SECTION 1: Identification

1.1 GHS Product identifier

Product name Diquat dibromide

1.2 Other means of identification

Product number -
Other names DEIQUAT 1-HYDRATE; diquat dication dibromide; Diquat dibromide

1.3 Recommended use of the chemical and restrictions on use

Identified uses Herbicide
Uses advised against no data available

SECTION 2: Hazard identification

2.1 Classification of the substance or mixture

Acute toxicity - Category 4, Oral
Skin irritation, Category 2
Eye irritation, Category 2
Skin sensitization, Category 1
Acute toxicity - Category 2, Inhalation
Specific target organ toxicity â€“ single exposure, Category 3
Specific target organ toxicity â€“ repeated exposure, Category 1
Hazardous to the aquatic environment, short-term (Acute) - Category Acute 1
Hazardous to the aquatic environment, long-term (Chronic) - Category Chronic 1

2.2 GHS label elements, including precautionary statements

Pictogram(s)

Signal word Danger

Hazard statement(s)
H302 Harmful if swallowed
H315 Causes skin irritation
H319 Causes serious eye irritation
H317 May cause an allergic skin reaction
H330 Fatal if inhaled
H335 May cause respiratory irritation
H372 Causes damage to organs through prolonged or repeated exposure
H410 Very toxic to aquatic life with long lasting effects

Precautionary statement(s)

Prevention
P264 Wash ... thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection/...
P261 Avoid breathing dust/fume/gas/mist/vapours/spray.
P272 Contaminated work clothing should not be allowed out of the workplace.
P260 Do not breathe dust/fume/gas/mist/vapours/spray.
P271 Use only outdoors or in a well-ventilated area.
P284 [In case of inadequate ventilation] wear respiratory protection.
P273 Avoid release to the environment.

Response
P301+P317 IF SWALLOWED: Get medical help.
P330 Rinse mouth.
P302+P352 IF ON SKIN: Wash with plenty of water/...
P321 Specific treatment (see ... on this label).
P332+P317 If skin irritation occurs: Get medical help.
P362+P364 Take off contaminated clothing and wash it before reuse.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P333+P317 If skin irritation or rash occurs: Get medical help.
P304+P340 IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P316 Get emergency medical help immediately.
P320 Specific treatment is urgent (see ... on this label).
P319 Get medical help if you feel unwell.
P391 Collect spillage.

Storage
P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.

Disposal
P501 Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

2.3 Other hazards which do not result in classification

no data available

SECTION 3: Composition/information on ingredients

3.1 Substances

Chemical name	Common names and synonyms	CAS number	EC number	Concentration
Diquat dibromide	Diquat dibromide	85-00-7	201-579-4	100%

SECTION 4: First-aid measures

4.1 Description of necessary first-aid measures

If inhaled

Fresh air, rest. Refer for medical attention.

Following skin contact

First rinse with plenty of water for at least 15 minutes, then remove contaminated clothes and rinse again. Refer for medical attention .

Following eye contact

First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then refer for medical attention.

Following ingestion

Rinse mouth. Give one or two glasses of water to drink. Give a slurry of activated charcoal in water to drink. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for medical attention .

4.2 Most important symptoms/effects, acute and delayed

INHALATION: No appreciable vapor pressure. Prolonged contact with spray or mist may cause oral and nasal irritation. EYES: Irritation. SKIN: Irritation. INGESTION: Vomiting, diarrhea, general malaise. Possible kidney and liver damage, dyspnea, and pulmonary edema. With large doses there may be tremors or convulsions. OTHER: May be fatal if swallowed, inhaled, or absorbed through skin. (USCG, 1999)

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

Basic treatment: . Establish a patent airway. Suction if necessary. . Watch for signs of respiratory insufficiency and assist ventilations if necessary. . Administer oxygen by nonrebreather mask at 10 to 15 L/min. . Monitor for pulmonary edema and treat if necessary . . Monitor for shock and treat if necessary . Anticipate seizures and treat if necessary . For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport . Do not use emetics. For ingestion, rinse mouth and administer 5 ml/kg up to 200 ml of water for dilution if the patient can swallow, has a strong gag reflex, and does not drool. Administer activated charcoal . Cover skin burns with dry sterile dressings after decontamination . Bromine, methyl bromide, and related compounds

SECTION 5: Fire-fighting measures

5.1 Suitable extinguishing media

Small Fire: Use dry chemical, CO2, water spray, or foam. Large Fire: Use water spray, fog or foam. Move containers from fire area if possible without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material.

5.2 Specific hazards arising from the chemical

Behavior in Fire: Decomposes at high temperature, charring rather than melting or boiling. (USCG, 1999)

5.3 Special protective actions for fire-fighters

In case of fire in the surroundings, use appropriate extinguishing media.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

6.2 Environmental precautions

Personal protection: particulate filter respirator adapted to the airborne concentration of the substance. Do NOT let this chemical enter the environment. Sweep spilled substance into covered containers. If appropriate, moisten first to prevent dusting. Carefully collect remainder. Then store and dispose of according to local regulations.

6.3 Methods and materials for containment and cleaning up

In case of land spill absorb bulk liquid with fly ash or cement powder.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Handling in a well ventilated place. Wear suitable protective clothing. Avoid contact with skin and eyes. Avoid formation of dust and aerosols. Use non-sparking tools. Prevent fire caused by electrostatic discharge steam.

7.2 Conditions for safe storage, including any incompatibilities

Provision to contain effluent from fire extinguishing. Well closed. Separated from food and feedstuffs.IT IS GENERALLY NOT ADVISABLE TO STORE UNDILUTED DIQUAT IN CONTACT WITH METALS; UNDILUTED MATERIAL IS BEST KEPT IN ORIGINAL CONTAINER.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure limit values

TLV: (inhalable fraction): 0.5 mg/m3, as TWA; (skin); A4 (not classifiable as a human carcinogen).TLV: (respirable fraction): 0.1 mg/m3, as TWA; (skin); A4 (not classifiable as a human carcinogen)

Biological limit values

no data available

8.2 Appropriate engineering controls

Ensure adequate ventilation. Handle in accordance with good industrial hygiene and safety practice. Set up emergency exits and the risk-elimination area.

8.3 Individual protection measures, such as personal protective equipment (PPE)

Eye/face protection

Wear safety goggles or eye protection in combination with breathing protection.

Skin protection

Protective gloves. Protective clothing.

Respiratory protection

Use local exhaust or breathing protection.

Thermal hazards

no data available

SECTION 9: Physical and chemical properties and safety characteristics

Physical state	Diquat is a yellow crystalline solid dissolved in a liquid carrier. It is a water emulsifiable liquid. The primary hazard is the threat to the environment. Immediate steps should be taken to limit its spread to the environment. Since it is a liquid it can easily penetrate the soil and contaminate groundwater and nearby streams. It can cause illness by inhalation, skin absorption and/or ingestion. It is used as a herbicide.
Colour	Colorless to yellow crystals
Odour	no data available
Melting point/freezing point	330-340(åˆ†è§£)ÂºC
Boiling point or initial boiling point and boiling range	Decomposes
Flammability	Combustible Solid, but does not readily ignite and burns with difficulty.
Lower and upper explosion limit/flammability limit	no data available
Flash point	no data available
Auto-ignition temperature	no data available
Decomposition temperature	335Â°C
pH	no data available
Kinematic viscosity	no data available
Solubility	greater than or equal to 100 mg/mL at 68Â° F (NTP, 1992)
Partition coefficient n-octanol/water	log Kow = -4.60
Vapour pressure	less than 0.000010 mm Hg at 68Â° F (NTP, 1992)
Density and/or relative density	1.25
Relative vapour density	no data available
Particle characteristics	no data available

SECTION 10: Stability and reactivity

10.1 Reactivity

Decomposes at 335Â°C. This produces toxic fumes including nitrogen oxides and hydrogen bromide.

10.2 Chemical stability

Under normal storage conditions, in original containers, shelf life is indefinitely long; dry chem sensitive to UV light.

10.3 Possibility of hazardous reactions

Diquat does not burn or burns with difficulty.DIQUAT is light sensitive. This compound can corrode aluminum and other metals. (NTP, 1992) Quaternary ammonium salts often serve as catalysts in reactions. They are incompatible with many strong oxidizers and reducing agents, such as metal hydrides, alkali/active metals, and organometallics. Unlike the ammonium ion, [NH4]+, and the primary, secondary, or tertiary ammonium cations, the quaternary ammonium cations are permanently charged, independent of the pH of their solution.

10.4 Conditions to avoid

no data available

10.5 Incompatible materials

Alkalis, UV light, basic solutions [Note: Concentrated diquat solutions corrode aluminum].

10.6 Hazardous decomposition products

When heated to decomposition, diquat dibromide emits very toxic fumes of /nitrogen oxides and hydrogen bromide/.

SECTION 11: Toxicological information

Acute toxicity

- Oral: LD50 Cow oral 30 mg/kg
- Inhalation: no data available
- Dermal: LD50 Rabbit percutaneous >750 mg/kg

Skin corrosion/irritation

no data available

Serious eye damage/irritation

no data available

Respiratory or skin sensitization

no data available

Germ cell mutagenicity

no data available

Carcinogenicity

Cancer Classification: Group E Evidence of Non-carcinogenicity for Humans

Reproductive toxicity

no data available

STOT-single exposure

The substance is irritating to the eyes, skin and respiratory tract. The substance may cause effects on the kidneys, liver, cardiovascular system and gastrointestinal tract. This may result in impaired functions and tissue lesions. Exposure to high concentrations could cause death.

STOT-repeated exposure

The substance may have effects on the eyes. This may result in cataract.

Aspiration hazard

Evaporation at 20Â°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly on spraying or when dispersed, especially if powdered.

SECTION 12: Ecological information

12.1 Toxicity

- Toxicity to fish: LC50 Pimephales promelas 14000 mg/l 96-hr
- Toxicity to daphnia and other aquatic invertebrates: no data available
- Toxicity to algae: no data available
- Toxicity to microorganisms: no data available

12.2 Persistence and degradability

Diquat dibromide is listed as being a chemical which is unlikely to be removed during biological sewage treatment, even after prolonged exposure of the microorganisms(1). However microorganisms are capable of degrading diquat dibromide(2) and biodegradation occurs in various sediment-water systems as is evidenced by the cumulative production of CO2 in these systems(3); the rate of degradation is very slow. After 65 days, only 0.88 and 0.21% of the diquat dromide was converted to CO2 under aerobic and anaerobic conditions using water and sediment from a eutrophic lake and negligible using water and sediment from an oligotrophic lake(3). Diquat dibromide adsorbed on the internal faces of montmorillonite clay in aqueous soil-nutrient solution was not degraded by microorganisms over a one year period(4). When adsorbed in the interlayer spacings of the clay, the compound probably persists indefinitely in its original form, although in a biologically inactive state(4).

12.3 Bioaccumulative potential

A BCF range of <0.6 to 1.4 was measured for diquat dibromide(1). According to a classification scheme(2), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC). No bioaccumulation in fish was reported using a microcosm(3). No residues were detected in organs or tissues of channel catfish collected from pools 5 months after a single application or 2 months after a second treatment of 1 ppm diquat(4).

12.4 Mobility in soil

Diquat dirbomide exhibits strong adsorption to soils(1). Using a structure estimation method based on molecular connectivity indices(2), the Koc for diquat dibromide can be estimated to be 2,000(SRC). According to a classification scheme(3), this estimated Koc value suggests that diquat dibromide is expected to have slight mobility in soil. The Rf value, from thin-layer chromatography on soil plates, for this compound falls in the range of 0-0.09, which indicates no mobility(4). Diquat dibromide is an organic divalent cation(5) and cations generally adsorb to organic carbon and clay more strongly than their neutral counterparts(6).

12.5 Other adverse effects

no data available

SECTION 13: Disposal considerations

13.1 Disposal methods

Product

The material can be disposed of by removal to a licensed chemical destruction plant or by controlled incineration with flue gas scrubbing. Do not contaminate water, foodstuffs, feed or seed by storage or disposal. Do not discharge to sewer systems.

Contaminated packaging

Containers can be triply rinsed (or equivalent) and offered for recycling or reconditioning. Alternatively, the packaging can be punctured to make it unusable for other purposes and then be disposed of in a sanitary landfill. Controlled incineration with flue gas scrubbing is possible for combustible packaging materials.

SECTION 14: Transport information

14.1 UN Number

ADR/RID: UN2781 (For reference only, please check.) IMDG: UN2781 (For reference only, please check.) IATA: UN2781 (For reference only, please check.)

14.2 UN Proper Shipping Name

ADR/RID: BIPYRIDILIUM PESTICIDE, SOLID, TOXIC (For reference only, please check.) IMDG: BIPYRIDILIUM PESTICIDE, SOLID, TOXIC (For reference only, please check.) IATA: BIPYRIDILIUM PESTICIDE, SOLID, TOXIC (For reference only, please check.)

14.3 Transport hazard class(es)

ADR/RID: 6.1 (For reference only, please check.) IMDG: 6.1 (For reference only, please check.) IATA: 6.1 (For reference only, please check.)

14.4 Packing group, if applicable

ADR/RID: I (For reference only, please check.) IMDG: I (For reference only, please check.) IATA: I (For reference only, please check.)

14.5 Environmental hazards

ADR/RID: Yes IMDG: Yes IATA: Yes

14.6 Special precautions for user

no data available

14.7 Transport in bulk according to IMO instruments

no data available

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations specific for the product in question

Chemical name	Common names and synonyms	CAS number	EC number
Diquat dibromide	Diquat dibromide	85-00-7	201-579-4
European Inventory of Existing Commercial Chemical Substances (EINECS)			Listed.
EC Inventory			Listed.
United States Toxic Substances Control Act (TSCA) Inventory			Not Listed.
China Catalog of Hazardous chemicals 2015			Not Listed.
New Zealand Inventory of Chemicals (NZIoC)			Listed.
Philippines Inventory of Chemicals and Chemical Substances (PICCS)			Listed.
Vietnam National Chemical Inventory			Not Listed.

Chinese Chemical Inventory of Existing Chemical Substances (China IECSC)	Not Listed.
Korea Existing Chemicals List (KECL)	Listed.

SECTION 16: Other information

Information on revision

Creation Date	July 15, 2019
Revision Date	July 15, 2019

Abbreviations and acronyms

- CAS: Chemical Abstracts Service
- ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road
- RID: Regulation concerning the International Carriage of Dangerous Goods by Rail
- IMDG: International Maritime Dangerous Goods
- IATA: International Air Transportation Association
- TWA: Time Weighted Average
- STEL: Short term exposure limit
- LC50: Lethal Concentration 50%
- LD50: Lethal Dose 50%
- EC50: Effective Concentration 50%

References

- IPCS - The International Chemical Safety Cards (ICSC), website: http://www.ilo.org/dyn/icsc/showcard.home
- HSDB - Hazardous Substances Data Bank, website: https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm
- IARC - International Agency for Research on Cancer, website: http://www.iarc.fr/
- eChemPortal - The Global Portal to Information on Chemical Substances by OECD, website: http://www.echemportal.org/echemportal/index?pageID=0&request_locale=en
- CAMEO Chemicals, website: http://cameochemicals.noaa.gov/search/simple
- ChemIDplus, website: http://chem.sis.nlm.nih.gov/chemidplus/chemidlite.jsp
- ERG - Emergency Response Guidebook by U.S. Department of Transportation, website: http://www.phmsa.dot.gov/hazmat/library/erg
- Germany GESTIS-database on hazard substance, website: http://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp
- ECHA - European Chemicals Agency, website: https://echa.europa.eu/

Other Information

The toxicological information is the same for diquat dibromide monohydrate (CAS 6385-62-2) and diquat (CAS 2764-72-9).Do NOT take working clothes home.Carrier solvents used in commercial formulations may change physical and toxicological properties.If the substance is formulated with solvents also consult the ICSCs of these materials.