SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY / UNDERTAKING

Product Name	**2-AB Dye**
Product Catalogue Name	**LT-2AB-01/03/96**
CAS-No.	**88-68-6**
Company:	Ludger Ltd Culham Science Centre Abingdon Oxford OX14 3EB
Telephone:	01865 408554
Emergency Telephone:	01865 408554
Email:	info@ludger.com

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567
Eye irritation (Category 2), H319
For the full text of the H-Statements mentioned in this Section, see Section 16.

2.2 Label elements
Labelling according to Regulation (EC) No 1272/2008 as amended by GB-CLP Regulation, UK SI 2019/720, and UK SI 2020/1567

Signal Word: Warning

Hazard Statement(s)

H319	Causes serious eye irritation.

Precautionary Statement(s)

P264	Wash skin thoroughly after handling.
P280	Wear eye protection/ face protection.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337 + P313	If eye irritation persists: Get medical advice/ attention.

Supplemental Hazard Statements: None

Reduced Labelling (<= 125 ml)

Signal Word	Warning
Hazard statement(s)	None
Precautionary Statement(s)	None
Supplemental Hazard Statements	None

2.3 Other hazard information:
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3. 1 Substances

Synonyms:	2-Aminobenzamide Anthranilic Acid Amide Anthranilamide 2-AB
Formula:	$C_7H_8N_2O$
Molecular Weight:	136.15g/mol

Component		Classification	Concentration
Name	Anthranilamide		< = 100%
CAS-No.	88-68-6	Eye Irrit. 2; 319	
EC-No.	201-851-2		

SECTION 4. FIRST-AID MEASURES

4.1 Description of First Aid Measures

General Advice
Consult a physician if exposure causes ill effects and if in any doubt. Show this safety data sheet to the physician/ first responder in attendance.

If Ingested
Never give anything by mouth to an unconscious person. Rinse mouth well with water.

If the skin is exposed
Wash the area well with soap and water.

If eyes are exposed
Rinse well with plenty of water for 15 minutes.

If inhaled
Move the person into fresh air. If not breathing give artificial respiration.

4.2 Most important symptoms and effects, both acute and delayed
To the best of our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated so cannot be reported.

4.3 Indication of immediate medical attention and special treatment needed
No Data available

SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media
Use a water spray, alcohol-resistant foam, dry chemical or carbon dioxide extinguisher.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, nitrogen oxides (NOx)

5.3 Advice for Firefighters
Firefighters are to wear self-contained breathing apparatus if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Use personal protective equipment. Avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation in work areas. Evacuate personnel to safe areas to avoid breathing dust.

6.2 Environmental Precautions
Do not let the product enter the drains.

6.3 Methods and material for containment and cleaning up
Carefully sweep up the spill without creating any dust. Contain the collected material in a sealed suitable container, to await disposal.

6.4 Reference to other sections
Please refer to section 13 for the disposal of products and spills.

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes. Avoid the formation of dust and aerosols. Provide appropriate exhaust ventilation at places where dust is formed. Normal measures for fire prevention protection.

7.2 Conditions for safe storage, including any incompatibilities
Store in a cool, dark place. Keep the container tightly closed in a dry well-ventilated place.

7.3 Specific end uses
No data available

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters
Contains no substances with occupational exposure limit values.

8.2 Exposure controls

Appropriate engineering controls

Handle following good laboratory and safety practices. Wash hands before entering the laboratory and at the end of the workday/ when finished handling the material.

Personal Protective Equipment

Eye / face protection

Safety glasses. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin protection

Handle wearing gloves. Gloves must be inspected before use. Use proper glove removal technique (without the glove touching the skin) to avoid skin contact with the product. Dispose of contaminated gloves as chemical dry waste following applicable laws and good laboratory practices. Wash and dry your hands. Gloves must satisfy the specifications of EU directive 89/686/EEC and the standard EN 374 derived from it.

Body Protection

Laboratory coat or other types of body covering suitable for use in a laboratory.

Respiratory protection

When used under an operational fume hood no special protection is required. If required use respirators and components tested and approved under government standards such as NIOSH (US) or CEN (EU). Required level for nuisance exposure P98 (US) or P1 (EU EN 143), and higher levels of protection OV/AG/P99 (US) or ABEK-P2 (EU EN 143).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Form: Crystalline Colour: Beige
Odour	No data available
Odour threshold	No data available
pH	No data available
Freezing/Melting Point	Melting point/range: 111-113°C Melting point/range: 111-113°C
Initial boiling point and boiling range	No data available
Flash Point	198°C – closed cup
Evaporation rate	No data available
Flammability	No data available
Upper/lower flammability or explosive limits	No data available
Vapour Pressure	No data available
Relative Density	No data available
Solubility in water and solvents (mg/l)	No data available
Partition coefficient: n- Octanol/water	No data available
Auto ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidising properties	No data available

9.2 Other information

No data available

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of Hazardous Reactions
No data available

10.4 Conditions to Avoid
No data available

10.5 Incompatible materials
Oxidizing agents

10.6 Hazardous decomposition products
Other decomposition products - No data available

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
Acute toxicity
No data available

Skin corrosion/irritation
No data available

Serious eye damage/irritation
No data available

Respiratory or skin sensitisation
No data available
May cause sensitisation by inhalation.

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No components of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

STOT-single exposure
Inhalation – May cause respiratory irritation.

STOT-repeated exposure
No data available

Aspiration hazard.
No data available

Potential Health Hazards

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	Harmful if swallowed.
Skin	May be harmful if absorbed through the skin. Causes skin irritation.
Eyes	Causes serious eye irritation.

Signs and symptoms of exposure
To the best of our knowledge the chemical, physical and toxicological properties have not been thoroughly investigated.

Additional Information
RTECS: CU8993000

SECTION 12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and Degradability
No data available

12.3 Bio-accumulative potential
No data available

12.4. Mobility in soil
No data available

12.5. Results of PBT and vPvB assessment
No data available

12.6. Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods
Contact a licensed waste disposal service to collect/dispose of any waste material.

Contaminated packaging
Treat it as an unopened/ unused product.

SECTION 14. TRANSPORT INFORMATION

14.1 UN Number
ADR/RID: - IMDG: - IATA: -

14.2 UN Proper Shipping Name
ADR/RID: Not dangerous goods
IMDG: Not dangerous goods
IATA: Not dangerous goods

14.3 Transport hazard class(es)
ADR/RID: - IMDG: - IATA: -

14.4 Packing group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: No IMDG Marine pollutant: No IATA: No

14.6 Special precautions for user
No data available

SECTION 15. REGULATORY INFORMATION

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

15.1. Safety, health, and environmental regulations/legislation specific to the substance or mixture
No data available

15.2 Chemical Safety Assessment
No data available

Note that the label elements, the Risk and Safety phrases (now Hazard and Precautionary statements) that used to be in Section 15 are now in Section 2.

SECTION 16. OTHER INFORMATION

The advice offered is derived from the currently available information on the hazardous materials in this product and it component(s). Consideration has been made regarding the quantities offered in the pre-dispensed container. The advice offered is, therefore not all-inclusive nor should it be taken as the descriptive of the compound generally.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY / UNDERTAKING

Product Name	**acetic acid**
Product Catalogue Name	**LT-ACETIC-01**
CAS-No.	**64-19-7**
Company:	Ludger Ltd Culham Science Centre Abingdon Oxfordshire OX14 3EB
Telephone:	01865 408554
Emergency Telephone:	01865 408554
Email:	info@ludger.com

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No 1272/2008 [EU-GHS/CLP].
Flammable liquids (Category 3)
Skin corrosion (Category 1A)
Serious eye damage (Category 1)

2.2 Label elements

Signal Word: Danger

Hazard Statement(s)

H314	Causes severe burns and eye damage.
H226	Flammable liquid and vapour.

Precautionary Statement(s)

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P280	Wear protective gloves/protective clothing/ face protection.
P301 + P330 + P331 +P338	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. P305+P351 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do so. Continue rinsing.
P310	Immediately call a POISON CENTRE or doctor/ physician.

2.3 Other hazard information:
Lachrymator

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3. 1 Substances

Synonyms: Glacial acetic acid
Formula: $C_2H_4O_2$
Molecular Weight: 60.05g/mol

Component		Classification	Concentration
Name	Acetic Acid	Flam. Liq. 3; Skin Corr. 1A; Eye Dam. 1 H314, H226, H318 Concentration limits: >= 90 %: Skin Corr. 1A, H314; 25 - < 90 %: Skin Corr. 1B, H314; 10 - < 25 %: Skin Irrit. 2, H315; 10 - < 25 %: Eye Irrit. 2, H319; 10 - < 25 %: Eye Irrit. 2, H319; 10 - < 25 %: Skin Irrit. 2, H315; 25 - < 90 %: Skin Corr. 1B, H314; >= 90 %: Skin Corr. 1A, H314; >= 90 %	< = 100%
CAS-No.	64-19-7		
EC-No.	200-580-7		
Index-No	607-002-00-6		

SECTION 4. FIRST-AID MEASURES

4.1 Description of First Aid Measures

General Advice
Consult a physician if exposure causes ill effects and if in any doubt. Show this safety data sheet to the physician/ first responder in attendance.

If swallowed
After swallowing: make the victim drink water (two glasses at most), and avoid vomiting (risk of perforation). Call a physician immediately. Do not attempt to neutralise.

If the skin is exposed
Remove any contaminated clothing immediately. Wash the affected area well with plenty of soap and water.

If eyes are exposed
Rinse thoroughly with plenty of water or eye wash solution for at least 15 minutes.

If inhaled
Move person to fresh air supply. If not breathing give artificial respiration.

4.2 Most important symptoms and effects, both acute and delayed
No data available.

SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media
For small fires use extinguishing media such as dry chemicals, carbon dioxide or “alcohol” foam.
For large fires apply water from as far away as possible, use large amounts of water, applied as mist or spray: solid streams of water may not be as effective. Cool all affected containers with large amounts of water.

5.2 Special hazards arising from the substance or mixture
No data available.

5.3 Advice for Firefighters
Wear a self-contained breathing apparatus, if necessary. Use water spray to cool unopened containers if near the fire.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment, and emergency procedures
Wear personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Unnecessary staff to leave the immediate area of spillage.

6.2 Environmental Precautions
Do not let the chemical enter the drains.

6.3 Methods and material for containment and cleaning up
Contain the spill and collect it with non-combustible absorbent material (such as sand, earth, diatomaceous earth, and vermiculite) and place it in a container for disposal. Keep in suitable, closed containers when waiting for disposal.

6.4 Reference to other sections
See Section 13 for suitable means of disposal of waste.

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist. Keep away from any sources of ignition- No smoking.
Take measures to prevent electrostatic charge near/in the work area when handling the chemical.

7.2 Conditions for safe storage, including any incompatibilities
Store in a cool, dry place. Keep the container tightly closed in a dry and well-ventilated place. Containers once opened must be carefully re-sealed and kept upright. This chemical is moisture-sensitive.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

ACETIC ACID

CAS-No.	Value	Control Parameters	Update	Basis
64-19-7	TWA	10ppm 25mg/m3	1991-07-05	Europe. Commission Directive 91/322/EEC on establishing indicative limits on values.
Remarks	Indicative			

8.2 Exposure controls

Appropriate engineering controls
Handle following good laboratory and safety practices. Wash hands when leaving the lab and before entering the laboratory.

Personal Protective Equipment

Eye/face protection
Laboratory Safety Glasses.

Skin/Body protection
Laboratory Gloves and coat or similar covering over clothes. Gloves to satisfy the specifications of EU directive 89/686/EEC and the standard EN 374 derived from it.

Respiratory protection
Chemicals should be handled when open, under an operational fume hood.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Form: Liquid Colour: Colourless
Odour	pungent
pH	2.4 at 60.05g/l
Melting Point	16.2°C
Initial boiling point and boiling range	117-118°C
Flash Point	40.0°C – closed
Evaporation rate	No data available
Flammability	High
Upper/lower explosive limits	Lower = 4% (V) Upper = 19.9% (V)
Vapour Pressure	73.3hPa at 50.0°C 15.2hPa at 20.0°C
Relative Density	1.049g/ml at 25°C
Solubility in water and solvents (mg/l)	Completely miscible
Partition coefficient: n-octanol/water	log Pow: - 0.17
Auto ignition temperature	485°C
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidising properties	No data available

9.2 Other information
No data available

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
Stable under recommended storage conditions.

10.3 Possibility of Hazardous Reactions
No data available

10.4 Conditions to Avoid
Heat, flames and sparks

10.5 Incompatible materials
Oxidising agents, soluble carbonates and phosphates, Hydroxides, Metals, Peroxides, Permanganates, e.g. Potassium permanganate, Amines, and Alcohols.

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions (Carbon oxides).

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
Acute toxicity
LD50 Oral – Rat – 3,310 mg/kg

LC50 Inhalation – Mouse – 1h - 5620ppm
Remarks: Sense Organs and Special Senses (Nose, Eyes, Ears and Taste): Eyes: Conjunctive irritation. Eyes: Other. Blood: Other changes.

LD50 Dermal – Rabbit – 1,112 mg/kg

Skin corrosion/irritation
Skin – Rabbit – Mild skin irritation – 24h

Serious eye damage/irritation
Eyes – Rabbit – Corrosive to eyes.

Respiratory or skin sensitisation
May cause sensitization by skin contact.

Germ cell mutagenicity
No data available.

Carcinogenicity
IARC: No component of this chemical present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available.

STOT-single exposure
No data available.

STOT-repeated exposure
No data available.

Aspiration hazard.
No data available.

Potential Health Hazards

Inhalation	May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion	May be harmful if swallowed. Causes serve burns.
Skin	May be harmful if absorbed through skin. Causes serve skin burns.
Eyes	Causes serve eye burns.

Signs and symptoms of exposure
Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract, eyes and skin, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, burning sensation, cough, wheezing, laryngitis, shortness of breath, headache, nausea, vomiting.
Ingestion or inhalation of concentrated acetic acid causes damage to tissue of the respiratory and digestive tracts. Symptoms include: Hematemesis, bloody diarrhoea, edema and/or perforation of the esophagus and pylorus, pancreatitis, hematuria, anuria, uremia, albuminuria, hemolysis, convulsions, bronchitis, pulmonary edema, pneumonia, cardiovascular collapse, shock and death.
Direct contact or exposure to high concentrations of vapour with skin or eyes can cause: erythema, blisters, tissue destruction with slow healing, skin blacking, hyperkeratosis, fissures, corneal erosion, opacification, iritis, conjunctivitis and possible blindness.
To the best of our knowledge, the chemical, physical and toxicological properties have not been fully investigated.

Additional Information
RTECS: AF1225000

SECTION 12. ECOLOGICAL INFORMATION

12.1 Toxicity
Toxicity to Fish
LC50 – Leuciscus idus (Golden Orfe) – 410.00mg/l – 48h
LC50 – Cyprinus carpio (Carp) – 49.00mg/l – 48h
LC50 – Pimephales promelas (Fathead minnow) – 79.00 - 88.00mg/l – 96h
LC50 – Lepomis macrochirus – 75mg/l – 96h
Toxicity to Daphnia and other aquatic invertebrates.
EC50 – Daphnia magna (Water flea) – 65.00mg/l – 48h

12.2 Persistence and Degradability
Biodegradability
Remarks: Expected to be biodegradable.

12.3 Bio-accumulative potential
No data available

12.4. Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
No data available

12.6 Other adverse effects
Biochemical Oxygen Demand (BOD) - 880mg/g

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods
This chemical is combustible and may be burned in a chemical incinerator equipped with an afterburner and scrubber. If not practical, use a licensed waste disposal service.

Contaminated packaging
Disposed of the packaging as unused/ waste product.

SECTION 14. TRANSPORT INFORMATION

14.1 UN Number
ADR/RID: 2789 IMDG: 2789 IATA: 2789

14.2 UN Proper Shipping Name
ADR/RID: ACETIC ACID, GLACIAL IMDG: ACETIC ACID, GLACIAL IATA: ACETIC ACID, GLACIAL

14.3 Transport hazard class(es)
ADR/RID: 8 (3) IMDG: 8 (3) IATA: 8 (3)

14.4 Packing group
ADR/RID: II IMDG: II IATA: II

14.5 Environmental hazards
ADR/RID: - IMDG Marine pollutant: No IATA: -

14.6 Other information
IMDG: EMS-No: F-E, S-C

SECTION 15. REGULATORY INFORMATION

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006.

Please note that the label elements, hazard and precautionary statements that used to be in Section 15 are now in Section 2.

SECTION 16. OTHER INFORMATION

The advice offered is derived from the currently available information on the hazardous materials in this product and it component(s). Consideration has been made regarding the quantities offered in the pre-dispensed container. The advice offered is, therefore not all-inclusive nor should it be taken as the descriptive of the compound generally.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/ UNDERTAKING

Product Name	**Sodium cyanoborohydride**
Product Catalogue Name	**LT-CYANOB-01/02/03/05/96**
CAS-No.	**25895-60-7**
Company:	Ludger Ltd Culham Science Centre Abingdon Oxford OX14 3EB
Telephone:	01865 408554
Emergency Telephone:	01865 408554
Email:	info@ludger.com

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification according to the Regulation (EC) No. 1272/2008 [EU-GHS/CLP]
Flammable solids (Category 1), H228
Substances, which in contact with water emit flammable gases (category 1), H260
Acute toxicity, Oral (Category 2), H300
Acute toxicity, Inhalation (Category 2), H330
Acute toxicity, Dermal (Category 2), H310
Skin corrosion (Sub-category 1B), H314
Short-term (acute) aquatic hazard (Category 1), H400
Long-term (chronic) aquatic hazard (Category 1), H410

2.2 Label elements

Signal Word: Danger

Hazard Statement(s)
H228 Flammable solid.
H260 In contact with water releases flammable gases which may ignite spontaneously.
H300 + H310 + H330 Fatal if swallowed, in contact with skin or if inhaled.
H314 Causes severe skin burns and eye damage.
H330 Fatal if inhaled.
H410 Very toxic to aquatic life with long-lasting effects.

Precautionary Statement(s)
P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P223 Keep away from any possible contact with water, because of violent reactions and possible flash fire.
P260 Do not breathe dust or mist
P264 Wash hands thoroughly after handling.

P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P284 Wear respiratory protection.
P301 + P310 + P330 + P310 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting. Immediately call a POISON CENTER/ doctor.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

2.3 Other hazard information
(EU)
EUH032 Contact with acids liberates very toxic gas.

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. Stench.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3. 1 Substances
Synonyms: Sodium Cyanotrihydridoborate
Formula: CH_3BNNa
Molecular weight 62.84 g/mol

Component	Concentration	Classification
Sodium Cyanotrihydroborate	100%	Flam. Sol. 1; Acute Tox. 2; Skin Corr. 1B; Aquatic Acute 1; Aquatic Chronic 1; H228, H300, H330, H310, H314, H400, H410 M-Factor - Aquatic Acute: 10
CAS-No. 25895-60-7	-	
EC-No. 247-317-2		

SECTION 4. FIRST-AID MEASURES

4.1 Description of First Aid Measures
General Advice
Consult a physician if exposure causes ill effects and if in any doubt. Show this safety data sheet to the doctor/ first responder in attendance.

If Ingested
Do NOT induce vomiting. Rinse mouth well with water unless the person(s) is unconscious.

If the skin is exposed
Remove contaminated clothing/shoes immediately. Wash the affected area(s) with water and soap.

If eyes are exposed
Wash eye(s) with plenty of water for at least 15 minutes, if unsure seek medical advice.

If inhaled
Move into a source of fresh air, if not breathing give artificial respiration.

4.2 Most important symptoms and effects, both acute and delayed
Burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, vomiting.
To our knowledge, the chemical, physical and toxicological properties have not been thoroughly investi-

gated. Absorption into the body leads to the formation of methaemoglobin which in sufficient concentration causes cyanosis.
Onset may be delayed two to four hours or longer.

4.3 Indication of immediate medical attention and special treatment needed
No Data available

SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media
Dry powder

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Nitrogen oxides, Hydrogen cyanide (Hydrocyanic acid), Borane/boron oxides.

5.3 Advice for Firefighters
Wear a self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures.
Wear respiratory protection; gently sweep up to avoid dust formation. Avoid breathing vapours, mist or gas. Ensure adequate ventilation and remove all sources of ignition. Evacuate personnel to a safe area; avoid breathing in dust/gas or mist.
For personal protection see section 8.

6.2 Environmental Precautions
Prevent further leakage or spillage if safe to do so. Do not let the chemical enter the drainage system and further discharge into the environment must be avoided.

6.3 Methods and material for containment and cleaning up
Contain the spill with matting if necessary and then collect using either an electrically protected vacuum cleaner or by damp brushing (not wet) and putting the collected waste into a secure dry container, do not flush with water. Dispose according to local regulations.

6.4 Reference to other sections
For disposal regulations see section 13.

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid contact with skin and eyes and avoid the formation of dust when handling. Provide appropriate exhaust ventilation in work areas where dust could be formed. Keep away from sources of ignition (No Smoking) and take measures to prevent the build-up of electrostatic charge.

7.2 Conditions for safe storage, including any incompatibilities
Store in a cool place. Keep the container tightly closed in a dry and well-ventilated place.
Never allow the product to get into contact with water during storage as it is moisture sensitive. Do not store near acids. Handle and open the container with care. Hygroscopic. Handle when open under an inert gas.

7.3 Specific end uses
No data available

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Contains no substances with occupational exposure limit values.

Component	CAS No.	Value Form of exposure	Control parameters	Basis
Sodium Cyanoborohydride	25895-60-7	TWA	5 mg/m3	UK. EH40 WEL - Workplace Exposure Limits
	Remarks	Can be absorbed through the skin. The assigned substances are those for which there are concerns that dermal absorption will lead to systemic toxicity. Where no specific short-term exposure limit is listed, a figure three times the long-term exposure should be used		

8.2 Exposure controls

Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

Personal protective equipment

Eye/Face protection

Face shields and safety glasses must be worn following good laboratory practice. Eye protection should be tested and approved under appropriate government standards such as EN 166 (EU) or NIOSH (US).

Skin protection

Handle with gloves always following good laboratory practice. Gloves must be inspected before use and be removed in the proper glove removal technique (without touching the gloves' outer surface) to avoid skin contact. Dispose of contaminated gloves after use as contaminated waste, following local regulations. Wash and dry hands.
Gloves to be within the specifications of EU directive 89/686/EEC and the standard EN 374 derived from it.

Full contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact
Material: Nitrile rubber
Minimum layer thickness: 0.11 mm
Break through time: 480 min
Material tested: Dermatril® (KCL 740 / Aldrich Z677272, Size M)
Data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE-approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering approval for any specific use scenario.

Body protection
Complete suit protecting against chemicals, Flame retardant antistatic protective clothing. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

Respiratory protection
Where risk assessment shows air-purifying respirators are appropriate use a full-face particle respirator type N100 (US) or type P3 (EN 143) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

Control of environmental exposure
Prevent further leakage or spillage if safe to do so. Do not let the product enter drains. Discharge into the environment must be avoided.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Form: Powder Colour: Beige
Odour	No data available
Odour threshold	No data available
pH	No data available
Freezing/Melting Point	Melting point/range :> 242°C
Initial boiling point and boiling range	No data available
Flash Point	No data available
Evaporation rate	No data available
Flammability (solids and gases)	The substance or mixture is a flammable solid with the subcategory 1.
Upper/lower flammability or explosive limits	No data available
Vapour Pressure	No data available
Relative Density	No data available
Solubility in water and solvents	No data available
Partition coefficient	No data available
Autoignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidising properties	No data available

9.2 Other information
None available

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity
No data available

10.2 Chemical stability
No data available

10.3 Possibility of Hazardous Reactions
Reacts violently with water.

10.4 Conditions to Avoid
Do not allow water to enter the container because of a violent reaction.
Heat, flames and sparks. Extremes of temperature and direct sunlight. Exposure to sunlight.

10.5 Incompatible materials
Do not store near acids or oxidising agents.

10.6 Hazardous decomposition products
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx), Hydrogen cyanide (hydrocyanic acid), Borane/boron oxides
Reacts with water to form: - Hydrogen gas
Other decomposition products - No data available
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Borane/boron oxides, Sodium oxides

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects
Acute toxicity
No Data available

Skin corrosion/irritation
No data available

Serious eye damage/irritation
No data available

Respiratory or skin sensitisation
No data available

Germ cell mutagenicity
No data available

Carcinogenicity
IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
No data available

STOT (specific target organ toxicity) -single exposure
No data available

STOT (specific target organ toxicity) -repeated exposure
No data available

Aspiration hazard.
No data available

Potential health effects

Inhalation	May be fatal if inhaled. Material is extremely destructive to the tissue of the mucus membranes and upper respiratory tract.
Ingestion	May be fatal if swallowed. Causes burns.

Signs and symptoms of Exposure
Burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, vomiting. To

our knowledge, the chemical, physical and toxicological properties have not been thoroughly investigated. Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed two to four hours or longer.

SECTION 12. ECOLOGICAL INFORMATION

12.1 Toxicity
No data available

12.2 Persistence and Degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4. Mobility in soil
No data available

12.5. Results of PBT and vPvB assessment
No data available

12.6. Other adverse effects
Very toxic to aquatic life with long-lasting effects.

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods
Product or/and collect waste from spillage.
Burn in a chemical incinerator equipped with an afterburner and scrubber but take extra precautions when igniting as this material is highly flammable. Or to contact a licensed disposal company and arrange disposal, inform the company of the nature of the waste.

Contaminated packaging
Dispose of as the unused product, with a licensed disposal company.

SECTION 14. TRANSPORT INFORMATION

14.1 UN Number
ADR/RID: 3179 IMDG: 3179 IATA: 3179

14.2 UN Proper Shipping Name
ADR/RID: FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S. (Sodium cyanotrihydroborate)
IMDG: FLAMMABLE SOLID, TOXIC, INORGANIC, N.O.S. (Sodium cyanotrihydroborate)
IATA: Flammable solid, toxic, inorganic, n.o.s. (Sodium cyanotrihydroborate)

14.3 Transport hazard class (es)
ADR/RID: 4.1 (6.1) IMDG: 4.1 (6.1) IATA: 4.1 (6.1)

14.4 Packing group
ADR/RID: II IMDG: II IATA: II

14.5 Environmental hazards
ADR/RID: No IMDG Marine pollutant: No IATA: No

14.6 Special precautions for user
No data available

SECTION 15. REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific to the substance or mixture
No data available

15.2 Chemical Safety Assessment
No data available

SECTION 16. OTHER INFORMATION

The advice offered is derived from the currently available information on the hazardous materials in this product and its component(s). Consideration has been made regarding the quantities offered in the pre-dispensed container. The advice offered is, therefore not all-inclusive nor should it be taken as the descriptive of the compound generally.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY / UNDERTAKING

Product Name	**dimethyl sulfoxide**
Product Catalogue Name	**LT-DMSO-01/02**
CAS-No.	**67-68-5**
Company:	Ludger Ltd Culham Science Centre Abingdon Oxford OX14 3EB
Telephone:	01865 408554
Emergency Telephone:	01865 408554
Email:	info@ludger.com

SECTION 2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture
Classification according to Regulation (EC) No. 1272/2008 [EU-GHS-CLP]
Not a hazardous substance or mixture according to Regulation (EC) No. 1272/2008 [EU-GHS-CLP].

2.2 Label elements
The product is not required to be labelled following EC directives or respective national laws.
Signal Word: None
Not a hazardous substance or mixture according to Regulation (EC) No 1272/2008.

Hazard Statement(s)
None

Precautionary Statement(s)
None

2.3 Other hazard information:
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher. Rapidly absorbed through the skin.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3. 1 Substances

Synonyms:	DMSO methyl sulfoxide dimethyl sulfoxide
Formula:	C_2H_6OS
Molecular Weight:	78.13g/mol

Component		Concentration
Name	Dimethyl Sulfoxide	< = 100%
CAS-No.	67-68-5	
EC-No.	200-664-3	

SECTION 4. FIRST-AID MEASURES

4.1 Description of First Aid Measures

General Advice
Consult a physician if exposure causes ill effects and if in any doubt. Show this safety data sheet to the physician/ first responder in attendance.

If Ingested
After swallowing: make the victim drink water (two glasses at most). Consult a doctor if feeling unwell

If the skin is exposed
Wash off with plenty of soap and water.

If eyes are exposed
Flush eyes with plenty of water/ eye wash solution as a precaution.

If inhaled
Move effect person to fresh air. If not breathing give artificial respiration.

4.2 Most important symptoms and effects, both acute and delayed
Effects due to ingestion may include Nausea, Fatigue and Headache.

4.3 Indication of immediate medical attention and special treatment needed
No data available.

SECTION 5. FIRE-FIGHTING MEASURES

5.1 Extinguishing media
Small fires: Use extinguishing media such as “alcohol” foam, dry chemicals or carbon dioxide.
Large fires: Use extinguishing media such as water, from a far away distance as possible. Use very large quantities of water as mist or spray to flood the fire and the combustible material. Cool all affected containers with large quantities of water.

5.2 Special hazards arising from the substance or mixture
Carbon oxides, Sulphur oxides

5.3 Advice for Firefighters
Wear self-contained breathing apparatus for fire fighting if necessary, to spray cool water on any unopened containers near the fire.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Avoid breathing vapours, gas or mist. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

6.2 Environmental Precautions
Prevent further leakage or spillage if safe to do so, e.g. with spill mats. Do not let the product enter drains.

6.3 Methods and material for containment and cleaning up
Contain the spillage and put the collected material into a suitable container with a secure lid. Wash the area well, do not let run off into the drains, collect as waste.

6.4 Reference to other sections
See section 13 for disposal of waste material(s).

SECTION 7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid inhalation of vapour or mist. Keep away from sources of ignition- No smoking.
Take measures to prevent the build-up of electrostatic charge.

7.2 Conditions for safe storage, including any incompatibilities
Store in a cool place. Keep the container closed in a dry well-ventilated place.

7.3 Specific end uses
No data available

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters
Components with workplace control parameters.
Contains no substances with occupational exposure limit values.

8.2 Exposure controls
Appropriate engineering controls
Handle following good laboratory hygiene and safety practices. Wash hands before breaks and at the end of the day.

Personal Protective Equipment
Eye / face protection
Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

Skin protection
Handle with gloves, which should be inspected before use. Use proper glove removal technique (removal without the outside of the glove touching the skin) to avoid contact with the skin/chemical. Dispose of contaminated gloves as Laboratory waste in accordance with applicable laws and good laboratory practices. Wash and dry hands.
Gloves should be of the standard that will stratify the specifications of EU directive 89/696/EEC and the standard EN 374 derived from it.

Body Protection
The type of protective clothing must be selected according to the amount of substance at the specific workplace being used. Impervious coats or laboratory coats.

Respiratory protection
Use substance in an operation fume hood/ outside venting extraction cupboard. Wear full face respirator if appropriate to use, must be tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance	Form: Liquid, clear Colour: Colourless
Odour	No data available
Odour threshold	No data available
pH	No data available
Freezing/Melting Point	Melting point/range: 16-19°C
Initial boiling point and boiling range	189°C
Flash Point	87°C – Closed cup
Evaporation rate	No data available
Flammability	No data available
Upper/lower flammability or explosive limits	Upper explosion limit: 42% (V) Lower explosion limit: 3.5% (V)
Vapour Pressure, Pa at temperature degree C	0.55hPa at 20°C
Relative Density	1.1g/mL
Solubility in water and solvents	Completely miscible
Partition coefficient: n-octanol/water	log Pow: - 2.03
Auto ignition temperature	No data available
Decomposition temperature	No data available
Viscosity	No data available
Explosive properties	No data available
Oxidising properties	No data available

9.2 Other information

No data available

SECTION 10. STABILITY AND REACTIVITY

10.1 Reactivity

Forms explosive mixtures with air on intense heating. A range from approx. 15 Kelvin below the flash point is to be rated as critical.

10.2 Chemical stability

The product is chemically stable under standard ambient conditions (room temperature).

10.3 Possibility of Hazardous Reactions

No data available

10.4 Conditions to Avoid

Heat, flames and sparks

10.5 Incompatible materials

Acid chlorides, Phosphorus halides, Strong acids, Strong oxidizing agents and strong reducing agents.

10.6 Hazardous decomposition products

Other decomposition products – No data available

SECTION 11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Acute toxicity

LD50 Oral - Rat - male and female - 28,300 mg/kg (OECD Test Guideline 401)

LC0 Inhalation - Rat - male and female - 4 h - > 5.33 mg/l (OECD Test Guideline 403)

LD50 Dermal - Rat - male and female - 40,000 mg/kg Remarks: (ECHA)

Skin corrosion/irritation
Skin - Rabbit Result: slight irritation - 4 h (OECD Test Guideline 404)

Serious eye damage/irritation
Eyes - Rabbit Result: slight irritation - 24 h (OECD Test Guideline 405)

Respiratory or skin sensitisation
Maximization Test - Guinea pig Result: negative (OECD Test Guideline 406)
Local lymph node assay (LLNA) - Mouse Result: negative (OECD Test Guideline 429)

Germ cell mutagenicity
Ames test Salmonella typhimurium Result: negative sister chromatid exchange assay
Chinese hamster ovary cells Result: negative Mutagenicity (mammal cell test): chromosome aberration.
Chinese hamster ovary cells Result: negative OECD Test Guideline 474 Rat - male and female Result: negative

Carcinogenicity
Carcinogenicity – Rat – Oral
Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Others: Tumors.

Carcinogenicity – Mouse – Oral
Tumorigic: Equivocal tumorigenic agent by RTECS criteria. Lukaemia skin and appendages: Other: Tumors.

IARC: No component of this product presents at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

Reproductive toxicity
Reproductive toxicity – Rat – Intraperitoneal
Effects on fertility: Abortion

Reproductive toxicity – Rat – Intraperitoneal
Effects on fertility: Post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).

Reproductive toxicity – Rat – Subcutaneous
Effects on fertility: Post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants). Effects on fertility: Litter size (e.g. # fetuses per litter; measured before birth).

Reproductive toxicity – Mouse – Oral
Effects on fertility: Pre-implantation mortality (e.g. reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or fetus: Fetoxicity (except death, e.g. stunted fetus). Specific developmental abnormalities: Musculoskeletal system.

Reproductive toxicity – Mouse – Intraperitoneal
Effects on embryo or fetus: Fetoxicity (except death, e.g. stunted fetus). Specific developmental abnormalities: Musculoskeletal system.

STOT-single exposure
No data available

STOT-repeated exposure
No data available

Aspiration hazard.
No data available

Potential Health Hazards

Inhalation	May be harmful if inhaled. May cause respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. May cause skin irritation.
Eyes	May cause eye irritation.
Aggravated Medical Condition	Avoid contact with DMSO solutions containing toxic materials or materials with unknown toxicological properties. Dimethyl sulfoxide is readily absorbed through the skin and may carry such materials into the body.

Signs and symptoms of exposure
Effects due to ingestion may include; Nausea, Fatigue, Headache.

Additional Information
RTECS: PV6210000

SECTION 12. ECOLOGICAL INFORMATION

12.1 Toxicity

Toxicity to Fish	LC50-Pimephales promelas (fathead minnow) – 34,000mg/l - 96h LC50-Oncorhynchus mykiss (rainbow trout) – 34,000mg/l-96h
Toxicity to daphnia and other Aquatic invertebrates	EC50-Daphnia pulex (water fleas) – 27,500mg/l
Toxicity to algae	EC50-Lepomis macrochirus (bluegill) - >400,000mg/l-96h

12.2 Persistence and Degradability
No data available

12.3 Bioaccumulative potential
No data available

12.4 Mobility in soil
No data available

12.5 Results of PBT and vPvB assessment
No data available

12.6 Other adverse effects
No data available

SECTION 13. DISPOSAL CONSIDERATIONS

13.1 Waste Treatment Methods
This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber or be disposed of by a licensed professional waste disposal company.

Contaminated packaging
Dispose of it as an unused product.

SECTION 14. TRANSPORT INFORMATION

14.1 UN Number
ADR/RID: - IMDG: - IATA: -

14.2 UN Proper Shipping Name
ADR/RID: Not Dangerous Goods
IMDG: Not Dangerous Goods
IATA: Not Dangerous Goods

14.3 Transport hazard class (es)
ADR/RID: - IMDG: - IATA: -

14.4 Packing group
ADR/RID: - IMDG: - IATA: -

14.5 Environmental hazards
ADR/RID: No IMDG Marine pollutant: No IATA: No

14.6 Special precautions for user
No data available

SECTION 15. REGULATORY INFORMATION

This safety data sheet complies with the requirements of Regulation (EC) No. 1907/2006

15.1 Safety, health and environmental regulations/legislation specific to the substance or mixture
No data available

15.2 Chemical Safety Assessment
No data available

Please note that the label elements that used to go in Section 15 are now in Section 2.

SECTION 16. OTHER INFORMATION

The advice offered is derived from the currently available information on the hazardous materials in this product and its component(s). Consideration has been made regarding the quantities offered in the pre-dispensed container. The advice offered is, therefore not all-inclusive nor should it be taken as the descriptive of the compound generally.