SAFETY DATA SHEET

Issuing Date 05-January-2024 **Revision Date** 11-Dec-2017 **Revision Number** 0

This Research Sample is for research and development purposes only. The information provided on this SDS is the best estimate of technically qualified individuals but may not be based on direct toxicology testing or experience in emergency situations. It must be used by or under the direct supervision of technically qualified individuals.

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

GHS product identifier

Product Name: **Li2155**

Other means of identification

Synonyms None

Recommended use of the chemical and restrictions on use

Recommended Use Additive into the following products:
Energy storage devices (i.e., batteries, capacitors)

Uses advised against This product contains a chemical that is regulated by TSCA Section 5(e) Consent Order and a SNUR at 40CFR721.10663. See Section 15 for additional information.

Supplier's details

Supplier Address	**Manufacturer Address**
Black Diamond Structures	Molecular Rebar Design
12310 Trail Driver	13477 Fitzhugh Rd
Austin, Texas 78737	Austin, TX 78736
TEL: 512-900-3824	TEL: 512-394-0922

Emergency telephone number

Emergency Telephone Number +1-512-900-3824
+1-512-394-0922

2. HAZARDS IDENTIFICATION

Classification

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)
Flammable liquids (Category 4), H227
Skin irritation (Category 2), H315
Eye irritation (Category 2A), H319
Reproductive toxicity (Category 1B), H360
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

GHS Label elements, including precautionary statements

Pictogram

Signal word Danger

Hazard statement(s)

H227	Combustible liquid.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H360	May damage fertility or the unborn child.

Precautionary statement(s)

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340 + P312	IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P337 + P313	If eye irritation persists: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

This product contains nanoparticles. Nanoparticles are particles which are <100 nanometers. Nanoparticles may or may not exhibit size-related properties that differ significantly from the properties of the bulk material. These size-related properties may affect absorption, inhalation, and toxicity of the material in animals, humans, and aquatic life.

Hazard Not Otherwise Classified (HNOC)

There is limited information on inhalation of aqueous suspensions of carbon nanotubes. Fine mists may contain inhalable respirable carbon nanotubes.

Other information

5% of the mixture consists of ingredient(s) of unknown toxicity.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %	Trade secret
Molecular Rebar	-	0.1-5	*
N-methyl-2-pyrrolidone	872-50-4	95-99.9	

**The exact percentage (concentration) of composition has been withheld as a trade secret.*

4. FIRST AID MEASURES

Description of necessary first-aid measures

General Advice Show this safety data sheet to the doctor in attendance.

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician or Poison Control Center immediately.

Skin Contact IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Call a physician or Poison Control Center immediately. Wash contaminated clothing before reuse.

Inhalation IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing. Call a physician or Poison Control Center immediately.

Ingestion IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell. Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

Most important symptoms/effects, acute and delayed

Most Important Symptoms/Effects The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11

Indication of immediate medical attention and special treatment needed, if necessary

Notes to Physician No data available

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

Specific Hazards Arising from the Chemical

No data available

Protective Equipment and Precautions for Firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

Environmental Precautions

Do not allow material to contaminate ground water system. Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. See Section 12 for additional Ecological Information.

Methods and materials for containment and cleaning up

Methods for Containment Dike far ahead of liquid spill for later disposal.

Methods for Cleaning Up Dam up. Soak up with inert absorbent material. Use personal protective equipment. Clean up promptly using a HEPA-filtered vacuum.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.
Keep away from sources of ignition - No smoking.Take measures to prevent the build up of electrostatic charge. For precautions see section 2.

Conditions for safe storage, including any incompatibilities

Storage Keep containers tightly closed in a dry, cool and well-ventilated place. Store under inert gas. Moisture sensitive.

Incompatible Products Strong oxidizing agents.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Control parameters

Exposure Guidelines Little is known about the occupational exposure to nanoparticles which means that regulatory bodies have not identified any exposure guidelines. Refer to "Approaches to Safe Nanotechnology" by the National Institute Occupational Safety and Health (NIOSH) for hazard assessment and risk management techniques.

Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
N-methyl-2-pyrrolidone	872-50-4	TWA	10.000000 ppm	USA. Workplace Environmental Exposure Levels (WEEL)
	Remarks	Skin		
		PEL	1 ppm 4 mg/m3	California permissible exposure limits for chemical contaminants (Title 8, Article 107)
		Skin		
		TWA	10 ppm	USA. Workplace Environmental Exposure Levels (WEEL)
		Skin		

Derived No Effect Level (DNEL)

Application Area	Exposure routes	Health effect	Value
Workers	Skin contact	Acute systemic effects	208mg/kg BW/d
Workers	Inhalation	Acute systemic effects	80 mg/m3
Workers	Skin contact	Long-term systemic effects	19.8mg/kg BW/d
Workers	Inhalation	Long-term systemic effects	40 mg/m3

Biological occupational exposure limits

Component	CAS-No.	Parameters	Value	Biological specimen	Basis
N-methyl-2-pyrrolidone	872-50-4	5-Hydroxy-N-methyl-2-pyrrolidone	100.0000 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
	Remarks	End of shift (As soon as possible after exposure ceases)			
		5-Hydroxy-N-methyl-2-pyrrolidone	100 mg/l	Urine	ACGIH - Biological Exposure Indices (BEI)
		End of shift (As soon as possible after exposure ceases)			

Predicted No Effect Concentration (PNEC)

Compartment	Value
Water	5 mg/l
Soil	0.138 mg/kg
Marine water	0.025 mg/kg
Fresh water	0.25 mg/l
Fresh water sediment	0.805 mg/kg
Onsite sewage treatment plant	10 mg/l

Other Exposure Guidelines NIOSH proposes a recommended exposure limit (REL) of 1 ug/m^3 elemental carbon as an 8 hr. Time Weighted Average respirable mass airborne concentrations for carbon nanotubes.

Appropriate engineering controls

Engineering Measures Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/Face Protection

Safety glasses with side-shields conforming to EN166. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

Skin and Body Protection

Skin Protection
Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact
Material: butyl-rubber
Minimum layer thickness: 0.3 mm
Break through time: 480 min
Material tested:Butoject® (KCL 897 / Aldrich Z677647, Size M)

Splash contact
Material: Nature latex/chloroprene
Minimum layer thickness: 0.6 mm
Break through time: 35 min
Material tested:Lapren® (KCL 706 / Aldrich Z677558, Size M)

Body Protection
Impervious 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 respirator with multipurpose combination (US) or type ABEK (EN 14387) 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).

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties of product

Physical State	Liquid.	**Appearance**	Black.
Odor	No data available.	**Odor Threshold**	No data available.

Property	Values	Remarks/ - Method
pH	No data available	None known
Melting Point/Range	No data available	None known
Boiling Point/Boiling Range	No data available	None known
Flash Point	No data available	None known
Evaporation rate	No data available	None known
Flammability (solid, gas)	No data available	None known
Flammability Limits in Air		
upper flammability limit	No data available	
lower flammability limit	No data available	
Vapor Pressure	No data available	None known
Vapor Density	No data available	None known
Specific Gravity	No data available	None known
Water Solubility	No data available	None known
Solubility in other solvents	No data available	None known
Partition coefficient: n-octanol/water	No data available	None known
Autoignition Temperature	No data available	None known
Decomposition Temperature	No data available	None known
Viscosity	No data available	None known

Explosive Properties	No data available
Oxidizing Properties	No data available

Other information

VOC Content (%) No data available

10. STABILITY AND REACTIVITY

Reactivity

No data available.

Chemical stability

Stable under recommended storage conditions.

Possibility of hazardous reactions

No data available.

Hazardous Polymerization

Hazardous polymerization does not occur.

Conditions to avoid

Do not allow to dry. Heat, flames and sparks.

Incompatible materials

Strong acids, Strong oxidizing agents, Strong reducing agents

Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Nitrogen oxides (NOx)
Other decomposition products - No data available

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information This material should only be handled by, or under the close supervision of, those properly qualified in the handling and use of potentially hazardous chemicals.It should be borne in mind that the toxocological and physiological properties of this compound is not well defined

Acute toxicity
LD50 Oral - Rat - 3,914 mg/kg
LDLO Inhalation - Rat - 4 h - > 5100 ppm
LD50 Dermal - Rabbit - 8,000 mg/kg
5% of the mixture consists of ingredients(s) of unknown toxicity
Skin corrosion/irritation
Serious eye damage/eye irritation
Eyes - Rabbit
Result: Eye irritation
Respiratory or skin sensitisation
No data available
Germ cell mutagenicity
No data available
Carcinogenicity
Reproductive toxicity
Damage to fetus possible
No data available
Specific target organ toxicity - single exposure
Inhalation - May cause respiratory irritation.
Specific target organ toxicity - repeated exposure
No data available
Aspiration hazard
No data available
Additional Information
RTECS: UY5790000
prolonged or repeated exposure can cause:, Vomiting, Diarrhoea, Abdominal pain, Rats exposed to 1-methyl-2-pyrrolidinone at a concentration of 1 mg/L as an aerosol for 10 days showed depletion of hematopoietic cells in the bone marrow and atrophy of the lymphoid tissues of the thymus, spleen, and lymph nodes.
Bone marrow - Irregularities - Based on Human Evidence
Bone marrow - Irregularities - Based on Human Evidence

12. ECOLOGICAL INFORMATION

Ecotoxicity
Toxicity to fish LC50 - other fish - 4,000 mg/l - 96 h; LC50 - Leuciscus idus (Golden orfe) - > 500 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - > 1,000 mg/l - 24 h
Toxicity to bacteria LC50 - Bacteria - > 9,000 mg/l

Persistence and Degradability No information available.

Bioaccumulation No information available.

Other Adverse Effects
No information available.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Methods This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

Contaminated Packaging Do not re-use empty containers. Dispose of as unused product.

14. TRANSPORT INFORMATION

DOT NA-Number: 1993 Class: NONE Packing group: III
Proper shipping name: Combustible liquid, n.o.s. (N-methyl-2-pyrrolidone)
Reportable Quantity (RQ):
Poison Inhalation Hazard: No

IMDG Not dangerous goods

IATA Not dangerous goods

15. REGULATORY INFORMATION

Molecular Rebar® is subject to SNUR regulations as per 40CFR721.10663.

SARA 302 Components
No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 313 Components
The following components are subject to reporting levels established by SARA Title III, Section 313:

N-methyl-2-pyrrolidone, CAS-No.872-50-4, Revision Date 2007-07-01

SARA 311/312 Hazards
Fire Hazard, Chronic Health Hazard

Massachusetts Right To Know Components
N-methyl-2-pyrrolidone, CAS-No.872-50-4, Revision Date 2007-07-01

Pennsylvania Right To Know Components
N-methyl-2-pyrrolidone, CAS-No.872-50-4, Revision Date 2007-07-01

New Jersey Right To Know Components
N-methyl-2-pyrrolidone, CAS-No.872-50-4, Revision Date 2007-07-01

16. OTHER INFORMATION

NFPA	**Health Hazard**	2	**Flammability**	2	**Instability**	0
HMIS	**Health Hazard**	2	**Flammability**	2	**Physical Hazard**	0

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Issuing Date 11-Dec-2017
Revision Date 11-Dec-2017
Revision Note Initial Release.

General Disclaimer
The information provided on this SDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as 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 material or in any process, unless specified in the text.

End of Safety Data Sheet