

SAFETY DATA SHEET

Date Printed : 01 Dec 2014

Date Updated : 9 Jan 2019

Version : Rev. 05

Regulation : In accordance with Regulation (EU) 2015/830 (REACH), Annex II

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1 Product identifier

Name of product : Glue stick (white)

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses : Adhesive for paper

Uses advised against : Use for recommended use only

1.3 Details of the supplier of the safety data sheet

Manufacturer/Supplier : DIXON TICONDEROGA

Street address/P.O. Box : 2525 N. Casaloma Dr. Appleton, WI 54913

Telephone number: 1-800-333-2545 (Fax: 1-800-332-5099)

1.4 Emergency Telephone

Emergency Telephone number : 1-800-333-2545

Opening hours : Not available

Other comments (e.g. language(s) of the phone service) : Not available

SECTION 2 : HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

2.1.1 Classification according to Regulation (EC) No. 1272/2008 [CLP] : Not classified

2.1.2 Additional information: Not available

2.2 Label elements

Hazard pictograms : Not applicable

Signal word : Not applicable

Hazard statement :

Not applicable

Additional precautionary statements :

Not applicable

2.3 Other hazards

No information available

SECTION 3 : COMPOSITION/INFORMATION ON INGREDIENTS

This product is not considered a hazardous substance as defined in the OSHA Hazard Communication Standard (29 CFR 1910.1200).

SECTION 4 : FIRST-AID MEASURES**4.1 Description of first aid measures**

General notes : Not available

Following inhalation

- Not applicable

Following skin contact

- Wash effected areas with soap and water.
- Get medical attention if irritation develops or persists.

Following eye contact

- Immediately flush eyes with plenty of water for at least 15 minutes, lifting the upper and lower eyelids.
- If irritation persists, get medical attention.

Following ingestion

- Rinse mouth with water. Get medical attention.

Self-protection of the first aider : Not available

4.2 Most important symptoms and effects, both acute and delayed

Acute effects : None known

Delayed effects : None known

4.3 Indication of immediate medical attention and special treatment needed

- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.

SECTION 5 : FIRE-FIGHTING MEASURES**5.1 Extinguishing media****Suitable extinguishing media:**

- Use dry sand, dry chemical, alcohol-resistant foam, water spray, regular foam, CO₂.

Unsuitable extinguishing media: High pressure water streams

5.2 Special hazards arising from the substance or mixture

- May be ignited by heat, sparks or flames.
- Containers may explode when heated.
- Some of these materials may burn, but none ignite readily.
- Fire will produce irritating and/or toxic gases.
- If inhaled, may be harmful.

5.3 Advice for firefighters

- Dike fire-control water for later disposal; do not scatter the material.
- Move containers from fire area if you can do it without risk.
- Fire involving Tanks; Cool containers with flooding quantities of water until well after fire is out.
- Fire involving Tanks; Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- Fire involving Tanks; Always stay away from tanks engulfed in fire.

SECTION 6 : ACCIDENTAL RELEASE MEASURES**6.1 Personal precautions, protective equipment and emergency procedures****For non-emergency personnel****Protective equipment :**

- Use personal protective equipment, see Section 8.

Emergency procedures :

- Stop leak if you can do it without risk.
- Eliminate all ignition sources.
- Ventilate the area.
- Do not touch or walk through spilled material.
- Prevent dust cloud.

For emergency responders

- Stop leak if you can do it without risk.
- Eliminate all ignition sources.
- Ventilate the area.
- Do not touch or walk through spilled material.
- Prevent dust cloud.

6.2 Environmental precautions

- Prevent entry into waterways, sewers, basements or confined areas.

6.3 Methods and material for containment and cleaning up**For containment**

- Small Spill; Flush area with flooding quantities of water. And take up with sand or other non-combustible absorbent material and place into containers for later disposal.
- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

For cleaning up :

- Small Spill; Flush area with flooding quantities of water. And take up with sand or other non-combustible absorbent material and place into containers for later disposal.
- Large Spill; Dike far ahead of liquid spill for later disposal.
- Absorb the liquid and scrub the area with detergent and water.

Other information: Not available

6.4 Reference to other sections

- See also sections 8 and 13 of the Safety Data Sheet.

SECTION 7 : HANDLING AND STORAGE

7.1 Precautions for safe handling

Protective measures :

- Please note that materials and conditions to avoid.
- Please work with reference to engineering controls and personal protective equipment.
- Be careful to high temperature.

Measures to prevent fire :

- Be careful to high temperature.

Measures to prevent aerosol and dust generation : Not available

Measures to protect the environment : Not available

Advice on general occupational hygiene :

- Wash thoroughly after handling

7.2 Conditions for safe storage, including any incompatibilities

Technical measures and storage conditions :

- Store in a closed container.
- Store in cool and dry place.

Packaging materials : Not available

Requirements for storage rooms and vessels :

- Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of.
- Store locked up.

Further information on storage conditions : Not available

7.3 Specific end use(s)

Recommendations : Not available

Industrial sector specific solutions : Not available

SECTION 8 : EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters

Occupational Exposure limits

Name	Korea regulation	ACGIH regulation	Biological exposure index	OSHA regulation	NIOSH regulation	EU regulation
GLYCERINE	TWA = 10 mg/m ³	TWA = 10 mg/m (mist)	Not available	TWA = 15 mg/m ³ (Total dust), 5 mg/m ³ (Respirable fraction)	Not available	Not available

8.2 Exposure controls

8.2.1 Appropriate engineering controls :

Substance/mixture related measures to prevent exposure during identified uses: No information available

Structural measures to prevent exposure: No information available

Organisational measures to prevent exposure: No information available

Technical measures to prevent exposure: No information available

8.2.2 Individual protection measures, such as personal protective equipment :

Eye and face protection : None required

Skin protection

Hand protection : None required

Other skin protection : None required

Respiratory protection : None required

8.2.3 Environmental exposure controls

Substance/mixture related measures to prevent exposure: Wash thoroughly after handling.

Instruction measures to prevent exposure: Not available

Organisational measures to prevent exposure: Not available

Technical measures to prevent exposure: Not available

SECTION 9 : PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Appearance

Description : Semi-Solid

Color : White

Odor : Characteristic

Odor threshold : Not available

pH : 10.0 ~ 11.0(10% Aqueous Solution)

Melting point/freezing point : 60 °C./-5°C

Initial boiling point and boiling range : Not available

Flash point : Not applicable

Evaporation rate : Not available

Flammability (solid, gas) : Not applicable

Upper/lower flammability or explosive limits : Not applicable

Vapor pressure : Not available

Solubility (ies) : Dilutable

Vapor density : Not available

Relative density : 1.06

Partition coefficient: n-octanol/water : Not available

Auto ignition temperature : Not available

Decomposition temperature : Not available

Viscosity : Not available

Explosive properties : Not available

Oxidizing properties : Not available

Molecular weight : Not available

9.2 Other information : No information available

SECTION 10 : STABILITY AND REACTIVITY

10.1 Reactivity :

- Fire may produce irritating and/or toxic gases.

10.2 Chemical stability

- The product is stable under normal conditions.

10.3 Possibility of hazardous reactions

- No data available

10.4 Conditions to avoid

- Heat, sparks or flames

10.5 Incompatible materials

- No data available

10.6 Hazardous decomposition products

- No data available

SECTION 11 : TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

(a) Acute toxicity;	
Oral	- POLY VINYL PYRROLIDONE : Rabbit LD ₅₀ = 1,040 mg/kg - GLYCERINE : Rat LD ₅₀ = 27,200 mg/kg (female) - PROPYLENE GLYCOL : Rat LD ₅₀ = 22,000 mg/kg - SODIUM STEARATE/SODIUM PALMITATE : Rat LD ₅₀ > 5,000 mg/kg (OECD TG 401, GLP)
Dermal	- GLYCERINE : Guinea pig LD ₅₀ = 56,750 mg/kg

	- PROPYLENE GLYCOL : Rabbit LD ₅₀ > 2,000 mg/kg
Inhalation	- GLYCERINE : Rat LC ₅₀ > 2.75 mg/L/4hr (male) - PROPYLENE GLYCOL : Rabbit LC ₅₀ > 158.5 mg/m ³ /4hr (LC ₅₀ > 317042 mg/m ³ air/2h)
(b) Skin Corrosion/ Irritation;	- GLYCERINE : In test on skin irritation with rabbits, skin irritations were not observed. - PROPYLENE GLYCOL : In skin irritation test with rabbits, skin irritations were not observed(OECD TG 404). - SODIUM STEARATE/SODIUM PALMITATE : In test on skin irritation with rabbits, skin irritations were not observed.(OECD TG 404, GLP)
(c) Serious Eye Damage/ Irritation;	- GLYCERINE : In test on eyes irritation with rabbits, eyes irritations were not observed. - PROPYLENE GLYCOL : In eyes irritation test with rabbits, eyes irritations were not observed(OECD TG 405). - SODIUM STEARATE/SODIUM PALMITATE : In eyes irritation test with rabbits, irritations were not observed.(OECD TG 405, GLP)
(d) Respiratory sensitization;	Not available
(e) Skin Sensitization;	- PROPYLENE GLYCOL : In skin sensitisation test with guinea pigs, skin sensitisations were not observed(OECD TG 406). - SODIUM STEARATE/SODIUM PALMITATE : In guinea pig maximisation test, skin sensitisation was not observed.(OECD TG 406)
(f) Carcinogenicity;	• IARC : - POLY VINYL PYRROLIDONE : Group 3 - KOREA-ISH, ACGIH, NTP, OSHA, EC Directive 1272/2008, US EPA: Not listed
(g) Mutagenicity;	- POLY VINYL PYRROLIDONE : Negative reaction were observed in AMES test with ALMONELLA TYPHIMURIUM. - GLYCERINE : Negative reactions were observed in in vitro test(Chromosomal aberrations test(OECD TG 473), unscheduled DNA synthesis test(OECD TG 482), Ames test(OECD TG 471, GLP)). - PROPYLENE GLYCOL : Negative reactions were observed in both in vitro-Mammalian Chromosome Aberration Test(OECD TG 473), bacterial reverse mutation assay and in vivo-mammalian bone marrow chromosome aberration test. - SODIUM STEARATE/SODIUM PALMITATE : Negative reactions were observed in both in vitro (Bacterial gene mutation test (OECD TG 471, GLP), Mammalian Chromosome Aberration Test (OECD TG 473, GLP), Mammalian Cell Gene Mutation Test(OECD TG 476)).
(h) Reproductive toxicity;	- GLYCERINE : In reproductive/developmental oral toxicity study, there were no significant adverse effects on reproductive parameters and no evidence of malformations at any doses.(NOAEL =8000-10000 mg/kg bw) - PROPYLENE GLYCOL : In reproductive/developmental toxicity study with mice, no test material-related adverse effects were observed(OECD TG 414, GLP). - SODIUM STEARATE/SODIUM PALMITATE : In developmental(OECD TG 414, GLP) toxicity studies with rats, there were no significant adverse effects on reproductive parameters and no evidence of malformations at any doses.
(i) Specific target organ toxicity (single	- GLYCERINE : In acute oral toxicity test with rats, Muscle spasms and clonic convulsions were observed.

exposure);	<p>- PROPYLENE GLYCOL : In acute oral toxicity study (doses: 15~25 mL/kg gw) with rats, hemorrhagic areas in the small intestine, microscopic changes in kidney and slight congestion of the liver were observed.</p> <p>- SODIUM STEARATE/SODIUM PALMITATE : In acute oral toxicity study with rats, 20 minutes after treatment, the symptoms were strongly ruffled fur and slightly decreased activity. This symptoms subsided completely within 24 hours.</p>
(j) Specific target organ toxicity (repeat exposure);	<p>- GLYCERINE : In repeated oral toxicity test with rats, In the male rats was an increase in the final liver/body weight ratio and upon microscopic examination generalized cloudy swelling and hypertrophy of the parenchymal cells was observed. The only effect in the female rats on this level was some generalized cloudy selling upon microscopic examination of the liver.</p> <p>- PROPYLENE GLYCOL : In subchronic inhalation toxicity study with rats, nasal haemorrhagings were observed.</p> <p>- SODIUM STEARATE/SODIUM PALMITATE : In repeated oral toxicity study with rats for 90 days, there were effects in food consumption, water consumption. But no histopathological changes and toxicological significance were observed.(OECD TG 408, GLP)</p>
(k) Aspiration Hazard;	No information available

SECTION 12 : ECOLOGICAL INFORMATION

12.1 Toxicity	
Acute toxicity	<p>Fish :</p> <p>- GLYCERINE : 96hr-LC₅₀ (<i>Salmo gairdneri</i>) = 54000 mg/L</p> <p>- PROPYLENE GLYCOL : 96hr-LC₅₀ (<i>Oncorhynchus mykiss</i>) = 40613 mg/L</p> <p>- SODIUM STEARATE/SODIUM PALMITATE : 96hr-LC₅₀ (<i>Brachydanio rerio</i>) = 46 mg/L (OECD TG 203, GLP)</p> <p>Invertebrates :</p> <p>- GLYCERINE : 48hr-EC₅₀ (<i>Daphnia magna</i>) = 1955 mg/L</p> <p>- PROPYLENE GLYCOL : 48hr-LC₅₀ (<i>Ceriodaphnia dubia</i>) = 18340 mg/L ,7d-NOEC(<i>Ceriodaphnia</i> sp) = 13020 mg/L</p> <p>- SODIUM STEARATE/SODIUM PALMITATE : 24hr-EC₅₀ (<i>Daphnia magna</i>) = 40 mg/L</p> <p>Algae :</p> <p>- PROPYLENE GLYCOL : 72hr-EC₅₀ (<i>Skeletonema costatum</i>) = 19300 mg/L (OECD TG 201, GLP)</p> <p>- SODIUM STEARATE/SODIUM PALMITATE : 96hr-EC₅₀ (<i>Scenedesmus subspicatus</i>) = 120 mg/L (GLP)</p>
Chronic toxicity	No information available
12.2 Persistence and Degradability	<p>Persistence :</p> <p>- GLYCERINE : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -1.75) (25 °C)(OECD TG 107)</p> <p>- PROPYLENE GLYCOL : Low persistency (log Kow is less than 4 estimated.) (Log Kow = -1.07) (EU Method A.8, GLP)</p> <p>- SODIUM STEARATE/SODIUM PALMITATE : Low persistency (log Kow is less than 4 estimated.) (Log Kow = 3.3) (OECD TG 107)</p> <p>Degradability : Not available</p>

12.3 Bioaccumulative potential	<p>Bioaccumulation :</p> <ul style="list-style-type: none"> - GLYCERINE : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 3.162) (Estimated) - PROPYLENE GLYCOL : Bioaccumulation is expected to be low according to the BCF < 500 (BCF = 0.09) <p>Biodegradation :</p> <ul style="list-style-type: none"> - GLYCERINE : As well-biodegraded, it is expected to have low accumulation potential in living organisms (60% biodegradation was observed after 2 hr) - PROPYLENE GLYCOL : As well-biodegraded, it is expected to have low accumulation potential in living organisms (106.8% biodegradation was observed after 28 day) (OECD TG 301F, GLP) - SODIUM STEARATE/SODIUM PALMITATE : As well-biodegraded, it is expected to have low accumulation potential in living organisms (86% biodegradation was observed after 28 day) (OECD TG 301E, GLP)
12.4 Mobility in soil	<ul style="list-style-type: none"> - GLYCERINE : Low potency of mobility to soil. (Koc = 0.1345) (estimated) - PROPYLENE GLYCOL : Low potency of mobility to soil. (Koc = 2.9)
12.5 Results of PBT and vPvB assessment	No information available
12.6 Other adverse effects	This product does not cause water pollution.
12.7 Hazardous to the ozone layer	Not applicable

SECTION 13 : DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product/Packaging disposal

- Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Waste codes / Waste designation according to LoW(2015) : 20 01 28

Waste treatment-relevant information

- Consider the required attentions in accordance with waste treatment management regulation.

Sewage disposal-relevant information: Not available

Other disposal recommendations: Not available

SECTION 14 : TRANSPORT INFORMATION

14.1 UN Number : Not applicable to the criteria for classification.

14.2 UN Proper shipping name : Not applicable to the criteria for classification.

14.3 Transport Hazard class : Not applicable to the criteria for classification.

(This product is not applicable to hazard transport)

14.4 Packing group : Not applicable to the criteria for classification.

14.5 Environmental hazards : Not applicable to the criteria for classification.

14.6 Special precautions for user

in case of fire : Not applicable

in case of leakage : Not applicable

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not applicable

SECTION 15 : REGULATORY INFORMATION

15.1 Safety, health and environmental regulation/legislation specific for the substance or mixture

EU Regulatory Information

EU classification :

EU CLP 2008 :

Classification : Not classified

Hazard statement codes : Not applicable

EU SVHC list : Not regulated

EU Authorisation List : Not regulated

EU Restriction list : Not regulated

Foreign Regulatory Information

External information :

U.S.A management information (OSHA Regulation) : Not regulated

U.S.A management information (CERCLA Regulation) : Not regulated

U.S.A management information (EPCRA 302 Regulation) : Not regulated

U.S.A management information (EPCRA 304 Regulation) : Not regulated

U.S.A management information (EPCRA 313 Regulation) : Not regulated

Australia management information : Inventory of Chemical Substances (AICS):

- 2-Pyrrolidinone, 1-ethenyl-, homopolymer : Present

- Natural polymer : Present

- 1,2,3-Propanetriol : Present

- 1,2-Propanediol : Present

- Fatty acids, (C=16-18), sodium salts : Present

- Water: Present

- Carbamic acid, butyl-3-iodo-2- propynyl ester : Present

China management information : Inventory of Existing Chemical Substances (IECSC):

- 2-Pyrrolidinone, 1-ethenyl-, homopolymer : Present [21730]

- Natural polymer : Present [26037]

- 1,2,3-Propanetriol : Present [13479]

- 1,2-Propanediol : Present [03186]

- Fatty acids, (C=16-18), sodium salts : Present [41779]

- Water: Present [32224]

- Carbamic acid, butyl-3-iodo-2- propynyl ester : Present [05843]

Philippines management information : Inventory of Chemicals and Chemical Substances

(PICCS):

- 2-Pyrrolidinone, 1-ethenyl-, homopolymer : Present

- Natural polymer : Present

- 1,2,3-Propanetriol : Present

- 1,2-Propanediol : Present

- Water: Present

- Carbamic acid, butyl-3-iodo-2- propynyl ester : Present

Korea management information :

A. Industrial Safety and Health Act :

- GLYCERINE : Occupational exposure limits listed

B. Dangerous goods Safety Management Law :

- GLYCERINE : Petroleum class 4-3 (water soluble liquid), 4000ℓ

- PROPYLENE GLYCOL : Petroleum class 4-3 (water soluble liquid), 4000ℓ

Substance of Roterdame Protocol : Not regulated

Substance of Stockholme Protocol : Not regulated

Substance of Montreal Protocol : Not regulated

15.2 Chemical safety assessment : No chemical safety assessment has been carried out for this product by the supplier.

SECTION 16 : OTHER INFORMATION

Product safety data sheet for Glue stick (white) prepared in accordance with Regulation (EU) 2015/830 (REACH), Annex II

16.1 Indication of changes

Date Updated : 9 Jan 2019

Version : Rev. 05

16.2 Abbreviations and acronyms

ACGIH = American Conference of Government Industrial Hygienists

CLP = Classification Labelling Packaging Regulation ; Regulation (EC) No 1272/2008

CAS No. = Chemical Abstracts Service number

DMEL = Derived Minimal Effect Levels

DNEL = Derived No Effect Level

EC Number = EINECS and ELINCS Number (see also EINECS and ELINCS)

EU = European Union

IARC = International Agency for Research on Cancer

ISHL = Industrial Safety & Health Law

NIOSH = National Institute for Occupational Safety & Health

NTP = National Toxicology Program

OSHA = European Agency for Safety and Health at work

PBT = Persistent, Bioaccumulative and Toxic substance

PNEC(s) = Predicted No Effect Concentration(s)

REACH = Registration, Evaluation, Authorisation and Restriction of Chemicals Regulation (EC) No 2015/830

STP = Sewage Treatment Plant

SVHC = Substances of Very High Concern

vPvB = Very Persistent and Very Bioaccumulative

UN = United Nations

MARPOL = International Convention for the Prevention of Pollution from Ships (IMO)

IBC = Intermediate Bulk Container

CERCLA = Comprehensive Environmental Response, Compensation & Liability Act (US)

EPCRA = Emergency Planning and Community Right-to-Know Act (US)

EINECS = European Inventory of Existing Commercial chemical Substances

ELINCS = European List of Notified Chemical Substances

16.3 Key literature reference and sources for data :

U.S. National Library of Medicine (NLM) Hazardous Substances Data Bank (HSDB)

Korea Occupational Health & Safety Agency: <http://www.kosha.net>

IUCLID: <http://ecb.jrc.ec.europa.eu/IUCLID-DataSheets/7631905.pdf>

CHRIP(CheMical Risk Information Platform)

EPISUITE v4.0: <http://www.epa.gov/opt/exposure/pubs/episuitedl.htm>

The Chemical Database (ARKON): <http://ull.chemistry.uakron.edu/erd/>

ECOTOX: <http://cfpub.epa.gov/ecotox/>

International Chemical Safety Cards (ICSC): <http://www.nihs.go.jp/ICSC/>

Waste Control Act enforcement regulation attached [1]

National Chemical Information System (<http://ncis.nier.go.kr>)

Korea Dangerous Material Inventory Management System (<http://hazmat.nema.go.kr>)

REACH information on registered substances; <https://echa.europa.eu/information-on-chemicals/registered-substances>

EU CLP; <https://echa.europa.eu/information-on-chemicals/cl-inventory-database>

NIOSH Pocket Guide; <http://www.cdc.gov/niosh/npg/npgdcas.html>

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans; <http://monographs.iarc.fr>

National Toxicology Program; <http://ntp.niehs.nih.gov/results/dbsearch/>

TOMES-LOLI®; <http://www.rightanswerknowledge.com/loginRA.asp>

American Conference of Governmental Industrial Hygienists TLVs and BEIs.

16.4 Classification and procedure used to derive the classification for mixtures according to Regulation(EC) 1272/2008(CLP):

Classification according to Regulation (EC) 1272/2008

Classification procedure

16.5 Relevant R-phrases and/or H-statements (number and full text) : Not applicable

16.6 Training advice :

- Do not handle until all safety precautions have been read and understood.

16.7 Further information :

- This safety data sheet (SDS) is authored by translating and revising the MSDS which is authored by AMOS CORPORATION. The content is based on the latest information and knowledge that we currently possess and some of these referred to KOSHA information.
- This SDS was authored to aid buyer, processor or any other third person who handles the chemical of subject in the SDS; additionally, it does not warrant suitability of the chemical for special purposes or the commercial use of statements that approves the use of it in combination with other chemicals as well as technical or legal liabilities.
- The content of the SDS may vary depending on the country or the region and may not coincide with the actual regulations. Therefore, the buyer or the processor of the chemical is responsible for observing responsible government's or the region's regulations.
- This safety data sheet (SDS) is based on the legal provisions of the REACH Regulation, as amended. Its contents are intended as a guide to the appropriate precautionary handling of the material. It is the responsibility of recipients of this SDS to ensure that the information contained therein is properly read and understood by all people who may use, handle, dispose or in any way come in contact with the product. Information and instructions provided in this SDS are based on the current state of scientific and technical knowledge at the date of issue indicated. It should not be construed as any guarantee of technical performance, suitability for particular applications, and does not establish a legally valid contractual relationship. This version of the SDS supersedes all previous versions.