

※ Please make sure to use it with the MSDS number applied.

1. PRODUCT AND COMPANY IDENTIFICATION

A. Product Name 1,2,4-Triazole

B. Recommended Use and Restrictions on Use

Recommended Use No data available

Restrictions on Use chemical intermediate

C. Supplier Information (For imports, provide local supplier information for emergency contact)

Company Name GloryGlobal Co., Ltd.

Address Room 1004, Seoul-Technopark, inside Seoul Tech, 232, Gongneung-ro, Nowon-gu, Seoul, Korea 01811

Emergency Contact Number 02-6223-0862

D. Additional Manufacturer/Supplier Information

No data available

2. Hazards identification

A. Hazard Classification

Acute toxicity (dermal): Category 4

Acute toxicity (oral): H302 – Harmful if swallowed

Eye irritation: Category 2, H319

Eye irritation: Category 2A, H319

Reproductive toxicity: Category 1B, H360FD

Hazardous to the aquatic environment, chronic: Category 3, H412

B. Label Elements Including Precautionary Statements

Pictogram



Signal Word Danger

Hazard Statements H302 Harmful if swallowed

H319 Causes serious eye irritation

H360FD May damage fertility or the unborn child

H412 Harmful to aquatic life with long lasting effects

Precautionary
Statements

Prevention P201 Obtain special instructions before use.

P273 Avoid release to the environment.

P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response	<p>P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.</p> <p>P337 + P313 If eye irritation persists: Get medical advice/attention.</p> <p>P308 + P313 IF exposed or concerned: Get medical advice/attention.</p>
Storage	Not available
Disposal	P501 Dispose of contents/container in accordance with local/regional/national/international regulations and product characteristics.

C. Other Hazards Not Included in the Classification Criteria

Potential Health Effects:

Inhalation: Decomposition products at high temperature may irritate the respiratory tract. Inhalation of vapors from thermal decomposition may not be free of toxic effects.

Eye contact: May cause damage to conjunctiva and cornea.

Environmental Effects:

Harmful to algae. Not readily biodegradable.

Physicochemical Hazards:

In the presence of ignition sources: Dust may form explosive mixtures with air.

At high temperatures: Thermal decomposition may release toxic and irritating substances.

Decomposition Products: Refer to Section 10.

3. Composition/Information on Ingredients

Chemical Name	Common Name and Synonyms	Existing Chemical List No.	CAS Number	Content (%)	Remarks
1,2,4-Triazole	Not available	KE-34007	288-88-0	99 - 100 %	Approval No.: N/A Validity Period: N/A

4. First-Aid Measures

A. Eye Contact

Rinse immediately with eyes wide open, thoroughly and continuously for at least 15 minutes. Seek prompt consultation with an ophthalmologist.

B. Skin Contact

Wash immediately, thoroughly, and completely with soap and water.

In case of severe contact: Keep under medical supervision and consult a physician.

If irritation occurs, consult a dermatologist.

C. Inhalation

If dust is inhaled, move the person to fresh air. Provide oxygen or artificial respiration if necessary.

Keep under medical supervision and consult a physician.

D. Ingestion

Drink plenty of water and seek medical attention.

E. General Advice

Immediately remove all contaminated clothing.

F. Protection for First-Aiders

Wear appropriate respiratory protection and protective clothing if ventilation is inadequate.

G. Most Important Symptoms and Effects, Both Acute and Delayed

No data available.

H. Notes to Physician

No data available.

5. Fire-Fighting Measures

Suitable (and Unsuitable) Extinguishing Media

Extinguishing media: Dry chemical powder

Specific Hazards Arising from the Chemical

Thermal decomposition may produce toxic substances such as ammonia, nitrogen oxides, carbon oxides, and hydrogen cyanide.

Advice for Firefighters

Specific methods: Ensure containers can be quickly emptied. In the event of a fire nearby, move exposed containers to a safe area.

Protective equipment and precautions: Wear self-contained breathing apparatus (SCBA) and full protective gear.

6. Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures

Avoid contact with skin and eyes. Prevent inhalation of dust.

Environmental Precautions

Do not release into the environment. Prevent the product from entering drains or waterways.

Methods and Materials for Containment and Cleaning Up

Recovery: Collect the spilled material. Do not wash away with water.

Disposal: Incinerate the material in accordance with local and national regulations.

Reference to Other Sections : Not applicable.

7. Handling and Storage

A. Precautions for Safe Handling

Technical measures / Preventive measures:

Prior safety measures for storage and handling of this product: solid, may form dust, hazardous, and irritating. Install proper exhaust ventilation at machinery or locations where dust may be generated. Provide safety showers and eye-wash stations.

Safe handling advice:

Avoid creating dust. Keep away from open flames.

Hygiene considerations:

Avoid inhalation of dust. Avoid contact with skin and eyes.

Do not eat, drink, or smoke while handling the product.

Wash hands after handling. Remove contaminated clothing and protective equipment before entering eating areas.

B. Conditions for Safe Storage

Incompatible materials: Store separately from strong oxidizing agents and strong acids.

Packaging materials: Recommended: Cardboard lined with polyethylene.

C. Specific End Use(s)

No data available.

8. Exposure Controls / Personal Protection

A. Explosion Limits (Dust):

Source	Date	Exposure Type	Exposure Limit (ppm)	Exposure Limit (mg/m ³)	Remarks
ACGIH (US)	03 2014	TWA	-	3	Respirable particles
ACGIH (US)	03 2014	TWA	-	10	Inhalable particles

B. Exposure Standards : Not applicable.

Exposure Controls:

Ensure adequate ventilation and/or exhaust in the workplace.

Maintain documentation on safe handling methods, including engineering controls and personal protective equipment.

Load and unload the material in an intact and undamaged condition.

Consider engineering techniques to minimize exposure.

Conduct regular monitoring and inspections to reduce leaks or emissions.

Personal Protective Equipment:

Respiratory protection: Effective dust mask.

Hand protection: Rubber gloves or PVC gloves.

Eye/face protection: Safety goggles or face shield.

Body protection: Protective clothing and safety boots.

Environmental Exposure Control: Do not release into the natural environment.

9. Physical and Chemical Properties

Product Characteristics

Property		Description
A. Appearance (physical state, color, etc.)	Form	Solid (powder)
	Color	White
	Particle size	> 100 µm
B. Odor		Almost none
C. Odor threshold		No data available
D. pH		No data available
E. Melting/Freezing point		120 - 121 °C
F. Initial boiling point and boiling range		Decomposes upon heating
G. Flash point		Not applicable
H. Evaporation rate		No data available
I. Flammability (solid, gas)		Not flammable
J. Upper/lower flammability or explosive limits		Minimum ignition energy: 16 Mj
K.. Vapor pressure		0.215 Pa at 20 °C (OECD Test Guideline 104)

L. Solubility	No data available
M. Density / Relative density	1.130 kg/m ³ at 153 °C
N. Specific gravity	No data available
O. Partition coefficient n-octanol/water (log Kow)	log Kow: -0.71 at 25 °C (OECD Guideline 107) log Kow: -0.76 (Quantitative Structure–Activity Relationship, QSAR)
P. Auto-ignition temperature	Not applicable (decomposes when heated)
Q. Decomposition temperature	260 °C
R. Viscosity	No data available
S. Molecular weight	No data available
T. Explosive properties	May form explosive dust-air mixtures in the presence of an ignition source
U. Oxidizing properties	Not relevant (based on chemical structure)

Other Data

Solubility in Other Solvents:	Xylene: approx. 10 g/L Chloroform (odor observed): approx. 10 g/L Ethyl acetate: approx. 50 g/L
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10. Stability and Reactivity

A. Chemical Stability and Possibility of Hazardous Reactions

No data available.

B. Conditions to Avoid

Keep away from all moisture. Avoid heat and sources of ignition.

C. Incompatible Materials

Strong oxidizing agents, strong acids.

D. Hazardous Decomposition Products

Thermal decomposition (above 260 °C) may generate toxic substances such as:
Ammonia, nitrogen oxides (NO_x), carbon oxides (CO, CO₂), hydrogen cyanide (HCN).

Store in a dry place away from all moisture. Keep away from heat and sources of ignition.

E. Chemical Stability

Stable under normal handling and storage conditions.

F. Possibility of Hazardous Reactions

No data available.

11. Toxicological Information

A. Likely Routes of Exposure

Toxicokinetics (Absorption, Distribution, Metabolism, and Excretion): May be absorbed through the skin.
(Test method: OECD Test Guideline 428)

B. Health Hazard Information

Acute Toxicity	Oral	Harmful if swallowed. Effects in animals: LD50(rat)= 1320 mg/kg bw
	Dermal	Slightly harmful in contact with skin. Effects in animals: 3,200 - 4,200 mg/kg bw
	Inhalation	Vapors produced during thermal decomposition at high temperatures may irritate the respiratory system. Toxic effects due to inhalation of decomposition vapors cannot be excluded.
Skin Corrosion/Irritation		Not irritating to skin. Effects in animals: No skin irritation observed (rabbit)
Serious Eye Damage/Eye Irritation		Irritating to eyes. Effects in animals: Severe eye damage or irritation observed (rabbit)
Respiratory Sensitization		No data available.
Skin Sensitization		Not a skin sensitizer. Effects in animals: No sensitization observed (guinea pig)
Carcinogenicity	IARC	No data available.
	NTP	No data available.
	OSHA	No data available.
	ACGIH	No data available.
Carcinogenicity	KOSHA (Korea Occupational Safety and Health Act)	No data available.
	Ministry of Employment and Labor (Korea)	No data available.
	EU CLP	No data available.
Germ Cell Mutagenicity		Based on in vivo and in vitro test results, the substance is not considered genotoxic. In vitro gene mutation test: Negative (OECD TG 471) In vitro chromosome aberration test: Negative (OECD TG 473) In vivo mouse micronucleus test: Negative
Reproductive Toxicity		<p>Fertility: May impair fertility based on experimental data. Animal data (two-generation study): NOAEL (maternal toxicity): 16 mg/kg bw/day NOAEL (fertility): 34.4 mg/kg bw/day NOAEL (lactation-related toxicity): 34.4 mg/kg bw/day (OECD TG 416, rat, oral) H295R steroidogenesis assay: Negative (OECD TG 456)</p> <p>Development of Offspring: May cause harm to the fetus based on experimental data. Animal data: NOAEL (developmental toxicity): 30 mg/kg bw/day (OECD TG 414, rat, oral) Malformations observed. NOAEL (no adverse effect level): 30 mg/kg bw/day (OECD TG 414, rabbit, oral)</p>

Specific Target Organ Toxicity – Single Exposure (STOT-SE)	No data available.
Specific Target Organ Toxicity – Repeated Exposure (STOT-RE)	Based on experimental data, the substance is not classified as STOT (repeated exposure). Animal data (oral): At high doses, effects on blood parameters, neurological symptoms, and liver damage were observed. NOAEL = 38–54 mg/kg bw (rat, 3-month study)
Aspiration Hazard	No data available.

12. Ecological Information

A. Aquatic Toxicity Assessment

All available relevant data for the product, its components listed in Section 3, and structurally similar substances/metabolites were considered in the hazard assessment.

Acute aquatic toxicity: Harmful to aquatic organisms.

B. Acute Toxicity

Fish	Harmful to fish with low acute toxicity. Based on comparison with test results of a similar product: 1H-1,2,4-Triazole, sodium salt: LC50 (96 h, Zebrafish <i>Danio rerio</i>) > 150 mg/L (Method: OECD Test Guideline 203).
Aquatic Invertebrates	Slightly harmful to daphnia. EC50 (48 h, <i>Daphnia magna</i>): > 495 mg/L (Method: OECD Test Guideline 202)
Aquatic Plants	Harmful to algae. ErC50 (72 h, <i>Selenastrum capricornutum</i>): 45 mg/L (Method: OECD Test Guideline 201)
Microorganisms	EC50 (3 h, activated sludge): > 1,000 mg/L (Method: OECD Test Guideline 209)

C. Chronic Aquatic Toxicity

Fish	NOEC (28 d, <i>Oncorhynchus mykiss</i>): > 100 mg/L (Method: OECD Test Guideline 215)
Aquatic Plants	NOECr (72 h, <i>Selenastrum capricornutum</i>): 3.5 mg/L (Method: OECD Test Guideline 201)

D. Terrestrial Toxicity (Acute)

Toxicity to soil-dwelling organisms	Soil organisms (earthworms): LC50 (14 d, <i>Eisenia fetida</i>): > 1,000 mg/kg (dry soil) (Method: OECD Test Guideline 207) Soil microorganisms: EC50: 0.353 mg/kg (dry soil) (Method: OECD Test Guideline 217) NOEC: 0.353 mg/kg (dry soil) (Method: OECD Test Guideline 216/217) NOEC (earthworm reproduction): 0.07081 mg/kg (dry soil) (Method: OECD Test Guideline 222)
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E. Persistence and Degradability

Hydrolysis Stability in Water:	Half-life > 30 days at 25 °C and pH 5, 7, and 9
Biodegradability	Not readily biodegradable. 16% degradation after 24 days (Method: OECD Test Guideline 301 A)

F. Bioaccumulative Potential

Bioaccumulative Potential	Low potential for bioaccumulation. log Kow: -0.71 at 25 °C (Method: OECD Test Guideline 107) log Kow: -0.76 (QSAR estimation)
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G. Mobility in Soil

No data available

H. Vapor Pressure

0.215 Pa at 20 °C (Method: OECD Test Guideline 104)

I. Adsorption/Desorption

See vapor pressure above (duplicated value reported)

J. PBT and vPvB Assessment

This substance is not considered to be PBT or vPvB in accordance with Annex XIII of REACH Regulation.

K. Other Adverse Effects

No data available

13. Disposal Considerations

A. Waste Disposal Method:

Dispose of the product by incineration in accordance with local laws and regulations.

B. Precautions for Disposal (including disposal of contaminated containers and packaging):

Incinerate packaging only at approved waste disposal facilities in accordance with local and national regulations.

14. Transport Information

Not classified as a hazardous material under transport regulations.

15. Regulatory Information

Chemical Name	CAS Number
1,2,4-Triazole	288-88-0

A. Regulations under the Chemical Control Act (Korea)

Not classified as a toxic substance under Article 2 (2).

Not classified as a restricted substance under Article 2 (3).

Not classified as a prohibited substance under Article 2 (4).

Not classified as a permitted substance under Article 2 (5).

Not classified as an accident preparedness substance under Article 2 (6).

This product does not contain any substances subject to the Pollutant Release and Transfer Register (PRTR).

B. Regulations under the Hazardous Materials Safety Control Act (Korea)

Not regulated as a hazardous material.

C. Regulations under the Occupational Safety and Health Act (Korea)

Not designated as a substance with occupational exposure limits under Article 106.

Not designated as a substance with allowable concentrations under Article 107 (1).

Not designated as a prohibited manufacturing substance under Article 117.

Not designated as a permitted substance under Article 118.

Not subject to Process Safety Management (PSM) reporting under Article 43 of the Enforcement Decree.

Not designated as a controlled hazardous substance under Article 420 of the Safety Standards.

Not subject to workplace environment monitoring under Table 21 of the Enforcement Rules.

Not subject to special health examinations under Table 22 of the Enforcement Rules.

D. Regulations under the Waste Management Act (Korea)

Waste must be classified according to its characteristics, and it is the user's responsibility to comply with applicable regulations.

E. Other Domestic and International Regulations

Not listed under the Chemical Weapons Convention (CWC) Schedule of Toxic Chemicals and Precursors.

Not listed under the Stockholm Convention on Persistent Organic Pollutants (POPs).

Not listed under the Montreal Protocol (Ozone-Depleting Substances).

Not listed under the Kyoto Protocol to the UNFCCC (Annex A, Greenhouse Gases).

Not listed under the Rotterdam Convention (PIC procedure for hazardous chemicals and pesticides).

F. Inventory Status

European Union/EEA (REACH): All components are either registered or exempt under REACH (EC No. 1907/2006). If purchased from an Arkema entity within the EEA, compliance is ensured. For purchases from outside the EEA, please contact your local representative.

TSCA (USA) : All components are listed.

NDSL (CA) : All components are listed on the DSL.

IECSC (CN) : All components are listed or exempt.

ENCS (JP) : All components are listed or exempt.

ISHL (JP) : All components are listed or exempt.

KECI (KR) : All components are listed or exempt.

PICCS (PH) : All components are listed or exempt.

NZIOC (NZ) : All components are listed or exempt.

AIIC (AU) : All components are listed or exempt.

TCSI (TW) : All components are listed or exempt.

16. Other Information

A. Full text of H and EUH statements mentioned in Sections 2 and 3:

H302 Harmful if swallowed.

H319 Causes serious eye irritation.

H360FD May damage fertility or the unborn child.

H412 Harmful to aquatic life with long lasting effects.

B. Revision History:

Section 2 – Hazards Identification: Updated classification and labeling

Section 11 – Toxicological Information: Revised

Section 12 – Ecological Information: Revised

C. Date of First Issue:

Not available

D. Number of Revisions / Date of Latest Revision:

Number of Revisions	time	Latest Revision Date	2022-07-07
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E. Abbreviations:

NOAEL : No Observed Adverse Effect Level

LOAEL : Lowest Observed Adverse Effect Level

bw : Body weight

food : Oral intake

dw : Dry weight

Note: In this document, "." is used as a thousands separator and "," as a decimal point.

F. Others:

○ The information provided in this Material Safety Data Sheet (MSDS) is believed to be accurate but is not exhaustive and should be used for guidance purposes only. The information is based on our current knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the product's properties. The supplier shall not be held liable for any damage resulting from handling or contact with the above product.