

## SAFETY DATA SHEET

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1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER	
1.1. GHS product identifier.	Choline Chloride
Other means of identification.	<u>Dry Products</u> 60% Choline Chloride Dry (F3070030) 60% Choline Chloride with carrier (F3070530) 70% Choline Chloride Dry (F3080030) 70% Choline Chloride with carrier (F3080530) PetShure Choline, 70% Choline Chloride, (F3080930)  <u>Aqueous Products</u> 75% Choline Chloride Aqueous (F3090030) 70% Choline Chloride Aqueous (F3060030) 62% Choline Chloride Aqueous (F3060062) 50% Choline Chloride Aqueous (F2060050)
1.2. Recommended use and restrictions on use.	Nutritional additive for feed.
1.3. Supplier's details.	Name: Balchem Corporation Address: 52 Sunrise Park Road New Hampton, NY 10958 USA  Phone number: +1 845-326-5613 Fax number: +1 845-326-5800 Internet: <a href="http://www.balchem.com">www.balchem.com</a> Email: <a href="mailto:sds@balchem.com">sds@balchem.com</a>
1.4. Emergency phone number.	CHEMTREC: 800-424-9300 (USA) +1 703-527-3887 (International)

2. HAZARDS IDENTIFICATION	
2.1. GHS classification of the substance or mixture and any national or regional information.	None. Material is not hazardous.
2.2. GHS label elements, including precautionary statements.	None. Material is not hazardous.
2.3. Other hazards which do not result in classification or are not covered by the GHS.	See Section 9: Upper/lower flammability or explosive limits.

3. COMPOSITION/INFORMATION ON INGREDIENTS			
3.1. <b>Substance:</b>			
Chemical identity.	See section 3.2.		
Common name, synonyms, etc.	See section 3.2.		
CAS number, EC number, etc.	See section 3.2.		
Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance.	See section 3.2.		
3.2. <b>Mixture:</b>			
The chemical identity and concentration or concentration ranges of all ingredients which are hazardous within the meaning of the GHS and are present above their cutoff levels.	<b>Chemical Identity:</b>	<b>Concentration:</b>	<b>CAS No.:</b>
	<b>Dry Products</b>		
	Choline Chloride (C <sub>5</sub> H <sub>14</sub> ClNO)	60-70%	67-48-1
	Carrier	30-40%	Not applicable
	Water (H <sub>2</sub> O)	<0.5%	7732-18-5
	<b>Aqueous Products</b>		
	Choline Chloride (C <sub>5</sub> H <sub>14</sub> ClNO)	45-75%	67-48-1
Water (H <sub>2</sub> O)	25-65%	7732-18-5	

4. FIRST AID MEASURES	
4.1. Description of first aid measures.	<b>Inhalation:</b> For significant exposure to any nuisance particles (dust or mist), remove to fresh air and, if there is difficulty breathing, get medical attention. Breathing dust from any source may cause respiratory irritation.

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	<p>Breathing large amounts of dust from any source may cause injury.</p> <p><b>Skin contact:</b> No first aid is required. As a precaution, wash with soap and water, and wash contaminated clothing before reuse.</p> <p><b>Eye contact:</b> To prevent mechanical irritation, flush with clean, low-pressure water.</p> <p><b>Ingestion:</b> No first aid required for ingesting small amounts.</p>
4.2. Most important symptoms/effects.	<p><b>Acute:</b> None.</p> <p><b>Delayed:</b> None.</p>
4.3. Indication of immediate medical attention and special treatment needed, if necessary.	There are no adverse effects from exposure to this product.

### 5. FIREFIGHTING MEASURES

5.1. Suitable (and unsuitable) extinguishing media.	Water, Foam, CO <sub>2</sub> , Dry Chemical.
5.2. Specific hazards arising from the chemical.	<p>No specific hazardous combustion products - combustion will produce compounds of carbon, hydrogen, nitrogen, chlorine and oxygen.</p> <p>Possible dust explosion. The particle size as produced and the deliquescent (will absorb moisture from air to form a liquid) nature of the product is expected to limit the potential for dust explosion.</p> <p>Aqueous products support combustion only after evaporation of the water content.</p>
5.3. Special protective equipment and precautions for firefighters.	<p>Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source, is a potential dust explosion hazard. This material may present an explosion and deflagration hazard risk when dispersed and ignited in air. Secondary explosions may also pose a risk once an initial explosion occurs with the presence of a combustible dust or powder in the area.</p>

### 6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures.	<p><b>For non-emergency personnel:</b> No specific protective equipment is required. Dust should not be allowed to accumulate on surfaces, as these may form an explosive mixture if they are released into the atmosphere in sufficient concentration. Avoid dispersal of dust in the air (e.g., avoid clearing dust surfaces with compressed air).</p> <p><b>For emergency responders:</b> No specific protective equipment is required.</p> <p>Also see Section 8: Exposure Controls / Personal Protection.</p>
6.2. Environmental precautions.	None.
6.3. Methods and materials for containment and cleaning up.	<p>Use absorbent for liquid; vacuum or sweep material and place in a disposal container.</p> <p>Also see Section 13: Disposal Considerations</p>

### 7. HANDLING AND STORAGE

7.1. Precautions for safe handling.	Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Avoid breathing dust.
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<p>7.2. Conditions for safe storage, including any incompatibilities.</p>	<p>Choline chloride is deliquescent (will absorb moisture from air to form a liquid). Ensure containers are properly secured before moving. Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Dry powders can build static electricity charges when subjected to the friction of transfer and mixing operations. Provide adequate precaution, such as electrical grounding and bonding, or inert atmospheres.</p> <p>Warning: There have been past incidents when aqueous choline chloride was inadvertently unloaded into a 'chlorine' (hypochlorite) tank. Addition of organics, such as choline chloride, to oxidizers, such as sodium hypochlorite or calcium hypochlorite (also referred to as bleach), may result in the evolution of heat, pressure, and toxic gasses such as chlorine. Refer to the bleach supplier's SDS for hazard information. Should aqueous choline chloride be inadvertently unloaded into a bleach tank, <b>in general</b>, and <b>if safe to do so</b>, addition of water to the tank should provide dilution and cooling to help mitigate the situation. Note that in some circumstances, addition of water could accelerate reactions due to viscosity reduction and/or mixing effects. <b><u>Personnel on the scene must evaluate each situation and decide on the best course of action.</u></b></p>
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<b>8. EXPOSURE CONTROLS/PERSONAL PROTECTION</b>	
8.1. Control parameters.	OSHA Nuisance Dust PELs (29 CFR 1910.1000): Respirable fraction = 5 mg/m <sup>3</sup> ; Total = 15 mg/m <sup>3</sup>
8.2. Appropriate engineering controls.	Provide ventilation and particulate control to maintain airborne levels below the exposure guidelines. It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in handling of this product contain explosion relief vents or an explosion suppression system or an oxygen-deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Use only appropriately classified electrical equipment and powered industrial trucks.
8.3. Individual protection measures, such as personal protective equipment.	<p><b>Eye protection:</b> If there is a potential for exposure to particles (mist or dust) which would cause mechanical injury to the eye, or splashing, wear chemical goggles.</p> <p><b>Skin protection:</b> No additional precautions.</p> <p><b>Respiratory protection:</b> In typical use, no respiratory protection should be needed. In dusty atmospheres, use an approved dust respirator. In confined or poorly ventilated areas or emergency and other conditions where the exposure guidelines may be greatly exceeded, use an approved positive pressure self-contained breathing apparatus.</p>

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<b>9. PHYSICAL AND CHEMICAL PROPERTIES</b>		
9.1. Information on basic physical and chemical properties.		
Product	Dry	Aqueous
Appearance (physical state, color, etc.).	Pale yellow / tan to light brown, dark brown or off-white granule or powder.	Clear to light amber/pale yellow.
Odor.	Odorless to slight grain odor.	Faint amine odor.
Odor threshold.	Threshold not determined.	Threshold not determined.
pH.	Choline chloride: 4.5-7.5 for a 25% wt/vol solution in water.	5 - 8 at 10 g/L water @ 20°C.
Melting point/freezing point.	Choline chloride: decomposes 247°C (477°F).	-0.4°F (-18°C)
Initial boiling point and boiling range.	Choline chloride: decomposes.	>125°C (>257°F).
Flash point.	Choline chloride: not applicable.	Not applicable.
Evaporation rate.	Not available (assumed to be essentially zero); VOC content assumed to be essentially zero.	Not available.
Flammability (solid, gas).	Not flammable.	Not flammable.
Upper/lower flammability or explosive limits.	<p>Based on minimal samples with vegetable carrier, material as produced is 0-2 wt% of particle size 70 microns or less.</p> <p>While not fully evaluated for dust explosion properties, material is expected to be classified as ST2 for dry particles less than 75 micron diameter.</p> <p>Literature reports choline chloride for particles &lt; 63 micron diameter and 2.3 wt% moisture is classified as ST1 dust explosion and has a lower explosion limit of 125 g/m<sup>3</sup>, overpressure of 3.5 bar, Kst of 4 bar-m/s, a minimum ignition energy (MIE) &gt; 10<sup>6</sup> mJ and an ignition temperature of 430 °C (806 °F).</p> <p>One sample of 70% choline chloride on vegetable carrier at 0.6 wt% moisture and particle size &lt; 70 micron diameter had the following properties: Layer Ignition Test (LIT): No ignition up to 400 °C (752 °F) of 5 mm dust layer, minimum ignition temperature (MIT) of 300 °C (572 °F), MIE = 30 mJ, Charge Relaxation Time &lt;0.01 seconds yielding classification as quick which implies rapid elimination of charge buildup when grounded / earthed, Powder</p>	<p>Material not tested as mist. Water content must first evaporate before dust formation occurs. Choline chloride for particles &gt; 500 micron diameter and 2.3 wt% moisture is classified as ST1 dust explosion and has a lower explosion limit of 125 g/m<sup>3</sup>, overpressure of 3.5 bar, Kst of 4 bar-m/s, a minimum ignition energy &gt; 10<sup>6</sup> mJ and an ignition temperature of 430 °C. For particles &lt; 63 um, choline chloride is classified as ST1 dust explosion.</p>

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	Volume Resistivity = $2.6 \times 10^4$ classified as low implying grounding/earthing is likely effective at preventing charge buildup, Pmax = 6.8 bar, Kst=245 bar-m/s and ST=2 (for dust cloud composed of particle 70 micron or less under high turbulence).	
Vapor pressure.	Not available (assumed to be essentially zero).	Only water vapor is present.
Vapor density.	Not available (assumed to be essentially zero).	Not available.
Relative density.	0.46 (Bulk density 450-650 kg/m <sup>3</sup> ).	1.1
Solubility (ies).	Choline chloride: 370 g/100 mL water @ 50 °F (10 °C).	Completely miscible in water.
Partition coefficient: n-octanol/water.	Not available.	Log P <sub>OW</sub> < 0
Auto ignition temperature.	Not available.	Not available.
Decomposition temperature.	247°C (477°F).	Not available.
Viscosity.	Not available.	26 mPa-s @ 20°C
Oxidizing properties.	Not available.	Not available.

### 10. STABILITY AND REACTIVITY

10.1. Reactivity.	Not considered reactive.
10.2. Chemical stability.	Stable.
10.3. Possibility of hazardous reactions.	No hazardous reactions expected.
10.4. Conditions to avoid (e.g., static discharge, shock or vibration).	Do not heat to boiling or decomposition in sealed container.
10.5. Incompatible materials.	Avoid contact with strong acids and bases, as well as iron, mild and galvanized steel.  Choline chloride can be oxidized/reduced by strong oxidants/reducing agents resulting in volatile, combustible degradation products such as trimethylamine, or release noxious chemicals for example setting free volatile chlorine compounds from hypochlorite solutions.
10.6. Hazardous decomposition products.	Compounds of carbon, hydrogen, nitrogen, chlorine and oxygen.

### 11. TOXICOLOGICAL INFORMATION

11.1. Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact);	Ingestion, skin and eye contact.
11.2. Symptoms related to the physical, chemical and toxicological characteristics;	None expected.
11.3. Delayed and immediate effects and also chronic effects from short- and long-term exposure;	None expected.
11.4. Numerical measures of toxicity (such as acute toxicity estimates).	<b>100% Choline Chloride:</b> LD <sub>50</sub> – 3400 mg/kg oral (rat) LD <sub>50</sub> – 450 mg/kg intraperitoneal (rat) LD <sub>50</sub> – 3900 mg/kg oral (mouse) LD <sub>50</sub> – 320 mg/kg intraperitoneal (mouse) LD <sub>Lo</sub> – 735 mg/kg subcutaneous (mouse) LD <sub>50</sub> – 53 mg/kg intravenous (mouse) LD <sub>Lo</sub> – 5 mg/kg intravenous (dog) LD <sub>Lo</sub> – 25 mg/kg intravenous (cat) LD <sub>Lo</sub> – 500 mg/kg intraperitoneal (rabbit) LD <sub>Lo</sub> – 1 g/kg subcutaneous (rabbit)

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	LD <sub>Lo</sub> – 1100 g/kg intravenous (rabbit) LD <sub>Lo</sub> – 1 g/kg rectal (rabbit) LD <sub>Lo</sub> – 1500 mg/kg (frog) TD <sub>Lo</sub> – 331 mg/kg/14 weeks continuous oral (rat) TD <sub>Lo</sub> – 4950 mg/kg/30 days intermittent intraperitoneal (rat) TD <sub>Lo</sub> – 6250 mg/kg/10 weeks intermittent intraperitoneal (rat) TD <sub>Lo</sub> – 3564 mg/kg/5 weeks intermittent intraperitoneal (rat)
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12. ECOLOGICAL INFORMATION	
12.1. Ecotoxicity (aquatic and terrestrial, where available).	100% Choline Chloride: 10,000 mg/L 24 weeks (mortality) coho salmon, silver salmon.
12.2. Persistence and degradability.	Expected to be readily biodegradable.
12.3. Bioaccumulative potential.	Not bioaccumulative.
12.4. Mobility in soil.	Not determined.
12.5. Results of PBT and vPvB.	Not determined.
12.6. Other adverse effects.	Not determined.

13. DISPOSAL CONSIDERATIONS	
13.1. Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.	<p><b>Product:</b> Not considered a hazardous waste under US Federal Hazardous Waste Regulations (40 CFR 261). Consult local regulations regarding proper disposal as they may be more restrictive or otherwise different from Federal/International regulations.</p> <p><b>Packaging:</b> Dispose of packaging contaminated by product in accordance with regulations.</p>

14. TRANSPORT INFORMATION	
14.1. UN number.	Not hazardous.
14.2. UN proper shipping name.	Not hazardous.
14.3. Transport hazard class (es).	Not hazardous.
Not hazardous.	Not hazardous.
14.4. Marine pollutant (Yes/No).	No.
14.5. Special precautions which a user needs to be aware of or needs to comply with in connection with transport or conveyance either within or outside their premises.	Not hazardous.
14.6. Transportation in bulk according to Annex II of MARPOL 73/78 and the IBC Code.	Not hazardous.

15. REGULATORY INFORMATION		
15.1. Safety, health and environmental regulations specific for the product in question.		
<b>US Federal:</b>	CERCLA:	Reportable Quantity – None (40 CFR 302.4)
	CWA:	Release into a waterway may require reporting to the National Response Center @ 800-424-8802 (40 CFR 116.4).
	FDA/USDA:	Follow Good Manufacturing Practice (GMP). Choline chloride is GRAS per 21 CFR 581.5252. IFN 7-01-228.
	FIFRA:	Not applicable.
	OSHA:	This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
	PSM:	This product is not subject to Process Safety Management (29 CFR 1910.119).
	RCRA:	If discarded in purchased form, this product is a characteristic hazardous waste. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261).
RMP:	Not listed under the Risk Management Plan (40 CFR 68.130).	

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	SARA TITLE III:	Section 302 Extremely Hazardous Substances – None (40 CFR 355 Appendix A) Section 304 Hazardous Substances – None (40 CFR 302.5) Section 311/312 Hazard Categories – None (40 CFR 370.66) Section 313 Toxic Chemicals – None (40 CFR 372.65)
	TSCA:	On TSCA inventory.
<b>US State:</b>	This product is not subject to California Proposition 65. There are no known additional requirements necessary for compliance with state right-to-know regulations.	
<b>Canadian:</b>	DSL:	Listed (published 5 April 1994).
<b>EU:</b>	CLP:	Regulation (EC) No. 1272/2008 Classification, Labeling and Packaging does not apply to non-hazardous materials.
	Reregistration of Feed Additives:	Regulation (EC) 1831/2003) – Feed Registry # not available.
	EINECS:	No. 200-655-4
	REACH:	Regulation (EC) No. 1907/2006 Registration, Evaluation, Authorization and Restriction of Chemicals does not apply to feed.
	Safety Data Sheets:	Regulation (EU) No. 453/2010 does not apply to non-hazardous materials.
<b>Other International Chemical Lists</b>	Australian Inventory of Chemical Substances (AICS):	Listed.
	Korean Existing Chemicals List (ECL):	No. KE-20909
	Japan ENCS:	2-341X; 9-1994X
	German Water Class (WKG):	0 (Internal assessment).

**16. OTHER INFORMATION INCLUDING INFORMATION ON PREPARATION AND REVISION**

<b>Reason for Issue:</b>	New	June 20, 2011	
	A	Reformatted per OSHA GHS. Added info concerning mixing aqueous choline chloride with bleach.	
	B	Added F3070530 60% Choline Chloride dehydrated Added 60% Choline Chloride non GMO (F3070730) Added 68% Choline Chloride Aqueous (F3060062) Changed Section 3.2 Carrier concentrations	
	C	Added 50% Choline Chloride Aqueous (F2060050) Changed Section 3.2 Carrier concentrations	9/30/2015
	D	Added 70% Choline Chloride with carrier (F3080530). Updated product names in Section 1.	10/26/16
	E	Added PetShure Choline, 70% Choline Chloride, (F3080930) Updated product names in Section 1.	11/8/16
	F	Removed 60% Choline Chloride dehydrated, non GMO (F3070730) from section 1.	12/12/16
<b>Risk Phrases Used:</b>	None used.		
<b>Hazard Ratings:</b>	The following NFPA hazard ratings are recommended for this product: Fire – 1; Health – 0; Reactivity – 0; Specific Hazard – None		
For safe handling, refer to NFPA 654, <i>Standard for the prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids.</i>			

**THE FOLLOWING ABBREVIATIONS MAY BE USED IN THIS DOCUMENT:**

ACGIH	American Council of Governmental Industrial Hygienists
AICS	Australian Inventory of Chemical Substances
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CLP	Classification, Labeling and Packaging
CWA	Clean Water Act

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D.O.T.	Department of Transportation
DSL	Domestic Substance List (Canada)
EC <sub>50</sub>	Effective concentration which induces a response halfway between the baseline and maximum.
EC	European Community
ECL	Existing Chemicals List (Korea)
EINECS	European Inventory of Existing Commercial Substances
EU	European Union
FDA	Food and Drug Administration
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
GHS	Globally Harmonized System
IBC	International Bulk Chemical Code
IDLH	Immediately Dangerous to Life and Health
K <sub>St</sub>	Deflagration Index
LC <sub>50</sub>	Lethal concentration for 50% mortality of subject species
LD <sub>50</sub>	Lethal dose for 50% mortality of subject species
LD <sub>Lo</sub>	Lethal dose low; the lowest dose of a substance introduced by any route other than inhalation reported to have caused death in humans or animals.
LEL / LFL	Lower Explosive Limit / Lower Flammable Limit
MARPOL	International Convention for the Prevention of Pollution from Ships
MSHA	Mine Safety Health Administration
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PBT	Persistent Bioaccumulative Toxic
PEL	Permissible Exposure Limit (default 8 hour day, 40 hour week TWA)
PSM	Process Safety Management
RCRA	Resource Conservation and Recovery Act
REACH	Registration, Evaluation, Authorization and Restriction of Chemical Substances
REL	Recommended Exposure Limit (default 10 hour day, 40 hour week TWA)
RMP	Risk Management Plan
SARA	Superfund Amendment and Reauthorization Act
STEL	Short Term Exposure Limit (default 15 minute TWA)
TD <sub>Lo</sub>	Lowest dose to which humans or animals have been exposed and reported to produce a toxic effect other than cancer
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average
UFL	Upper Flammable Limit
USDA	United States Department of Agriculture
vPvB	Very Persistent, Very Bioaccumulative

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.