UEL</td><td>dust 15 kg/m^3</td></tr>
<tr><td>Vapor Pressure (mm Hg)</td><td>N/A</td><td colspan="2" rowspan="3">Appearance and Odor:
A clear, colorless to amber-colored liquid with little or no odor.</td></tr>
<tr><td>Vapor Density (AIR = 1)</td><td>N/A</td></tr>
<tr><td>Solubility in Water:</td><td>infinitely soluble</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Section 10</td><td>Stability and Reactivity</td><td colspan="2">Stable under ordinary conditions of use and storage. Hazardous polymerization will NOT occur.

Avoid temperatures above 160F; heat, flames, ignition sources, and incompatibles.</td><td colspan="2">Avoid strong oxidizers (e.g. nitric acid or sulfuric acid).

Thermal decomposition or burning will produce carbon dioxide, carbon monoxide.</td></tr>
<tr><td>Section 11</td><td>Toxicological Information</td><td colspan="2">Non-toxic</td><td colspan="2">Product contains no ingredients currently classified as carcinogenic by NTP, IARC, or OSHA.</td></tr>
<tr><td>Section 12</td><td>Ecological Information (non-manditory)</td><td colspan="2">Non-toxic and biodegradable.</td><td colspan="2"></td></tr>
<tr><td>Section 13</td><td>Disposal Considerations (non-manditory)</td><td colspan="2">Whatever cannot be saved for recovery may be discarded as permitted by applicable regulations.</td><td colspan="2"></td></tr>
<tr><td>Section 14</td><td>Transport Information (non-manditory)</td><td colspan="2">Not applicable</td><td colspan="2"></td></tr>
<tr><td>Section 15</td><td>Regulatory Information (non-manditory)</td><td colspan="2">Not ordinarily regulated. (Note some countries do have import quotas which restrict total amount of sugar entering their borders.)</td><td colspan="2"></td></tr>
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Section 16	**Other Information**	**Note: sugar dust is explosive, similar to flour and grain products (however, this is an issue ONLY if large amounts of material are allowed to dry).**

Ignition temperature of dust cloud	**350°C (662°F)**
Minimum igniting energy	**< 10mJ**
Minimum explosion concentration	**0.035 oz / cu ft**
Maximum explosion pressure	**9 bar**
Maximum rate of pressure rise	**5,000 psi / sec**
Minimum exposable concentration in air:	**0.045 g/L**

Avoid using steam to loosen material in plugged piping under those conditions listed in §VII without proper pressure relief devices due to possible exothermic "runaway behavior" referenced earlier in this document: §VII – Handling and Storage, "Conditions to Avoid."