

Dendritech, Inc.

SAFETY DATA SHEET

Revision Date: 4June15

1. PRODUCT AND COMPANY IDENTIFICATION

1.1 Product identifiers

Product Name : Polyamidoamine (PAMAM) dendrimer, succinamic acid surface, aqueous solution (all generations)
Family Code : 621
Brand : Dendritech

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

Identified uses : Laboratory research chemical, manufacture of substances, no food use

1.3 Supplier Details

Company : Dendritech, Inc.
3110 Schuette Drive
Midland, Michigan
USA
Telephone: 989-496-2016
Fax: 989-496-2051

1.3 Emergency telephone number

Emergency Number : CHEMTREC™ 1-800-424-9300 (Outside USA: 703-527-3887)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance or mixture

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

This mixture is not considered hazardous under current GHS guidelines.

Nonhazardous ingredients are polyamidoamine and water.

Not an eye or skin irritant under GHS guidelines..

2.2 GHS Label elements, including precautionary statements

Pictogram: No hazard symbols required

Signal word: No signal word required

Hazard statement(s): None required

Precautionary statement(s)

P281 Use personal protective equipment as required.
P301+312 IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell
P302+352 IF ON SKIN: Wash with soap and water.
P305+351+338 IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
P333+313 IF skin irritation or a rash occurs: Get medical advice/attention.
P411+235 Store at temperatures not exceeding 10°C/50°F. Keep cool.
P370 + P378 In case of fire: Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide for extinction.

P501

Dispose of contents/ container to an approved waste disposal plant.

2.3 Hazards not otherwise classified (HNOC) or not covered by GHS – none

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

Description : Polyamidoamine (PAMAM), succinamic acid surface, aqueous solution.

Molecular Weight : Variable depending on dendrimer product generation; from 4500 to 80,000 MW

Hazardous components: None

Nonhazardous components:

Component	Classification	Concentration
Polyamidamine, succinamic acid surface, in water	No acute hazards	5-90 weight%
	NFPA ratings: Health 0 Fire 0 Reactivity 0	

Polyamidoamine dendrimer, succinamic acid surface, has no CAS numbers assigned. The primary amine “base” dendrimer family is represented by CAS number 93376-66-0 (Generation 2.0). The surface group for the succinamide dendrimers is –NH-CO-CH₂CH₂-CO-OH.

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

If inhaled

Inhalation is unlikely. If somehow aspirated into lungs, move person into fresh air. Consult a physician.

In case of skin contact

Wash off with soap and plenty of water. Remove contaminated clothing. Consult a physician if irritation is present after washing.

In case of eye contact

Flush eyes with water for 15 minutes as a precaution. Consult a physician if irritation is present after washing.

If swallowed

Consult a physician immediately.

4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labeling (see section 2.2) and/or in section 11.

4.3 Indication of any immediate medical attention and special treatment needed

No data available

5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media

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

5.2 Special hazards arising from the substance or mixture

Will produce carbon and nitrogen oxides and varied nitrogen-containing products upon combustion.

5.3 Advice for firefighters

Wear self contained breathing apparatus and protective fire clothing.

5.4 Further information

Hazardous polymerization does not occur.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures

Wear protective clothing and ensure adequate ventilation when cleaning spills. Gloves (nitrile gloves preferred) and goggles are minimum protective equipment for larger spills.

For personal protection see section 8.

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains, sewers or waterways. Biodegrades in water.

6.3 Methods and materials for containment and cleaning up

Contain spillage and then collect with an explosion proof vacuum cleaner or pump, or by wet-brushing and place in container for disposal according to local regulations (see section 13). Small spills can soaked up in noncombustible absorbent material like sand, silica gel or clay.

6.4 Reference to other sections

For disposal see section 13.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Minimum personal protective equipment are rubber gloves (nitrile gloves recommended) and safety glasses. Goggles and impervious clothing should be worn if contact with large quantities is possible.

For precautions see section 2.2.

7.2 Conditions for safe storage, including any incompatibilities

Avoid contact with copper and copper-containing alloys.

Avoid contact with strong oxidizing or reducing agents, acids and acid halides (possible reaction hazard).

Recommended storage temperature: 2 - 8 °C for long term storage of dendrimer solutions to maintain product quality.

7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1 Control parameters

Components with workplace control parameters

Polyamidoamine dendrimers component have no workplace control parameters (e.g. ACGIH, TLV or PEL limits) established.

Biological occupational exposure limits

None determined.

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

Safety glasses are minimum protection. Use goggles if contact with larger quantities is possible. 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. Nitrile rubber gloves are preferred. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to minimize skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Body Protection

Complete suit protecting against chemicals may be required for large quantity handling,

Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls (adequate ventilation).

Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains or waterways.

9.0 PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

- | | |
|------------------------------------|---------------------------------|
| a) Appearance | : Clear yellow liquid |
| b) Odor | : Essentially odorless |
| c) Odor Threshold | : Not applicable |
| d) pH | : 3-4, approximately |
| e) Melting point/freezing point | : varies with dendrimer content |
| f) Initial boiling point | : no data available |
| g) Flash point | : no data available |
| h) Evaporation rate | : no data available |
| i) Flammability (solid, gas): | : no data available |
| j) Upper/lower flammability limits | : no data available |
| k) Vapour pressure | : no data available |

l) Vapour density	: no data available
m) Relative density	: no data available
n) Water solubility	: highly water soluble
o) Partition coefficient: n-octanol/water	: no data available
p) Auto-ignition temperature	: no data available
q) Decomposition temperature	: no data available
r) Viscosity	: no data available.
s) Explosive properties	: no data available
t) Oxidizing properties	: no data available

9.2 Other safety information

No data available

10. STABILITY AND REACTIVITY

10.1 Reactivity

Avoid contact with chemicals that can react with amines, as heat and pressure could be generated. Examples are shown in section 10.5.

10.2 Chemical stability

Stable under recommended storage conditions and normal use conditions.

10.3 Possibility of hazardous reactions

Hazardous polymerization will not occur.

10.4 Conditions to avoid

Extremes of temperature can lead to deterioration in product quality.

10.5 Incompatible materials

Acid chlorides, acid anhydrides, oxidizing agents, alkali metals, reducing agents, acids, reactive monomers like acrylates. Avoid contact with copper, brass or other copper alloys in piping and containers.

10.6 Hazardous decomposition products

Oxides of carbon and nitrogen can be formed under fire conditions.
In the event of fire: see section 5.

11. TOXICOLOGICAL INFORMATION

11.1 Information on toxicological effects

Note that the data below are for aqueous solutions of polyamidoamine (PAMAM) dendrimers with primary amine surfaces which show low acute hazard. The succinamic acid surfaces of this MSDS have been shown in external studies to be of even lower toxicity than the primary amine surfaces.

Acute toxicity

(G1 and G5 dendrimers tested)

Oral:	
LD50/rat	: > 5000 mg/kg
Inhalation:	
LC50/4 h/rat	: Not applicable
Dermal:	
LD50/rabbit	: >2000 mg/kg

Inhalation

The polyamidoamine dendrimer has a very high vapor pressure and significant airborne concentrations are unlikely.

Ingestion

LD50 (rats) : >5000 mg/kg.

Not considered acutely toxic.

Skin corrosion/irritation

Not considered a skin irritant.

Serious eye damage/eye irritation

Essentially non-irritating to the eyes.

Respiratory or skin sensitization

(G2 dendrimer tested)

Buehler tests (guinea pig) indicated a G2 dendrimer neutralized to pH=7 was not a skin sensitizer.

Germ cell mutagenicity

Was not a mutagen by Ames bacterial testing to several Salmonella typhimurium tester strains.

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.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

Reproductive toxicity

No information.

Teratogenicity

No information.

Specific target organ toxicity - single exposure

None observed.

Specific target organ toxicity - repeated exposure

No information.

Aspiration hazard

Minimal due to low vapor pressure. Sticky, very viscous liquid when dry. No particulates.

Additional Information

None.

12. ECOLOGICAL INFORMATION**12.1 Toxicity**

Not determined.

12.2 Persistence and degradability

Readily biodegradable; completely miscible with water

12.3 Bioaccumulative potential

Not expected to bioaccumulate due to high water solubility.

12.4 Mobility in soil

Will tend to accumulate in soil pore water.

12.5 Results of PBT and vPvB assessment

Would not be expected to be persistent or bioaccumulating. Toxicity could be similar to other polyamines.

12.6 Other adverse effects

None known

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods

Product

Burn 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

Dispose of as unused product.

14. TRANSPORT INFORMATION

There are no specific transportation requirements (e.g. UN number or packing group) under DOT (US), IMDG or IATA.

15. REGULATORY INFORMATION

Labelling according to EC Directives

None

SARA 302 Components

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

SARA 313 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 313.

SARA 311/312 Hazards

None

Pennsylvania Right To Know Components

None

New Jersey Right To Know Components

None

California Prop. 65 Components

Does not contain any chemical known to the State of California to cause birth defects or other reproductive harm.

16. OTHER INFORMATION

NFPA Rating

Health hazard: 0

Fire Hazard: 0

Reactivity Hazard: 0

Further information

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Preparation Information

Dendritech, Inc.

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