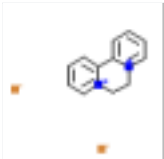
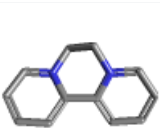








Diquat dibromide

PubChem CID	6794
Structure	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>2D</p> </div> <div style="text-align: center;">  <p>3D</p> </div> </div>
Chemical Safety	<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  Acute Toxic </div> <div style="text-align: center;">  Health Hazard </div> <div style="text-align: center;">  Environmental Hazard </div> </div> <p style="text-align: center;">Laboratory Chemical Safety Summary (LCSS) Datasheet</p>
Molecular Formula	<p>C₁₂H₁₂N₂Br₂</p> <p>C₁₂H₁₂Br₂N₂</p>
Synonyms	<p>DIQUAT DIBROMIDE</p> <p>85-00-7</p> <p>Aquacide</p> <p>Reglon</p> <p>Reglox</p> <p>View More...</p>
Molecular Weight	<p>344.04 g/mol</p> <p><i>Computed by PubChem 2.2 (PubChem release 2021.10.14)</i></p>
Parent Compound	<div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> CID 6795 (Diquat) </div> </div>
Component Compounds	<div style="display: flex; flex-direction: column; gap: 10px;"> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> CID 6795 (Diquat) </div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> CID 260 (Hydrobromic Acid) </div> </div> </div>
Dates	<p>Create: Modify:</p> <p>2005-08-08 2024-02-17</p>

Description

Diquat dibromide is a non-selective contact herbicide, algicide, desiccant, and defoliant that produces desiccation and defoliation most often available as the dibromide, diquat dibromide.

► [Toxin and Toxin Target Database \(T3DB\)](#)

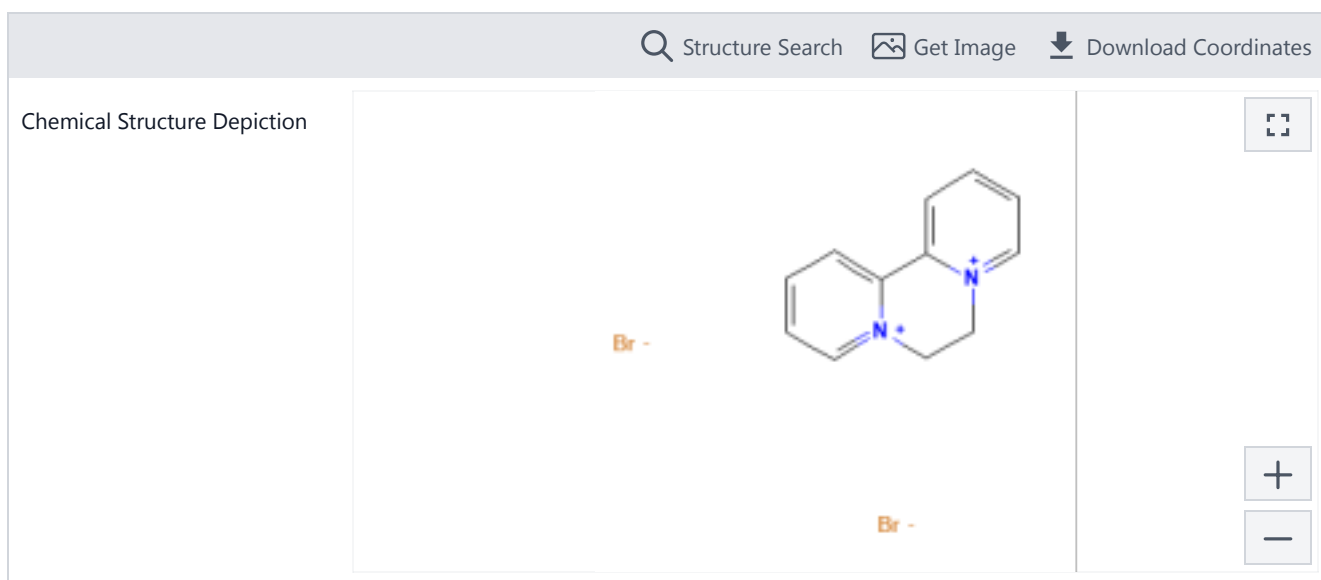
A contact herbicide used also to produce desiccation and defoliation. (From Merck Index, 11th ed)

► [Medical Subject Headings \(MeSH\)](#)

1 Structures



1.1 2D Structure

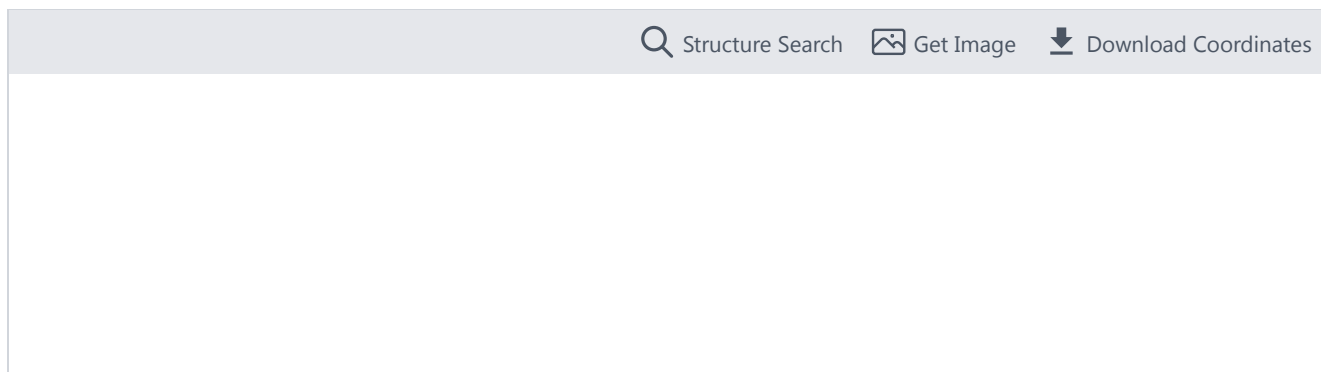


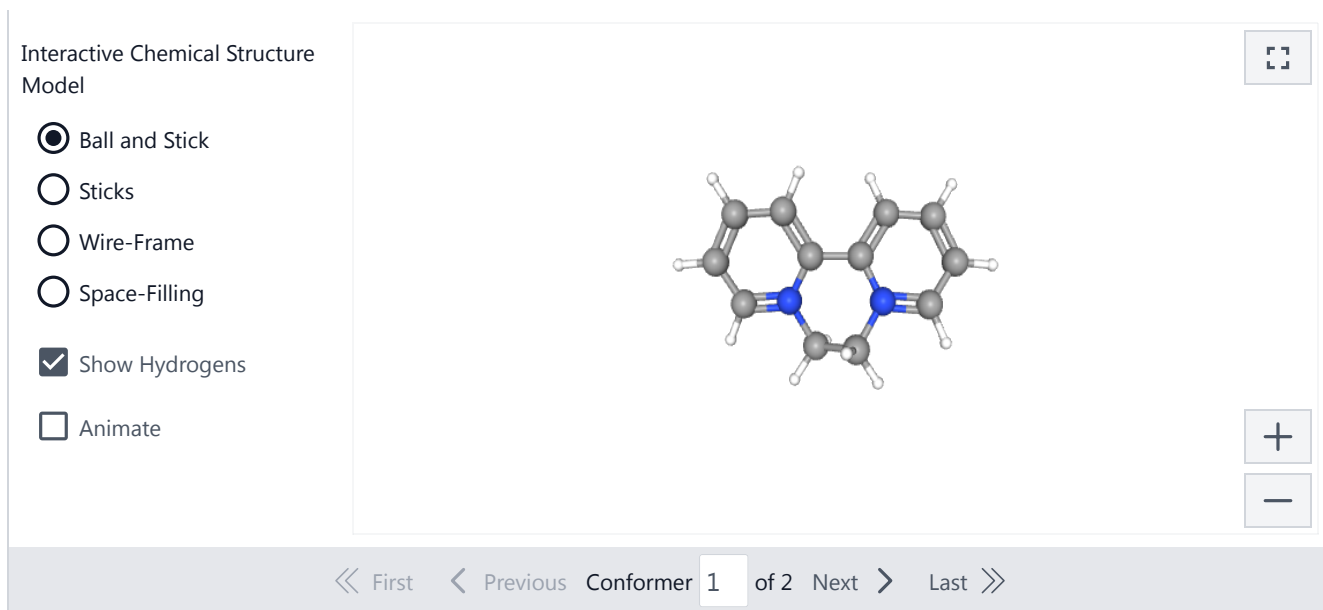
► [PubChem](#)

1.2 3D Conformer



3D Conformer of Parent





[▶ PubChem](#)

2 Names and Identifiers [?](#) [↗](#)

2.1 Computed Descriptors [?](#) [↗](#)

2.1.1 IUPAC Name [?](#) [↗](#)

7,10-diazoniatricyclo[8.4.0.0^{2,7}]tetradeca-1(14),2,4,6,10,12-hexaene;dibromide

Computed by Lexichem TK 2.7.0 (PubChem release 2021.10.14)

[▶ PubChem](#)

2.1.2 InChI [?](#) [↗](#)

InChI=1S/C12H12N2.2BrH/c1-3-7-13-9-10-14-8-4-2-6-12(14)11(13)5-1;;/h1-8H,9-10H2;2*1H/q+2;;/p-2

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

[▶ PubChem](#)

2.1.3 InChIKey [?](#) [↗](#)

ODPOAESBSUKMHD-UHFFFAOYSA-L

Computed by InChI 1.0.6 (PubChem release 2021.10.14)

[▶ PubChem](#)

2.1.4 Canonical SMILES [?](#) [↗](#)

C1C[N+]2=CC=CC=C2C3=CC=CC=[N+]31.[Br-].[Br-]

Computed by OEChem 2.3.0 (PubChem release 2021.10.14)

▶ [PubChem](#)



2.2 Molecular Formula

$C_{12}H_{12}N_2Br_2$

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

$C_{12}H_{12}Br_2N_2$

Computed by PubChem 2.2 (PubChem release 2021.10.14)

▶ [PubChem](#)



2.3 Other Identifiers



2.3.1 CAS

85-00-7

▶ [ChemIDplus](#); [EPA DSSTox](#); [European Chemicals Agency \(ECHA\)](#); [FDA Global Substance Registration System \(GSRS\)](#); [Hazardous ...](#)

34417-68-0

▶ [ChemIDplus](#)



2.3.2 European Community (EC) Number

201-579-4

▶ [European Chemicals Agency \(ECHA\)](#)



2.3.3 UNII

6BDV3T272W

▶ [FDA Global Substance Registration System \(GSRS\)](#)



2.3.4 UN Number

2781

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#); [NJDOH RTK Hazardous Substance List](#)

2.3.5 ChEMBL ID



CHEMBL1599022

▶ ChEMBL

2.3.6 DSSTox Substance ID



DTXSID3024075

▶ EPA DSSTox

2.3.7 ICSC Number



1363

▶ ILO-WHO International Chemical Safety Cards (ICSCs)

2.3.8 RTECS Number



JM5690000

▶ The National Institute for Occupational Safety and Health (NIOSH)

2.3.9 Wikidata



Q910903

▶ Wikidata

2.3.10 Wikipedia



Diquat

▶ Wikipedia

2.4 Synonyms



2.4.1 MeSH Entry Terms



Dibromide, Diquat
Diquat
Diquat Dibromide

► Medical Subject Headings (MeSH)

2.4.2 Depositor-Supplied Synonyms



DIQUAT DIBROMIDE	6BDV3T272W	HSDB 1700
85-00-7	6,7-Dihydrodipyrido[1,2-a:2',1'-c]pyrazine-5,8-diiium bromide	NSC-116553
Aquacide	Detrone	EINECS 201-579-4
Reglon	Ortho-Diquat	PP 100
Reglox	34417-68-0	EPA Pesticide Che
Deiquat	Dipyrido(1,2-a:2',1'-c)pyrazinediium, 6,7-dihydro-, dibromide	NSC 116553
Preeglone	Caswell No. 402	UNII-6BDV3T272W
Reglone	Reglon dibromide (USSR)	1,1'-Ethylene 2,2'
Weedtrine-D	Deiquat dibromide (USSR)	1,1'-Ethylene-2,2'
Diquat dibromide [ISO]	7,10-diazoniatricyclo[8.4.0.02,7]tetradeca-1(14),2,4,6,10,12-hexaene;dibromide	1,1'-Ethylene-2,2'
Ethylene dipyridylium dibromide	Diquat dibromide 100 microg/mL in Water	1,1'-Ethylene-2,2'

► PubChem

3 Chemical and Physical Properties



3.1 Computed Properties



Property Name	Property Value	Reference
Molecular Weight	344.04 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Hydrogen Bond Donor Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Hydrogen Bond Acceptor Count	2	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Rotatable Bond Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Exact Mass	343.93467 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Monoisotopic Mass	341.93672 g/mol	Computed by PubChem 2.2 (PubChem release 2021.10.14)
Topological Polar Surface Area	7.8Å ²	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Heavy Atom Count	16	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	183	Computed by Cactvs 3.4.8.18 (PubChem release 2021.10.14)
Isotope Atom Count	0	Computed by PubChem
Defined Atom Stereocenter Count	0	Computed by PubChem
Undefined Atom Stereocenter Count	0	Computed by PubChem
Defined Bond Stereocenter Count	0	Computed by PubChem

Property Name	Property Value	Reference
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	3	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2021.10.14)

▶ [PubChem](#)

3.2 Experimental Properties



3.2.1 Physical Description



Colorless to yellow crystals; [ICSC] Aqueous solution is dark reddish-brown; [CHEMINFO]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

COLOURLESS-TO-YELLOW CRYSTALS.

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.2.2 Color / Form



Colorless to yellow crystals

Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium, 11 th ed., British Crop Protection Council, Surrey, England 1997, p. 436

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.3 Melting Point



337 °C

Lide, DR (ed.). CRC Handbook of Chemistry and Physics. 81st Edition. CRC Press LLC, Boca Raton: FL 2000, p. 3-145

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.4 Solubility



Slightly soluble in alcohols, hydroxylic solvents. Practically insoluble in nonpolar organic solvents.

Farm Chemicals Handbook 2001. Willoughby, Ohio: Meister 2001., p. C 154

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

In [water](#), 708,000 mg/l @ 20 °C

Shiu WY et al; Rev Environ Contam Toxicol 116: 15-187 (1990)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Solubility in [water](#), g/100ml at 20 °C: 70

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.2.5 Density



1.22 to 1.27 @ 20 °C/20 °C

Lide, DR (ed.). CRC Handbook of Chemistry and Physics. 81st Edition. CRC Press LLC, Boca Raton: FL 2000, p. 3-145

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

1.2 g/cm³

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.2.6 Vapor Pressure



0.00000181 [mmHg]

- ▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

<<1X10⁻⁷ mm Hg @ 25 °C

Ahrens, W.H. Herbicide Handbook of the Weed Science Society of America. 7th ed. Champaign, IL: Weed Science Society of America, 1994, p. 109

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Vapor pressure, Pa at ? °C:

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.2.7 LogP



log Kow = -4.60

Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium, 11 th ed., British Crop Protection Council, Surrey, England 1997, p. 436

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

-4.60 (20 °C)

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.2.8 Stability / Shelf Life



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

Prager, J.C. *Environmental Contaminant Reference Databook Volume 1*. New York, NY: Van Nostrand Reinhold, 1995., p. 629

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

PRODUCT IS STABLE TO HEAT BEYOND RANGE OF ORDINARY AMBIENT TEMP

Weed Science Society of America. Herbicide Handbook. 4th ed. Champaign, IL: Weed Science Society of America, 1979. of America, 1979., p. 186

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Stable in neutral & acidic solns, but readily hydrolysed in alkaline solns. DT50 at pH 7 in simulated sunlight /about/ 74 days. Photochemically decomposed by UV irradiation.

Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 370

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.9 Decomposition



When heated to decomposition, diquat dibromide emits very toxic fumes of /nitrogen oxides and [hydrogen bromide](#)/.

Prager, J.C. Environmental Contaminant Reference Databook Volume 1. New York, NY: Van Nostrand Reinhold, 1995., p. 628

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

DT50 at pH 7 in simulated sunlight /about/ 74 days. Photochemically decomposed by uv irradiation.

Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 370

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

335 °C. This produces toxic fumes including nitrogen oxides and [hydrogen bromide](#).

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

3.2.10 Corrosivity



The active ingredient is corrosive to metals.

Hartley, D. and H. Kidd (eds.). The Agrochemicals Handbook. Old Woking, Surrey, United Kingdom: Royal Society of Chemistry/Unwin Brothers Ltd., 1983., p. A121/Oct 83

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Formulated product contains corrosive inhibitors that allow use through spray machinery

Farm Chemicals Handbook 2001. Willoughby, Ohio: Meister 2001., p. C 154

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Concentrated [diquat](#) solutions corrode [aluminum](#)

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 122

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.11 Other Experimental Properties



MP: below 320 °C, decomp, also reported as mp 335-340 °C; Sol in [water](#) @ 20 °C: 70%; Insol in organic solvents; slightly soluble in alcohol; Max absorption: 308.31 nm (E= 18,000); Stable in acid or neutral soln /Monohydrate/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 590

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

SALT DECOMP @ HIGH TEMP, CHARRING RATHER THAN MELTING OR BOILING

Weed Science Society of America. Herbicide Handbook. 4th ed. Champaign, IL: Weed Science Society of America, 1979. of America, 1979., p. 185

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Elemental Analysis: C 41.89%; H 3.52%; Br 46.45%; N 8.14%

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 590

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Yellow crystalline solid /Pure salt monohydrate/

Ahrens, W.H. Herbicide Handbook of the Weed Science Society of America. 7th ed. Champaign, IL: Weed Science Society of America, 1994., p. 109

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

3.2.12 Chemical Classes



Pesticides -> Herbicides, [Bipyridyl](#)

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

4 Spectral Information



4.1 Mass Spectrometry



4.1.1 GC-MS



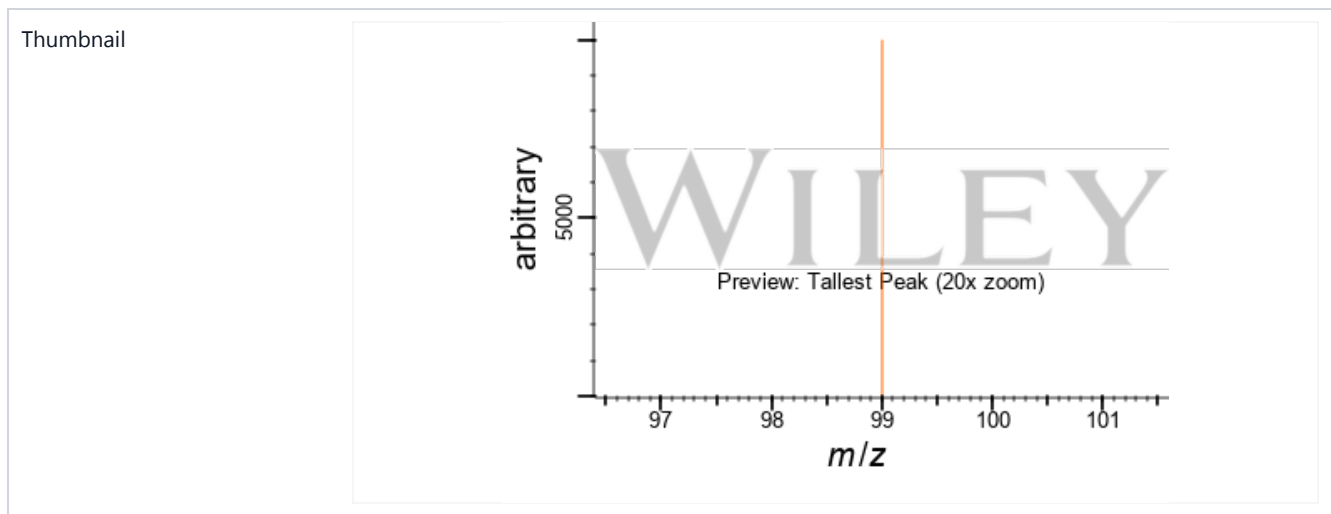
1 of 2

Source of Spectrum

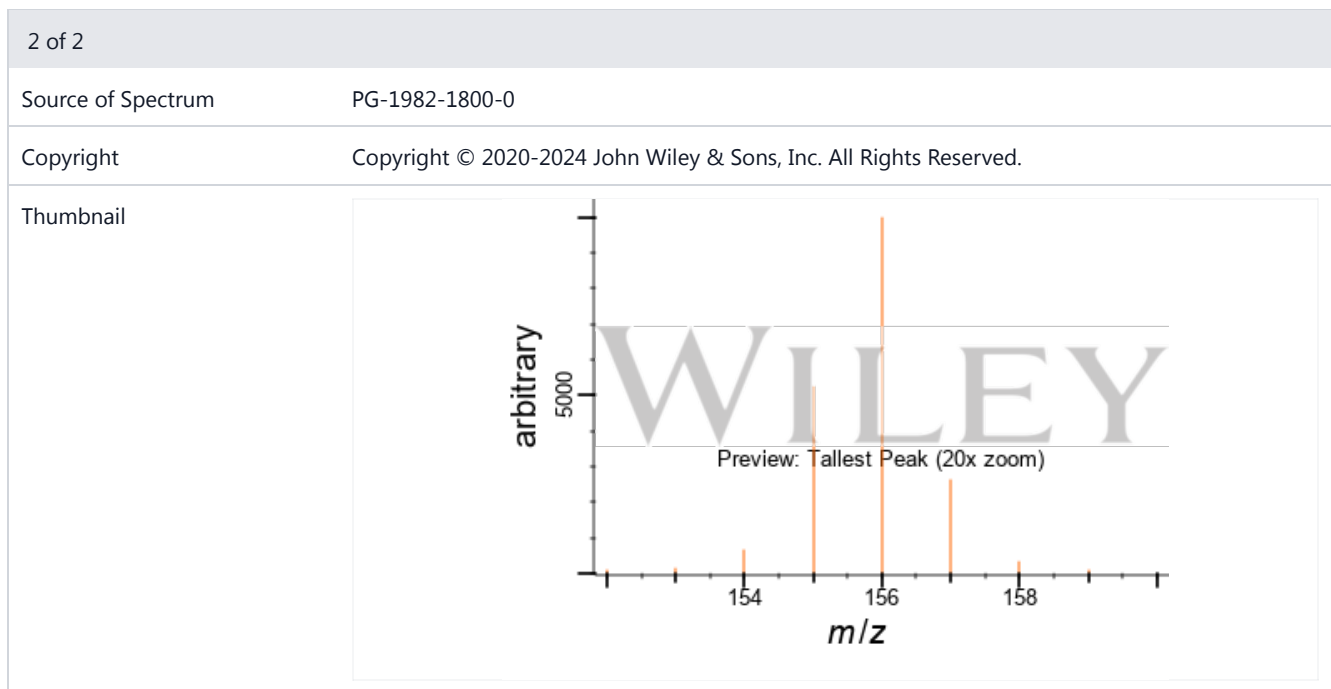
IC-981-0-0

Copyright

Copyright © 2020-2024 John Wiley & Sons, Inc. All Rights Reserved.



► [SpectraBase](#)



► [SpectraBase](#)

4.2 UV Spectra



Spectrophotometric extinction in [acetate](#) buffer is 310 nm.

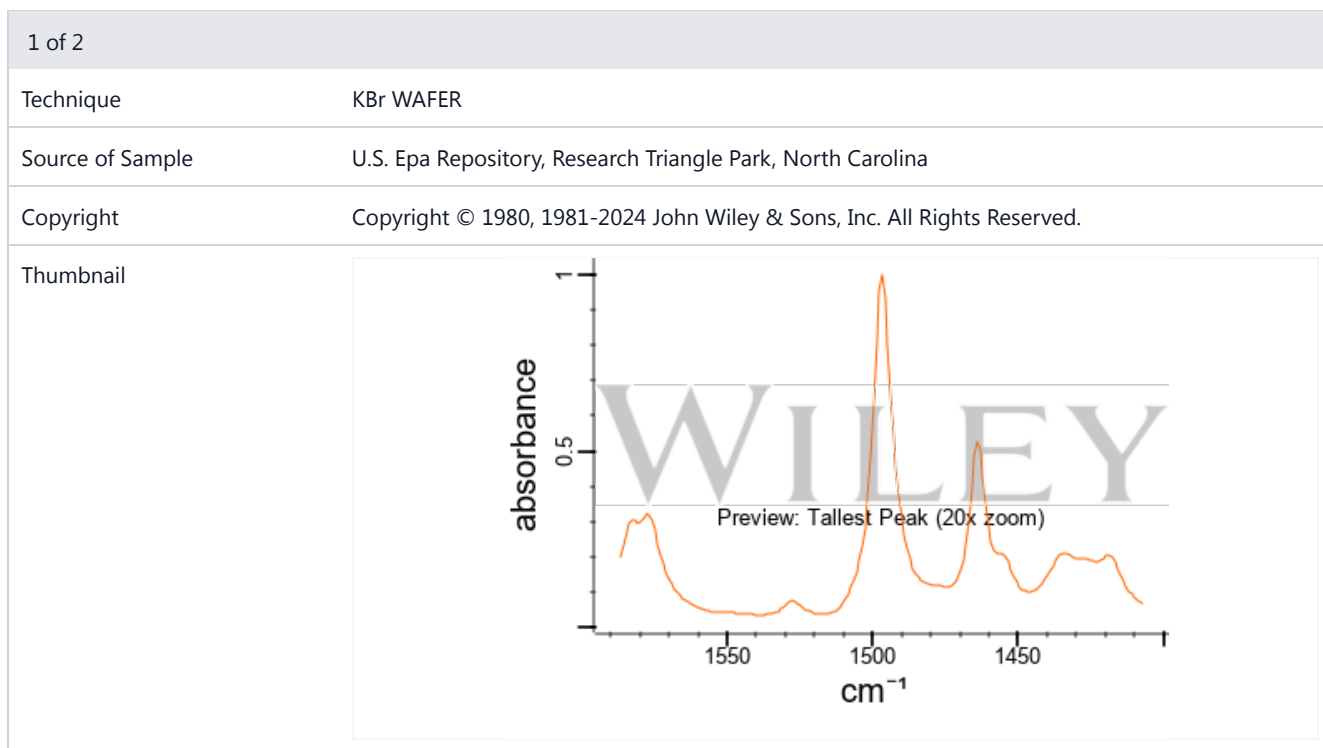
Spencer, E. Y. Guide to the Chemicals Used in Crop Protection. 7th ed. Publication 1093. Research Institute, Agriculture Canada, Ottawa, Canada: Information Canada, 1982., p. 240

► [Hazardous Substances Data Bank \(HSDB\)](#)

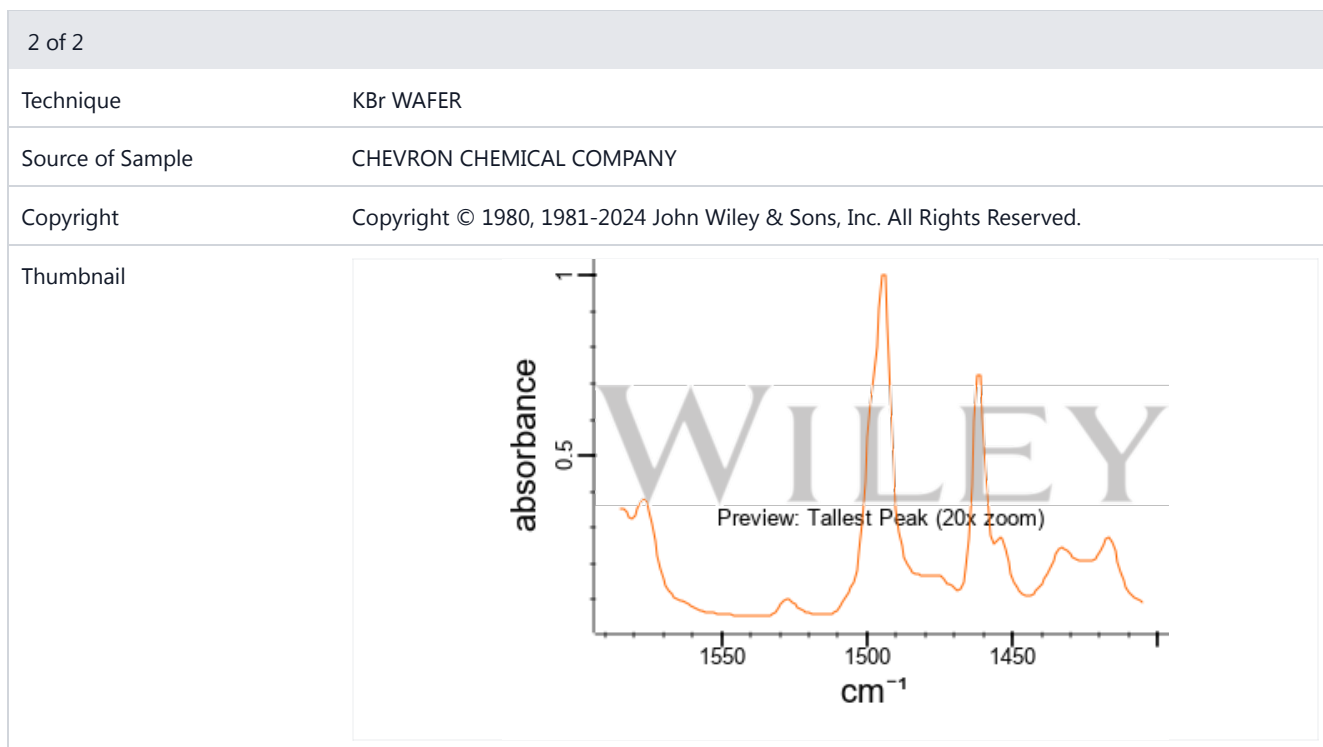
4.3 IR Spectra



4.3.1 FTIR Spectra



▶ SpectraBase



▶ SpectraBase

5 Related Records



5.1 Related Compounds with Annotation



▶ PubChem

5.2 Parent Compound



CID 6795 (Diquat)

▶ PubChem

5.3 Component Compounds



CID 6795 (Diquat)



CID 260 (Hydrobromic Acid)

▶ PubChem

5.4 Related Compounds



Same Connectivity Count	4
Same Parent, Connectivity Count	34
Same Parent, Exact Count	27

Mixtures, Components, and Neutralized Forms Count	2
Similar Compounds Count	276

▶ [PubChem](#)

5.5 Substances



5.5.1 Related Substances



Same Count	68
------------	----

▶ [PubChem](#)

5.5.2 Substances by Category



▶ [PubChem](#)

6 Chemical Vendors



▶ PubChem

7 Agrochemical Information



7.1 Agrochemical Category



Herbicide

▶ EPA Pesticide Ecotoxicity Database

8 Pharmacology and Biochemistry



8.1 MeSH Pharmacological Classification



Herbicides

Pesticides used to destroy unwanted vegetation, especially various types of weeds, grasses (POACEAE), and woody plants. Some plants develop HERBICIDE RESISTANCE. (See [all compounds classified as Herbicides.](#))

▶ Medical Subject Headings (MeSH)

Defoliants, Chemical

Herbicides that remove leaves from trees and growing plants. They may be either organic or inorganic. Several of the more persistent types have been used in military operations and many are toxic. (From Hawley's Condensed Chemical Dictionary, 11th ed) (See [all compounds classified as Defoliants, Chemical.](#))

▶ Medical Subject Headings (MeSH)

8.2 Absorption, Distribution and Excretion



... (14)C-DIQUAT ... POORLY ABSORBED AFTER ORAL ADMIN TO RATS, AS WOULD BE EXPECTED FOR /CATION/. A RAT DOSED WITH (14)C-DIQUAT HAD EXCRETED 90% OF THE (14)C IN FECES & 6% IN URINE AFTER 48 HR ...

The Chemical Society. Foreign Compound Metabolism in Mammals. Volume 1: A Review of the Literature Published Between 1960 and 1969. London: The Chemical Society, 1970., p. 85

▶ Hazardous Substances Data Bank (HSDB)

... DIQUAT, PARAQUAT ... WERE STUDIED IN BILE-DUCT-CANNULATED RATS, GUINEA-PIGS & RABBITS. ... EXCRETED UNCHANGED IN BILE & URINE, EXCEPT DIQUAT, WHERE 18% OF DOSE WAS METABOLIZED BY THE RABBIT. ALL THE CATIONS WERE POORLY EXCRETED IN THE BILE (LESS THAN 10%).

The Chemical Society. Foreign Compound Metabolism in Mammals Volume 3. London: The Chemical Society, 1975., p. 575

▶ Hazardous Substances Data Bank (HSDB)

... **Diquat** was applied in doses of 0, 0.2, 0.5, 0.75, & 1.0 ug/ml **diquat** cation. The concn of **diquat** initially followed an exponential decline; after day 3 the decline in concn in the 3 highest treatments was less precipitous. By day 5, **diquat** was below the min detectable level of 0.05 ug/ml in all treatments. Half-lives were as follows: 0.59, 0.79, & 0.88 days for treatments of 0.5, 0.75, & 1.0 ug/ml, respectively. Max concns of **diquat** in plant tissue rose to a peak on day 4 or 5, then gradually declined. Max mean tissue concns were 490 ug/g on day 5 (0.5 ug/ml treatment), 688 ug/g on day 5 (0.75 ug/ml treatment), & 869 ug/g on day 4 (1.0 ug/ml treatment). The lethal concn of **diquat** in hydrilla tissue was about 600 ug/g dry weight. Dissolved **oxygen** concns decreased until day 4 or 5, leveled off, & then rose after day 7. Expressed as a % of the control dissolved **oxygen** concn, treatment concns leveled off at about 80%, 40%, & 30% in the 0.2, 0.5, & 0.75-1.0 ug/ml treatments, respectively. Membrane permeability, expressed as incr in conductivity of deionized **water** over a 4 hr interval/gram (dry weight) of hydrilla tissue increased until day 4, plateaued until day 9, then declined. **Chlorophyll A** concns showed no statistically significant differences.

Cassidy K, Rodgers JH; *Environ Toxicol Chem* 8 (2): 133-40 (1989)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

DIQUAT ... POORLY ABSORBED FROM THE GUT OF ANIMALS FOLLOWING ORAL ADMIN. ... DEMONSTRATED THAT ... LOWER QUANTITIES ... WERE ABSORBED FROM GUT OF COWS; ONLY 0.4-2.6% OF INGESTED **DIQUAT** & 0.26% OF ... **PARAQUAT** APPEARED IN THE URINE AND 0.015% OR LESS OF THE HERBICIDES (OR THEIR METABOLITES) APPEARED IN MILK.

Kearney, P.C., and D. D. Kaufman (eds.) *Herbicides: Chemistry, Degredation and Mode of Action. Volumes 1 and 2. 2nd ed. New York: Marcel Dekker, Inc., 1975., p. 523*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Absorption, Distribution and Excretion (Complete) data for **DIQUAT DIBROMIDE** (14 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.3 Metabolism / Metabolites



... AFTER ORAL ADMIN ... TO RATS, 77% OF DOSE APPEARED IN FECES AS **DIQUAT**, & 12% AS METABOLIC PRODUCTS, ALMOST HALF OF WHICH WAS MONOPYRIDONE OF **DIQUAT**.

Kearney, P.C., and D. D. Kaufman (eds.) *Herbicides: Chemistry, Degredation and Mode of Action. Volumes 1 and 2. 2nd ed. New York: Marcel Dekker, Inc., 1975., p. 524*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

METABOLIC BREAKDOWN DOES NOT OCCUR IN PLANTS.

Weed Science Society of America. Herbicide Handbook. 4th ed. Champaign, IL: Weed Science Society of America, 1979. of America, 1979., p. 186

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

DIQUAT UNDERWENT PHOTOCHEMICAL DEGRADATION ... AFTER APPLICATION TO PLANTS. USING (14)C-RING- OR -**ETHYLENE** BRIDGE-LABELED **DIQUAT**, ONE MAJOR METABOLITE & SEVERAL MINOR CMPD ... OBSERVED ... THAT THE MAJOR METABOLITE WAS RADIOACTIVE IN BOTH INSTANCES INDICATED AT LEAST ONE INTACT RING. ... CMPD WAS /SHOWN/ ... TO BE TETRAHYDRO-OXO-PYRIDO-PYRAZINE.

Menzie, C.M. *Metabolism of Pesticides*. U.S. Department of the Interior, Bureau of Sport Fisheries and Wildlife, Publication 127. Washington, DC: U.S. Government Printing Office, 1969., p. 179

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Free radicals were shown to be produced from [paraquat](#) and [diquat](#) incubated in the presence of reduced [NADP](#) and liver microsomes.

Doull, J., C.D. Klaassen, and M. D. Amdur (eds.). *Casarett and Doull's Toxicology*. 2nd ed. New York: Macmillan Publishing Co., 1980., p. V4 391-392

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Metabolism/Metabolites (Complete) data for DIQUAT DIBROMIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.4 Biological Half-Life



... [Diquat](#) was applied in doses of 0, 0.2, 0.5, 0.75, & 1.0 ug/ml [diquat](#) cation. ... Half-lives were as follows: 0.59, 0.79, & 0.88 days for treatments of 0.5, 0.75, & 1.0 ug/ml, respectively. ... /[Diquat](#)/

Cassidy K, Rodgers JH; *Environ Toxicol Chem* 8 (2): 133-40 (1989)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

...After intravascular admin of 1 mg/kg, toxicokinetic analysis of the plasma concn-time profile of [diquat](#) using a two-compartment model provided... /an/ elimination half life (t_{1/2}) = 35.8: 8.9 hr.

Schultz IR et al; *Aquatic Toxicology* 33 (3-4): 297-310 (1995)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

8.5 Mechanism of Action



[Diquat](#) was not significantly more potent than [paraquat](#). Both produced dose- and time-dependent inhibition of DNA synthesis. /[Diquat](#)/

PMID:7245208

Carmines EL et al; *Toxicol Appl Pharmacol* 58 (3): 353-62 (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

[Diquat](#) ruptured mitochondria of type A of type II alveolar cells, which became necrotic. /[Diquat](#)/

HIRA K, TAKAMATSU H; *KANKYO KAGAKU SOGO KENKYUSHO NENPO* 6: 9-18 (1979)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

...[Diquat](#), a potent redox cyler that generates reactive oxygen species, has been used to study oxidative stress

[Diquat](#) reduces cell growth in /human/ neuroblastoma /SH-SY5Y/ cells and induces an adaptive antioxidant response, which are concn dependent and occur at sublethal concns. At higher concns, [diquat](#) alters mitochondrial function and becomes increasingly toxic.

Slaughter MR, Thakkar H et al; Toxicol Appl Pharmacol 178(2): p.63-70 (2002)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

...The age-associated enhancement of [diquat](#) toxicity /in Fischer 344 rats/ could be due to an increased availability of [iron](#) for reaction with [diquat](#)-generated [hydrogen peroxide](#) and for stimulation of lipid and protein oxidation.

PMID:8382845

Rikans LE et al; Toxicol Appl Pharmacol 118 (2): 263-70 (1993)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Mechanism of Action (Complete) data for DIQUAT DIBROMIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9 Use and Manufacturing



9.1 Uses



EPA CPDat Chemical and Product Categories



The Chemical and Products Database, a resource for exposure-relevant data on chemicals in consumer products, Scientific Data, volume 5, Article number: 180125 (2018), DOI:10.1038/sdata.2018.125

▶ [EPA Chemical and Products Database \(CPDat\)](#)

Sources/Uses

Non-selective contact herbicide, algicide, desiccant, and defoliant; [HSDB]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

Industrial Processes with risk of exposure

[Farming \(Pesticides\)](#) [Category: Industry]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

For Diquat dibromide (USEPA/OPP Pesticide Code: 032201) ACTIVE products with label matches. /SRP: Registered for use in the U.S. but approved pesticide uses may change periodically and so federal, state and local authorities must be consulted for currently approved uses./

U.S. Environmental Protection Agency/Office of Pesticide Program's Chemical Ingredients Database on Diquat dibromide (85-00-7). Available from, as of June 26, 2002: <https://npirspublic.ceris.purdue.edu/ppis/>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Non-selective contact herbicide, algicide, desiccant, and defoliant.

USEPA; R.E.D. Facts Database on Diquat Dibromide (85-00-7). USEPA 738-F-95-015. July 1995. Available from, as of Jun 17, 2002: <https://www.epa.gov/pesticides/reregistration/status.htm#top>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

As desiccant/defoliant, it is used on seed crops and potatoes. Largest use is as a desiccant on potato crops.

USEPA; R.E.D. Facts Database on Diquat Dibromide (85-00-7). USEPA 738-F-95-015. July 1995. Available from, as of Jun 17, 2002: <https://www.epa.gov/pesticides/reregistration/status.htm#top>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

As herbicide/algicide ...used on noncrop, including residential, and aquatic areas

USEPA; R.E.D. Facts Database on Diquat Dibromide (85-00-7). USEPA 738-F-95-015. July 1995. Available from, as of Jun 17, 2002: <https://www.epa.gov/pesticides/reregistration/status.htm#top>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Uses (Complete) data for DIQUAT DIBROMIDE (9 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.1.1 Use Classification



HERBICIDES

▶ [USGS Columbia Environmental Research Center](#)

9.1.2 Household Products



Household & Commercial/Institutional Products

Information on 30 consumer products that contain Diquat dibromide in the following categories is provided:

- Landscaping/Yard
- Pesticides

▶ [Consumer Product Information Database \(CPID\)](#)

9.2 Methods of Manufacturing



Fielden et al, US patent 2,823,987 (1958 to ICI).

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. 13th Edition, Whitehouse Station, NJ: Merck and Co., Inc., 2001., p. 590

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

2,2'-Bipyridine + ethylene dibromide (quaternisation)

Ashford, R.D. *Ashford's Dictionary of Industrial Chemicals*. London, England: Wavelength Publications Ltd., 1994., p. 352

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

AIR OXIDATION OF PYRIDINE IN THE PRESENCE OF A NICKEL CATALYST, FOLLOWED BY REACTION WITH ETHYLENE DIBROMIDE

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.3 Formulations / Preparations



USEPA/OPP Pesticide Code 032201; Trade Names: [Reglone](#), Weedkiller Conc.D., Aquacide, Dextrone, FB 2, [Reglox](#), [Weedtrine D](#).

U.S. Environmental Protection Agency/Office of Pesticide Program's Chemical Ingredients Database on Diquat dibromide (85-00-7). Available from, as of June 26, 2002: <https://npispublic.ceris.purdue.edu/ppis/>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Soluble concentrate; ready-to-use liquid

USEPA; R.E.D. Facts Database on Diquat Dibromide (85-00-7). USEPA 738-F-95-015. July 1995. Available from, as of Jun 17, 2002: <https://www.epa.gov/pesticides/reregistration/status.htm#top>

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

2 lb/gal (US); 200 g/l (outside US)

Farm Chemicals Handbook 2001. Willoughby, Ohio: Meister 2001., p. C 154

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Gel

Tomlin, C.D.S. (ed.). *The Pesticide Manual - World Compendium, 11 th ed.*, British Crop Protection Council, Surrey, England 1997, p. 436

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Formulations/Preparations (Complete) data for DIQUAT DIBROMIDE (14 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.4 Consumption Patterns



HERBICIDE FOR INDUSTRIAL/COMMERCIAL USES, 67%; AQUATIC USES, 33% (1982)

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.5 U.S. Production



(1977) NOT PRODUCED COMMERCIALY IN U.S.

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

(1982) NOT PRODUCED COMMERCIALY IN U.S.

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.6 U.S. Imports



(1977) 1.33X10+8 G (PRINCPL CUSTMS DIST)

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

(1982) 3.79X10+8 G (PRINCPL CUSTMS DIST)

SRI

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

9.7 General Manufacturing Information



INTRODUCED AS EXPTL HERBICIDE BY ICI 1957. BRITISH PATENT 785,732.

Spencer, E. Y. Guide to the Chemicals Used in Crop Protection. 7th ed. Publication 1093. Research Institute, Agriculture Canada, Ottawa, Canada: Information Canada, 1982., p. 240

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Lab method of general purification: recrystallization from [water](#) or aq solvent mixt.

Ahrens, W.H. Herbicide Handbook of the Weed Science Society of America. 7th ed. Champaign, IL: Weed Science Society of America, 1994., p. 110

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

COMMON NAMES [DIQUAT](#) & [PARAQUAT](#) REFER TO THE CATIONS, WHICH ARE RESPONSIBLE FOR THE HERBICIDAL ACTION OF THE SALTS. THE ASSOCIATED ANION ([BROMIDE](#) OR [CHLORIDE](#)) HAS NO EFFECT ON THE HERBICIDAL ACTIVITY.

Kearney, P.C., and D. D. Kaufman (eds.) Herbicides: Chemistry, Degredation and Mode of Action. Volumes 1 and 2. 2nd ed. New York:

Marcel Dekker, Inc., 1975., p. 503

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Incompatible with some alkyl sulfonate or alkyl aryl sulfonate wetting agents or alkali metal salts of hormone weed killers. ... [Diquat](#) may be mixed with [2,4-D](#), substituted ureas, uracils, [dalapon](#), and s-triazines.

Ahrens, W.H. *Herbicide Handbook of the Weed Science Society of America*. 7th ed. Champaign, IL: Weed Science Society of America, 1994, p. 109

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more General Manufacturing Information (Complete) data for DIQUAT DIBROMIDE (7 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

10 Identification



10.1 Analytic Laboratory Methods



Product analysis is by uv spectrophotometry (CIPAC Handbook, 1970, 1, 342; 1992, E, 73-78; 1995, G 47); impurities may be measured by gas liquid chromatography (CIPAC Handbook 1980, 1A, 1245; Herbicides 1977, p 48). Residues may be determined by colorimetry (MG Ashley, Pestic Sci, 1970, 1, 101; A. Calderbank et al, Analyst (London), 1961, 86, 569; A Calderbank & SH Yuen, Analyst (London), 1965, 90, 95; 1966, 91, 625

Tomlin, C.D.S. (ed.). *The Pesticide Manual - World Compendium*, 11 th ed., British Crop Protection Council, Surrey, England 1997, p. 437

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

A METHOD FOR IDENTIFICATION OF [DIQUAT](#) BY MASS SPECTROSCOPY FOLLOWING SEPARATION FROM THE CATION IS PRESENTED.

KENNDLER E, KANIANSKY D; J CHROMATOGR 209 (2): 306-9 (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

EPA Method PMD-DQT. Determination of [Diquat](#) (Dibromide) by High Performance Liquid Chromatography.

USEPA; EMMI. *EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

ASTM Method D4763. Standard Practice for Identification of Organic Chemicals in [Water](#) by Fluorescence Spectroscopy.

USEPA; EMMI. *EPA's Environmental Monitoring Methods Index. Version 1.1. PC# 4082. Rockville, MD: Government Institutes (1997)*

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Analytic Laboratory Methods (Complete) data for DIQUAT DIBROMIDE (6 total), please visit the [HSDB record page](#).

10.2 Clinical Laboratory Methods



A TLC procedure for the detection of bipyridylum cmpd /[Reglone \(diquat\)](#)/ in post-mortem human tissues is described...

Van den Heede M et al; Med, Sci Law 22(1): 57-62 (1982)

11 Safety and Hazards



11.1 Hazards Identification



11.1.1 GHS Classification



1 of 4		View All
Pictogram(s)	<p style="text-align: center;"> Corrosive Acute Toxic Irritant Health Hazard Environmental Hazard </p>	
Signal	<u>Danger</u>	
GHS Hazard Statements	<p>H290 (31.58%): May be corrosive to metals [Warning Corrosive to Metals]</p> <p>H302 (100%): Harmful if swallowed [Warning Acute toxicity, oral]</p> <p>H315 (100%): Causes skin irritation [Warning Skin corrosion/irritation]</p> <p>H317 (100%): May cause an allergic skin reaction [Warning Sensitization, Skin]</p> <p>H319 (100%): Causes serious eye irritation [Warning Serious eye damage/eye irritation]</p> <p>H330 (100%): Fatal if inhaled [Danger Acute toxicity, inhalation]</p> <p>H335 (100%): May cause respiratory irritation [Warning Specific target organ toxicity, single exposure; Respiratory tract irritation]</p> <p>H372 (100%): Causes damage to organs through prolonged or repeated exposure [Danger Specific target organ toxicity, repeated exposure]</p> <p>H400 (100%): Very toxic to aquatic life [Warning Hazardous to the aquatic environment, acute hazard]</p> <p>H410 (100%): Very toxic to aquatic life with long lasting effects [Warning Hazardous to the aquatic environment, long-term hazard]</p>	
Precautionary Statement Codes	<p>P234, P260, P261, P264, P264+P265, P270, P271, P272, P273, P280, P284, P301+P317, P302+P352, P304+P340, P305+P351+P338, P316, P319, P320, P321, P330, P332+P317, P333+P317, P337+P317, P362+P364, P390, P391, P403+P233, P405, P406, and P501</p> <p>(The corresponding statement to each P-code can be found at the GHS Classification page.)</p>	
ECHA C&L Notifications Summary	<p><i>Aggregated GHS information provided by 95 companies from 7 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.</i></p> <p><i>Information may vary between notifications depending on impurities, additives, and other factors.</i></p>	

The percentage value in parenthesis indicates the notified classification ratio from companies that provide hazard codes. Only hazard codes with percentage values above 10% are shown.

▶ [European Chemicals Agency \(ECHA\)](#)

11.1.2 Hazard Classes and Categories



Met. Corr. 1 (31.58%)
Acute Tox. 4 (100%)
Skin Irrit. 2 (100%)
Skin Sens. 1 (100%)
Eye Irrit. 2 (100%)
Acute Tox. 2 (100%)
STOT SE 3 (100%)
STOT RE 1 (100%)
Aquatic Acute 1 (100%)
Aquatic Chronic 1 (100%)

▶ [European Chemicals Agency \(ECHA\)](#)

Specific target organ toxicity (repeated exposure) - category 1
Eye irritation - category 2
Skin irritation - category 2
Skin sensitisation - category 1
Hazardous to the aquatic environment (acute) - category 1
Specific target organ toxicity (single exposure) - category 3
Hazardous to the aquatic environment (chronic) - category 1
Acute toxicity (inhalation) - category 2
Acute toxicity (ingestion) - category 4

▶ [Hazardous Chemical Information System \(HCIS\), Safe Work Australia](#)

[View More...](#)

11.1.3 Fire Hazards



Not combustible. Liquid formulations containing organic solvents may be flammable. Gives off irritating or toxic fumes (or gases) in a fire.

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.1.4 Hazards Summary



A skin, eye, and respiratory tract irritant; Can injure the kidneys, liver, cardiovascular system after ingestion or

significant absorption through skin or respiratory tract; [ICSC] Skin sensitizer; Highly toxic; [Quick CPC] See [Diquat](#).

Quick CPC - Forsberg K, Mansdorf SZ. Quick Selection Guide to Chemical Protective Clothing, 5th Ed. Hoboken, NJ: Wiley-Interscience, 2007.

- ▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

11.1.5 Fire Potential



[Diquat](#) does not burn or burns with difficulty.

Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.208 (1981)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.1.6 Skin, Eye, and Respiratory Irritations



[Diquat](#) concentrate may cause severe skin irritation and burning on contact. Contact with dilute liquid or dust formulations of [diquat](#) may result in reversible skin irritation. Systemic toxicity may occur from skin absorption, especially with repeated contact.

Arena, J. M. Poisoning: Toxicology, Symptoms, Treatments. Fourth Edition. Springfield, Illinois: Charles C. Thomas, Publisher, 1979., p. 184

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Contact with dilute liquid or dust ([Diquat](#) dibromide) formulations may cause reversible eye irritation.

Arena, J. M. Poisoning: Toxicology, Symptoms, Treatments. Fourth Edition. Springfield, Illinois: Charles C. Thomas, Publisher, 1979., p. 185

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Some respiratory distress may be present in acute poisoning, but it is nonspecific.

American Conference of Governmental Industrial Hygienists, Inc. Documentation of the Threshold Limit Values, 4th ed., 1980. Cincinnati, Ohio: American Conference of Governmental Industrial Hygienists, Inc., 1980., p. 159

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Eye, skin, and respiratory irritant. Can be readily absorbed through the intact skin.

Prager, J.C. Environmental Contaminant Reference Databook Volume 1. New York, NY: Van Nostrand Reinhold, 1995., p. 629

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.2 Safety and Hazard Properties



11.2.1 Explosive Limits and Potential



[Diquat](#) cylinder may explode in heat of fire.

Prager, J.C. Environmental Contaminant Reference Databook Volume 1. New York, NY: Van Nostrand Reinhold, 1995., p. 628

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.2.2 NIOSH Recommendations



Recommended Exposure Limit: 10 Hr Time-Weighted Avg: 0.5 mg/cu m.

NIOSH. NIOSH Pocket Guide to Chemical Hazards & Other Databases. U.S. Department of Health & Human Services, Public Health Service, Center for Disease Control & Prevention. DHHS (NIOSH) Publication No. 2001-145 (CD-ROM) August 2001.

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.3 First Aid Measures



11.3.1 Inhalation First Aid



Fresh air, rest. Refer for medical attention.

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.3.2 Skin First Aid



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

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.3.3 Eye First Aid



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

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.3.4 Ingestion First Aid



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 .

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.4 Fire Fighting



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

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.4.1 Fire Fighting Procedures



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.

Prager, J.C. Environmental Contaminant Reference Databook Volume 1. New York, NY: Van Nostrand Reinhold, 1995., p. 628

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.5 Accidental Release Measures



11.5.1 Spillage Disposal



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.

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.5.2 Cleanup Methods



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

Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.208 (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.5.3 Disposal Methods



SRP: At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

[Diquat](#) is inactivated by inert clay or by anionic surfactants. Therefore, an effective and environmentally safe disposal method would be to mix the product with ordinary household detergent and bury the mixture in clay soil.

Recommendable methods: Absorption & landfill. Peer-review: Adsorb on vermiculite or other clay mineral and landfill. (Peer-review conclusions of an IRPTC expert consultation (May 1985)) /SRP: approved/

United Nations. Treatment and Disposal Methods for Waste Chemicals (IRPTC File). Data Profile Series No. 5. Geneva, Switzerland: United Nations Environmental Programme, Dec. 1985., p. 166

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.5.4 Preventive Measures



Keep diquat dibromide out of [water](#) sources and sewers.

Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.208 (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Personnel protection: 1) keep up wind; 2) avoid breathing vapors or dusts; and 3) wash away any material, which may have contacted the body, with copious amounts of [water](#) or soap and [water](#).

Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.208 (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The worker should immediately wash the skin when it becomes contaminated.

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 123

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Work clothing that becomes wet or significantly contaminated should be removed and replaced.

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 123

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Preventive Measures (Complete) data for DIQUAT DIBROMIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.6 Handling and Storage



11.6.1 Safe Storage



Provision to contain effluent from fire extinguishing. Well closed. Separated from food and feedstuffs.

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.6.2 Storage Conditions



IT IS GENERALLY NOT ADVISABLE TO STORE UNDILUTED [DIQUAT](#) IN CONTACT WITH METALS; UNDILUTED MATERIAL IS BEST KEPT IN ORIGINAL CONTAINER.

Weed Science Society of America. Herbicide Handbook. 4th ed. Champaign, IL: Weed Science Society of America, 1979. of America, 1979., p. 186

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.7 Exposure Control and Personal Protection



11.7.1 Threshold Limit Values (TLV)



0.5 [mg/m³](inhalable fraction), 0.1 mg/m³(respirable fraction)

- ▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

8 hr Time Weighted Avg (TWA): 0.5 mg/cu m (inhalable fraction), skin; 0.1 mg/cu m (respirable fraction), skin. /[Diquat](#)/

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 27

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded. /[Diquat](#)/

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 5

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

A4; Not classifiable as a human carcinogen. /[Diquat](#)/

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH, 2008, p. 27

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

(inhalable fraction): 0.5 mg/m

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.7.2 Inhalation Risk



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

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.7.3 Effects of Short Term 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.

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.7.4 Effects of Long Term Exposure



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

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

11.7.5 Allowable Tolerances



Tolerances are established for residues of the plant growth regulator [diquat](#) (6,7-dihydrodipyrido (1,2-a:2(a) Tolerancprime;,1-c)pyrazinediium) derived from application of the dibromide salt and calculated as the cation in or on the following food commodities: cattle, fat: 0.02 ppm; cattle, meat-byproducts: 0.02 ppm; cattle, meat: 0.02 ppm; egg: 0.02 ppm; goat, fat: 0.02 ppm; goat, meat-byproducts: 0.02 ppm; goat, meat: 0.02 ppm; hot, fat: 0.02 ppm; hog, meat-byproducts: 0.02 ppm; hot, meat: 0.02 ppm; horse, fat: 0.02 ppm; horse, meat-byproducts: 0.02 ppm; horse, meat: 0.02 ppm; milk: 0.02 ppm; potato: 0.1 ppm; potato, waste, dried: 1.0 ppm; poultry, fat: 0.02 ppm; poultry, meat-byproducts: 0.02 ppm; poultry, meat: 0.02 ppm; sheep, fat: 0.02 ppm; sheep, meat-byproducts: 0.02 ppm; and sheep, meat: 0.02 ppm. /Diquat/

40 CFR 180.226 (a)(1) (7/1/2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Tolerances are established for residues of the herbicide [diquat](#) (6,7-dihydrodipyrido (1,2-a:2,1-c) pyrazinediium) (calculated as the cation) derived from the application of the dibromide salt to ponds, lakes, reservoirs, marshed, drainage ditches, canals, streams, and rivers which are slow-moving or quiescent in programs of the Corps of Engineers or other Federal or State public agencies and to ponds, lakes and drainage ditches only where there is little or no outflow of [water](#) and which are totally under the control of the user, in or on the following food commodities: avocado: 0.02 ppm; cotton, undelinted seed: 0.02 ppm; fish: 0.1 ppm; fruit, citrus, group: 0.02 ppm; fruit, pome group: 0.02 ppm; fruit, small: 0.02 ppm; fruit, stone, group: 0.02 ppm; grain, crop: 0.02 ppm; grass, forage: 0.1 ppm; hop, dried cones: 0.02 ppm; nut, tree, group: 0.02 ppm; shellfish: 0.1 ppm; sugarcane, cane: 0.02 ppm; vegetable, cucurbit, group: 0.02 ppm; vegetable, foliage of legume, group: 0.1 ppm; vegetable, fruiting, group: 0.02 ppm; vegetable, leafy: 0.02 ppm; vegetable, root and tuber, group: 0.02 ppm; and vegetable, seed and pod: 0.02 ppm. /Diquat/

40 CFR 180.226 (a)(2)(i) (7/1/2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Where tolerances are established at higher levels from other uses of [diquat](#) on the subject crops, the higher tolerances applies also to residues of the aquatic uses cited in this paragraph. /Diquat/

40 CFR 180.226 (a)(2)(ii) (7/1/2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Tolerances are established for residues of the plant growth regulator [diquat](#) (6,7-dihydrodipyrido (1,2-a:2 1/4, 1 1/4-c) pyrazinediium) derived from application of the dibromide salt and calculated as the cation in or on the following food commodities: banana: 0.05 ppm; and coffee: 0.05 ppm. /Diquat/

40 CFR 180.226 (a)(3) (7/1/2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Allowable Tolerances (Complete) data for DIQUAT DIBROMIDE (6 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.7.6 Personal Protective Equipment (PPE)



SO FAR AS OCCUPATIONAL HAZARDS ... /DIQUAT DOES/ NOT CONSTITUTE VERY DANGEROUS INHALATION HAZARD UNDER NORMAL CONDITIONS OF USE. RESP ... EQUIPMENT ... WORN ... WHERE CONTAMINATION OF ATMOSPHERE IS LIABLE TO BE RELATIVELY HIGH ... FOR INSTANCE, WHEN PERSONS HAVE TO WALK FOR SOME TIME

THROUGH DRIFTING SPRAY ...

International Labour Office. Encyclopedia of Occupational Health and Safety. Volumes I and II. New York: McGraw-Hill Book Co., 1971., p. 666

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Wear boots, protective gloves, and goggles.

Bureau of Explosives; Emergency Handling of Haz Matl in Surface Trans p.208 (1981)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Wear face shield, ... and rubber apron when handling concentrate.

Farm Chemicals Handbook 1984. Willoughby, Ohio: Meister Publishing Co., 1984., p. C-83

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Wear appropriate personal protective clothing to prevent skin contact.

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 123

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Personal Protective Equipment (PPE) (Complete) data for DIQUAT DIBROMIDE (6 total), please visit the [HSDB record page](#).

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.7.7 Exposure Prevention



PREVENT DISPERSION OF DUST! STRICT HYGIENE! IN ALL CASES CONSULT A DOCTOR!

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.7.8 Inhalation Prevention



Use local exhaust or breathing protection.

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.7.9 Skin Prevention



Protective gloves. Protective clothing.

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.7.10 Eye Prevention



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

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.7.11 Ingestion Prevention



Do not eat, drink, or smoke during work. Wash hands before eating.

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.8 Stability and Reactivity



11.8.1 Hazardous Reactivities and Incompatibilities



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

NIOSH. NIOSH Pocket Guide to Chemical Hazards. DHHS (NIOSH) Publication No. 97-140. Washington, D.C. U.S. Government Printing Office, 1997., p. 122

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Incompatible with alkaline materials, anionic surfactants (e.g., alkyl sulfonates or alkyl aryl sulfonates), & alkali-metal salts of hormone-type herbicides.

Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 370

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.9 Transport Information



11.9.1 Shipping Name / Number DOT/UN/NA/IMO



UN 2782; Bipyridilium pesticide, liquid, flammable, toxic, flash point less than 23 °C

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

UN 3016; Bipyridilium pesticide, liquid, toxic

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

UN 3015; Bipyridilium pesticide, liquid, flammable, toxic, flash point between 23 °C and 61 °C

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

UN 2781; Bipyridilium pesticide, solid, toxic

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Shipping Name/ Number DOT/UN/NA/IMO (Complete) data for DIQUAT DIBROMIDE (6 total), please visit the [HSDB record page](#).

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.9.2 Standard Transportation Number



49 633 42; [Diquat](#) (agricultural insecticides, not elsewhere classified liquid)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 633 44; [Diquat](#) (agricultural insecticides, not elsewhere classified, other than liquid)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

49 633 39; [Diquat](#) (insecticides, other than agricultural, not elsewhere classified)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.9.3 Shipment Methods and Regulations



No person may /transport,/ offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance ... and the hazardous material is properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by ... /the hazardous materials regulations (49 CFR 171-177)./

49 CFR 171.2 (7/1/2000)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Air Transport Association (IATA) Dangerous Goods Regulations are published by the IATA Dangerous Goods Board pursuant to IATA Resolutions 618 and 619 and constitute a manual of industry carrier regulations to be followed by all IATA Member airlines when transporting hazardous materials.

IATA. Dangerous Goods Regulations. 42nd Ed. Montreal, Canada and Geneva, Switzerland: International Air Transport Association, Dangerous Goods Regulations, 2001., p. 123

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

The International Maritime Dangerous Goods Code lays down basic principles for transporting hazardous chemicals. Detailed recommendations for individual substances and a number of recommendations for good practice are included in the classes dealing with such substances. A general index of technical names has also been compiled. This index should always be consulted when attempting to locate the appropriate procedures to be used when shipping any substance or article.

IMDG; International Maritime Dangerous Goods Code; International Maritime Organization p.3270, 6219, 6220, 6221 (1998)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.9.4 Packaging and Labelling



Do not transport with food and feedstuffs.

- ▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

11.9.5 EC Classification



Symbol: T+, N; R: 22-26-36/37/38-43-48/25-50/53; S: (1/2)-28-36/37/39-45-60-61

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

11.9.6 UN Classification



UN Hazard Class: 6.1; UN Pack Group: III

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

11.10 Regulatory Information



REACH Registered Substance

Status: Active Update: 29-04-2021 <https://echa.europa.eu/registration-dossier/-/registered-dossier/32257>

- ▶ European Chemicals Agency (ECHA)

New Zealand EPA Inventory of Chemical Status

Diquat dibromide: [HSNO](#) Approval: HSR002845 Approved with controls

- ▶ New Zealand Environmental Protection Authority (EPA)

11.10.1 Federal Drinking Water Standards



EPA 20 ug/l

USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present

- ▶ Hazardous Substances Data Bank (HSDB)

11.10.2 Federal Drinking Water Guidelines



EPA 20 ug/l

USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present

- ▶ Hazardous Substances Data Bank (HSDB)

11.10.3 State Drinking Water Guidelines



(ME) MAINE 15 ug/l

USEPA/Office of Water; Federal-State Toxicology and Risk Analysis Committee (FSTRAC). Summary of State and Federal Drinking Water Standards and Guidelines (11/93) To Present

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.10.4 Clean Water Act Requirements



Diquat dibromide is designated as a hazardous substance under section 311(b)(2)(A) of the Federal [Water](#) Pollution Control Act and further regulated by the Clean [Water](#) Act Amendments of 1977 and 1978. These regulations apply to discharges of this substance. This designation includes any isomers and hydrates, as well as any solutions and mixtures containing this substance.

40 CFR 116.4 (7/1/2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.10.5 CERCLA Reportable Quantities



Persons in charge of vessels or facilities are required to notify the National Response Center (NRC) immediately, when there is a release of this designated hazardous substance, in an amount equal to or greater than its reportable quantity of 1000 lb or 454 kg. The toll free number of the NRC is (800) 424-8802; In the Washington D.C. metropolitan area (202) 426-2675. The rule for determining when notification is required is stated in 40 CFR 302.4 (section IV. D.3.b).

40 CFR 302.4 (7/1/2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.10.6 FIFRA Requirements



Tolerances are established for residues of the plant growth regulator [diquat](#) (6,7-dihydrodipyrido (1,2-a:2(a) Tolerancprime;1-c)pyrazinediium) derived from application of the dibromide salt and calculated as the cation in or on the following food commodities: cattle, fat; cattle, meat-byproducts; cattle, meat; egg; goat, fat; goat, meat-byproducts; goat, meat; hot, fat; hog, meat-byproducts; hot, meat; horse, fat; horse, meat-byproducts; horse, meat; milk; potato; potato, waste, dried; poultry, fat; poultry, meat-byproducts; poultry, meat; sheep, fat; sheep, meat-byproducts; and sheep, meat. /[Diquat](#)/

40 CFR 180.226 (a)(1) (7/1/2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Tolerances are established for residues of the herbicide [diquat](#) (6,7-dihydrodipyrido (1,2-a:2,1-c) pyrazinediium) (calculated as the cation) derived from the application of the dibromide salt to ponds, lakes, reservoirs, marshed, drainage ditches, canals, streams, and rivers which are slow-moving or quiescent in programs of the Corps of Engineers or other Federal or State public agencies and to ponds, lakes and drainage ditches only where there is little or no outflow of [water](#) and which are totally under the control of the user, in or on the following food commodities: avocado; cotton, undelinted seed; fish; fruit, citrus, group; fruit, pome group; fruit, small; fruit, stone, group; grain, crop; grass, forage; hop, dried cones; nut, tree, group; shellfish; sugarcane, cane; vegetable, cucurbit, group; vegetable, foliage of legume, group; vegetable, fruiting, group; vegetable, leafy; vegetable, root and tuber, group; and vegetable, seed and pod. /[Diquat](#)/

40 CFR 180.226 (a)(2)(i) (7/1/2001)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Where tolerances are established at higher levels from other uses of [diquat](#) on the subject crops, the higher tolerances applies also to residues of the aquatic uses cited in this paragraph. /[Diquat](#)/

40 CFR 180.226 (a)(2)(ii) (7/1/2001)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Tolerances are established for residues of the plant growth regulator [diquat](#) (6,7-dihydrodipyrido (1,2-a:2'1'-c) pyrazinediium) derived from application of the dibromide salt and calculated as the cation in or on the following food commodities: banana; and coffee. /[Diquat](#)/

40 CFR 180.226 (a)(3) (7/1/2001)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more FIFRA Requirements (Complete) data for DIQUAT DIBROMIDE (7 total), please visit the [HSDB record page](#).

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.11 Other Safety Information



11.11.1 Toxic Combustion Products



When heated to decomposition, diquat dibromide emits very toxic fumes of NO_x and HBr.

Sax. Danger Props Indus Mater 6th ed p.1249 (1984)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

11.11.2 Special Reports



USEPA; Recognition and Management of Pesticide Poisoning (1982) EPA 540/9-80-005

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12 Toxicity



12.1 Toxicological Information



12.1.1 NIOSH Toxicity Data



- ▶ The National Institute for Occupational Safety and Health (NIOSH)

12.1.2 Evidence for Carcinogenicity



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

USEPA Office of Pesticide Programs, Health Effects Division, Science Information Management Branch: "Chemicals Evaluated for Carcinogenic Potential" (April 2006)

- ▶ Hazardous Substances Data Bank (HSDB)

A4; Not classifiable as a human carcinogen. /Diquat/

American Conference of Governmental Industrial Hygienists TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati, OH 2010, p. 28

- ▶ Hazardous Substances Data Bank (HSDB)

12.1.3 Carcinogen Classification



Carcinogen Classification	No indication of carcinogenicity to humans (not listed by IARC).
---------------------------	--

- ▶ Toxin and Toxin Target Database (T3DB)

12.1.4 Exposure Routes



The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

12.1.5 Inhalation Symptoms



Cough. Sore throat. Nosebleeds.

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

12.1.6 Skin Symptoms



Redness.

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

12.1.7 Eye Symptoms



Redness. Pain.

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

12.1.8 Ingestion Symptoms



Nausea. Vomiting. Ulceration in the mouth. Abdominal pain. Diarrhoea. Further see Inhalation.

- ▶ ILO-WHO International Chemical Safety Cards (ICSCs)

12.1.9 Acute Toxicity Link



Chemical: DIQUAT

- ▶ USGS Columbia Environmental Research Center

12.1.10 Adverse Effects



Occupational hepatotoxin - Secondary hepatotoxins: the potential for toxic effect in the occupational setting is based on cases of poisoning by human ingestion or animal experimentation.

Nephrotoxin - The chemical is potentially toxic to the kidneys in the occupational setting.

Skin Sensitizer - An agent that can induce an allergic reaction in the skin.

ACGIH Carcinogen - Not Classifiable.

- ▶ Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

12.1.11 Acute Effects



▶ [ChemIDplus](#)



12.1.12 Treatment

EYES: irrigate opened eyes for several minutes under running [water](#). INGESTION: do not induce vomiting. Rinse mouth with [water](#) (never give anything by mouth to an unconscious person). Seek immediate medical advice. SKIN: should be treated immediately by rinsing the affected parts in cold running [water](#) for at least 15 minutes, followed by thorough washing with soap and [water](#). If necessary, the person should shower and change contaminated clothing and shoes, and then must seek medical attention. INHALATION: supply fresh air. If required provide artificial respiration.

▶ [Toxin and Toxin Target Database \(T3DB\)](#)



12.1.13 Interactions

Generally, both herbicides /[diquat](#) and [paraquat](#)/ retarded the absorption of monosaccharides /[glucose](#) and [galactose](#)/, although the effects of the treatment at different time intervals were sometimes inconclusive.

Madge DS; Gen Pharmacol 33(2): 139-45 (1982)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

LOW CONCENTRATIONS OF CU²⁺ (0.2-5.0 PPM), DID HAVE A DAMAGING EFFECT, EVEN WHEN THE FISH WERE EXPOSED FOR A RELATIVELY SHORT TIME. FOR MIXTURES OF DIQUAT DIBROMIDE & CU²⁺, CU²⁺ HAD THE DOMINANT TOXIC EFFECT. THUS, HERBICIDE MIXTURES TO BE USED IN FRESHWATER AQUATIC SYSTEMS SHOULD NOT CONTAIN [COPPER SULFATE](#), AS THE EFFECTS ON FRESHWATER FISH MAY BE VERY DAMAGING.

MORRISON RJ; FIJI AGRIC J 40 (2): 105 (1978)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

A 2-FOLD INCR IN MORTALITY WAS OBSERVED WHEN [DIQUAT](#) WAS GIVEN TO RATS PLACED IN 85% [OXYGEN](#) RATHER THAN AIR.

PRATT IS ET AL; ARCH TOXICOL, SUPPL 4: 415-8 (1980)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

[Diquat](#) decomposes by alkalis to form colored complexes. Should not be used with anionic surface agents due to cationic nature.

Spencer, E. Y. Guide to the Chemicals Used in Crop Protection. 7th ed. Publication 1093. Research Institute, Agriculture Canada, Ottawa, Canada: Information Canada, 1982., p. 240

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Cell cultures and chicken embryos were treated with max tolerant concns of different compounds and infected with Newcastle disease virus simultaneously or 24 hours after the compounds were introduced. ...It was found that [Reglone](#) inhibited [Carbaryl](#) increased virus multiplication. ... /[Diquat \(Reglone\)](#)/

PMID:2503664

► [Hazardous Substances Data Bank \(HSDB\)](#)



12.1.14 Antidote and Emergency Treatment

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/

Bronstein, A.C., P.L. Currence; Emergency Care for Hazardous Materials Exposure. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 404

► [Hazardous Substances Data Bank \(HSDB\)](#)

Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious. Positive pressure ventilation techniques with a bag valve mask device may be beneficial. Monitor cardiac rhythm and treat arrhythmias if necessary Start an IV with D5W /SRP: "To keep open", minimal flow rate/. Use lactated Ringer's if signs of hypovolemia are present. Watch for signs of fluid overload. Consider drug therapy for pulmonary edema Consider vasopressors to treat hypotension without signs of hypovolemia (refer to shock protocol in Section Three). Treat seizures with [diazepam \(Valium\)](#) Use [proparacaine hydrochloride](#) to assist eye irrigation /[Bromine](#), [methyl bromide](#), and related compounds/

Bronstein, A.C., P.L. Currence; Emergency Care for Hazardous Materials Exposure. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 405

► [Hazardous Substances Data Bank \(HSDB\)](#)

Basic treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Do not use supplemental [oxygen](#) in cases of [paraquat](#) or [diquat](#) exposure. Monitor for pulmonary edema and treat if necessary Monitor for shock 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 Fullers' Earth, 7% bentonite USP or activated [charcoal](#) Do not delay GI decontamination. Cover skin burns with dry, sterile dressings after decontamination /[Paraquat](#) and Related Compounds/

Bronstein, A.C., P.L. Currence; Emergency Care for Hazardous Materials Exposure. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 314

► [Hazardous Substances Data Bank \(HSDB\)](#)

Advanced treatment: Consider orotracheal or nasotracheal intubation for air way control in the patient who is unconscious. Positive pressure ventilation techniques with a bag valve mask device, ... may be beneficial. Monitor cardiac rhythm and treat arrhythmias if necessary Start an IV with D5W /SRP: "To keep open", minimal flow rate/. Use lactated Ringer's if signs of hypovolemia are present. Watch for signs of fluid overload. Consider drug therapy for pulmonary edema For hypotension with signs of hypovolemia, administer fluid cautiously, Consider vasopressors for hypotension with a normal fluid volume. Watch for signs of pulmonary edema Use [proparacaine hydrochloride](#) to assist eye irrigation /[Paraquat](#) and Related Compounds/

Bronstein, A.C., P.L. Currence; *Emergency Care for Hazardous Materials Exposure*. 2nd ed. St. Louis, MO. Mosby Lifeline. 1994., p. 314

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Antidote and Emergency Treatment (Complete) data for DIQUAT DIBROMIDE (12 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)



12.1.15 Medical Surveillance

... Workers with prolonged exposure at levels approaching 0.5 mg/cu m should be given frequent eye examinations to detect early changes indicative of cataract formation.

American Conference of Governmental Industrial Hygienists, Inc. Documentation of the Threshold Limit Values, 4th ed., 1980. Cincinnati, Ohio: American Conference of Governmental Industrial Hygienists, Inc., 1980., p. 159

▶ [Hazardous Substances Data Bank \(HSDB\)](#)



12.1.16 Human Toxicity Excerpts

/HUMAN EXPOSURE STUDIES/ Workers who have skin contact with concentrated [diquat](#) solutions may show a color change and softening of one or more fingernails. ... Dust or mist of the compound has led to nosebleeds. ... the mists may cause skin irritation, irritation of the mouth and upper respiratory tract, cough and chest pain.

Booth, N.H., L.E. McDonald (eds.). Veterinary Pharmacology and Therapeutics. 5th ed. Ames, Iowa: Iowa State University Press, 1982., p. 561

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/HUMAN EXPOSURE STUDIES/ [Diquat](#) poisoning by suicidal or accidental ingestion is much less common than observed with [paraquat](#). It does produce a similar severe clinical syndrome with two notable differences: diarrhea is a prominent feature and pulmonary fibrosis has not been reported. Accidental and suicidal cases usually occur by the ingestion route. Clinical symptomatology, individual case histories, and preferred treatments for [diquat](#) poisoning have been described in detail elsewhere.

Bingham, E.; Cohrssen, B.; Powell, C.H.; Patty's Toxicology Volumes 1-9 5th ed. John Wiley & Sons. New York, N.Y. (2001), p. V4 1243

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/HUMAN EXPOSURE STUDIES/ Occupational intoxication with [diquat](#) has been uncommon. However, similar to agricultural workers using [paraquat](#), upper respiratory irritation and inflammation and bleeding of the nasal mucosa have been reported, as well as nail changes and delayed wound healing

Bingham, E.; Cohrssen, B.; Powell, C.H.; Patty's Toxicology Volumes 1-9 5th ed. John Wiley & Sons. New York, N.Y. (2001), p. V4 1243

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/HUMAN EXPOSURE STUDIES/ ...A case of full thickness burns of the feet requiring skin grafting occurred following prolonged exposure of the soles of the feet to diquat dibromide.

[PMID:2381016](#)

Manoguerra AS; J Toxicol Clin Toxicol 28 (1): 107-110 (1990)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Human Toxicity Excerpts (Complete) data for DIQUAT DIBROMIDE (12 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)



12.1.17 Non-Human Toxicity Excerpts

/LABORATORY ANIMALS: Acute Exposure/ The effects of postmaturational aging on the toxicity of [diquat](#)... were investigated in hepatocytes that were isolated from mature (6 months) and old (27 months) male Fischer 344 rats and pretreated with [1,3-bis\(2-chloroethyl\)-1-nitrosourea \(BCNU\)](#), an inhibitor of [glutathione](#) reductase. ... [Diquat](#) cytotoxicity was intensified in hepatocytes of old rats compared with those of mature rats, and the enhanced toxicity was associated with increased lipid peroxidation and protein carbonyl formation. However, the enhanced toxicity in old rat hepatocytes was also accompanied by a decr in [diquat](#)-induced [GSH](#) oxidation and there was no difference in protein sulfhydryl loss. Concentrations of total nonheme [iron](#) and low-molecular-weight chelatable Fe²⁺, measured with [ferene](#) as the chromogen, were several times higher in freshly isolated hepatocytes of old rats than in those of mature rats. ...

Rikans LE, et al; Toxicol Appl Pharmacol 118(2): p.263-270 (1993)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/LABORATORY ANIMALS: Acute Exposure/ ORAL DOSES NEAR LD50 PRODUCE HYPEREXCITABILITY LEADING TO CONVULSIONS & DISTENTION OF GI TRACT WITH DISCOLORATION OF INTESTINAL FLUIDS.

Doull, J., C.D. Klaassen, and M. D. Amdur (eds.). Casarett and Doull's Toxicology. 2nd ed. New York: Macmillan Publishing Co., 1980., p. 391

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/LABORATORY ANIMALS: Acute Exposure/ AFTER LETHAL SC DOSE OF [DIQUAT](#) TO RATS, THE ANIMALS SHOWED NO SYMPTOMS FOR A FEW HR. THEN PUPILS BECAME PROGRESSIVELY DILATED SO THE IRIS WAS HARDLY VISIBLE AT 6 HR AND THE LIGHT REFLEX WAS GONE. AFTER 24 HR THE RATS WERE SUBDUED, LETHARGIC, & DID NOT EAT. GRADUALLY RESPIRATION BECAME LABORED, BODY TEMP FELL, & BODY WEIGHT WAS LOST. THE ANIMALS DIED 2-13 DAYS POST-TREATMENT. THE PUPILS WERE DILATED UNTIL DEATH. BEYOND 7 DAYS RATS HAD DISTENDED ABDOMENS FROM A GROSSLY SWOLLEN CECUM.

Clayton, G. D. and F. E. Clayton (eds.). Patty's Industrial Hygiene and Toxicology: Volume 2A, 2B, 2C: Toxicology. 3rd ed. New York: John Wiley Sons, 1981-1982., p. 2752

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/LABORATORY ANIMALS: Acute Exposure/ [Diquat](#) administered orally to rats at the LD50 rate had an effect on the distribution of [water](#) within the body, and early deaths were associated with rapid fluid loss into the gastrointestinal tract. The effect of subcutaneous [diquat](#) on [water](#) distribution was delayed and was less pronounced. The accumulation of fluid was caused mainly by incr production and not by reduced emptying time...

Booth, N.H., L.E. McDonald (eds.). Veterinary Pharmacology and Therapeutics. 5th ed. Ames, Iowa: Iowa State University Press, 1982., p. 559

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Non-Human Toxicity Excerpts (Complete) data for DIQUAT DIBROMIDE (41 total), please visit the [HSDB record page](#).

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12.1.18 Non-Human Toxicity Values



LD50 Rabbit percutaneous >750 mg/kg

Tomlin, C.D.S. (ed.). The Pesticide Manual - World Compendium. 10th ed. Surrey, UK: The British Crop Protection Council, 1994., p. 371

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

LD50 Cow oral 30 mg/kg

Clark A, Hurst E; Brit J Ind Med 27: 51-55 (1970)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

LD50 Dog oral 100-200 mg/kg

Clark A, Hurst E; Brit J Ind Med 27: 51-55 (1970)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

LD50 Guinea pig oral 100 mg/kg

Clark A, Hurst E; Brit J Ind Med 27: 51-55 (1970)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Non-Human Toxicity Values (Complete) data for DIQUAT DIBROMIDE (17 total), please visit the [HSDB record page](#).

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12.1.19 Ecotoxicity Values



LC50 Hyallella azteca 48 mg/l 96-hr

Wilson DC, Bond CE; Transaction Am Fishery Soc 98(3): 438-443 (1969)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

LC50 Pimephales promelas 14000 mg/l 96-hr

Surber EW, Pickering QH; Prog Fish Cult 24(4): 164-171 (1962)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

LC50 Micropterus salmoides 7800 mg/l 96-hr

Surber EW, Pickering QH; Prog Fish Cult 24(4): 164-171 (1962)

- ▶ [Hazardous Substances Data Bank \(HSDB\)](#)

LC50 *Esox lucius* 16000 mg/l 48-hr

Gilderhus PA; Prog Fish Cult 29(2): 67-74 (1967)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Ecotoxicity Values (Complete) data for DIQUAT DIBROMIDE (22 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)



12.1.20 Ecotoxicity Excerpts

/BIRDS and MAMMALS/ ...Mallard (*Anas platyrhynchos*) eggs were exposed to [diquat](#) by immersing the eggs for 10 sec in solns of 0.88, 3.5, 7, 14, or 56 g/L on either day 4 or 21 of incubation. Application of [diquat](#) on day 4 yielded an estimated LC50 of 19.5 g/L through 18 days of incubation, and 9.6 g/L through hatching. Body and organ weights, and bone lengths of hatchlings did not differ between control and treatment groups with the exception of a slight incr in brain weight in the 14 g/L group. Malformations in [diquat](#)-treated embryos included defects of the brain, eye, bill, limb, and pelvis; skeletal scoliosis; and incomplete ossification. Subcutaneous edema was also present. Significant manifestations of oxidative stress were apparent in hatchlings and included increased hepatic [thiobarbituric acid-reactive substances \(TBARS\)](#) (lipid peroxidation) and decreased brain reduced glutathione ([GSH](#)). Brain protein-bound sulfhydryls (PBSH) increased. [Diquat](#) applied on day 21 of incubation yielded an estimated LC50 of 12.6 g/L through hatching. Exposure at this late stage of development did not produce deformities. Body and organ weights and, bone lengths of hatchlings did not differ between control and treatment groups. Significant manifestations of oxidative stress in hatchlings included decreased brain [GSH](#), increased oxidized glutathione ([GSSG](#)), and ratio of [GSSG](#) to [GSH](#). This study suggests that concns of [diquat](#) commonly used for aquatic weed control, when based upon the dilution effect of avg [water](#) depth of the application area, would probably have little impact on mallard embryos. However, concns applied above ground to weeds and cattails along ditches could adversely affect the survival and development of mallard embryos, and presumably other avian species nesting in such habitats.

PMID:11205534

Sewalk CJ et al; J Toxicol Environ Health A 62 (1): 33-45 (2001)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/BIRDS and MAMMALS/ MALLARDS, ORALLY: ATAXIA ... NUTATION, WING DROP, WING SHIVERS, IMMOBILITY. SURVIVORS TOOK AS LONG AS 14 DAYS TO RECOVER. MORTALITIES OCCURRED 1 TO 3 DAYS POST-TREATMENT.

U. S. Department of the Interior, Fish & Wildlife Service, Bureau of Sport Fisheries & Wildlife. Handbook of Toxicity of Pesticides to Wildlife. Washington, D. C.: U. S. Government Printing Office, 1970., p. 51

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/BIRDS and MAMMALS/ Drinking [water](#) containing 0.5 or 5% [Reglone](#) (dibromide) decreased [water](#) consumption by Japanese quails in a concn-dependent manner. Ten-day drinking of [Reglone](#) /dibromide/ caused /decrease in/ erythrocyte and Hb /levels/ which continued for 7 days after termination of the [Reglone](#) /dibromide/ administration. The Hb and erythrocyte levels returned to normal within 3 wk after the termination of [Reglone](#) /dibromide/ administration. Within the first wk after the termination of [Reglone](#) /dibromide/ administration, 4 of 15 quails died drinking 5% [Reglone](#) /dibromide/.

Laitnerova N et al; Acta Univ Agric, Fac Agron (Brno) 29(1-2): 319-26 (1981)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

/AQUATIC SPECIES/ TOXICOLOGICAL MODIFICATION OF RHEOTAXIS & SWIMMING SPEEDS WERE OBSERVED IN RAINBOW TROUT FOLLOWING 24-HR EXPOSURES TO [DIQUAT](#) & ITS FORMULATION [REGLONE A](#). RESIDUES IN FISH LEVELLED OFF WITH INCR TREATMENT LEVELS. THIS SENSITIVE BIOASSAY /IS USED/ TO ASSESS SUBLETHAL EFFECTS.

DODSON JJ, MAYFIELD CI; ENVIRN POLLUT 18 (2): 147-57 (1979)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

For more Ecotoxicity Excerpts (Complete) data for DIQUAT DIBROMIDE (9 total), please visit the [HSDB record page](#).

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12.2 Ecological Information



12.2.1 EPA Ecotoxicity



Pesticide Ecotoxicity Data from EPA



▶ [EPA Pesticide Ecotoxicity Database](#)

12.2.2 ICSC Environmental Data



The substance is harmful to aquatic organisms. This substance does enter the environment under normal use. Great care, however, should be taken to avoid any additional release, for example through inappropriate disposal.

▶ [ILO-WHO International Chemical Safety Cards \(ICSCs\)](#)

12.2.3 Environmental Fate / Exposure Summary



Diquat dibromide's production may result in its release to the environment through various waste streams; its use as a non-selective contact herbicide, algicide, desiccant, and defoliant may result in its direct release to the environment. If released to air, a vapor pressure of $<<1.0 \times 10^{-7}$ mm Hg at 25 °C indicates diquat dibromide will exist in the particulate phase in the ambient atmosphere. Particulate-phase diquat dibromide will be removed from the atmosphere by wet and dry deposition. Diquat has an absorption maximum at 310 nm and is therefore susceptible to

UV decomposition. However, when adsorbed on particulate matter, no photodegradation occurs. If released to soil, diquat dibromide is expected to have slight mobility based upon an estimated Koc of 2,000. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 1.4×10^{-13} atm-cu m/mole. Diquat dibromide is a divalent cation and cations generally adsorb to organic carbon and clay more strongly than their neutral counterparts. Biodegradation is not expected to be an important environmental fate process as diquat dibromide reached 0% of its theoretical BOD using the Japanese MITI test. If released into water, diquat dibromide is expected to adsorb to suspended solids and sediment based upon the estimated Koc. Diquat dibromide will exist almost entirely in the ionized form at pH values of 5 to 9 and therefore volatilization from water surfaces is not expected to be an important fate process. A BCF range of 0.6 to 1.4 suggests bioconcentration in aquatic organisms is low. Diquat dibromide is stable in neutral or acid solutions; however, it hydrolyzes in alkaline waters. Occupational exposure to diquat dibromide may occur through inhalation and dermal contact with this compound at workplaces where diquat dibromide is produced or used. Monitoring data were not located that would indicate general population exposure to diquat dibromide; however, drift from aerial application in the immediate vicinity is a possibility. (SRC)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)



12.2.4 Artificial Pollution Sources

Diquat dibromide's production may result in its release to the environment through various waste streams; its use as a non-selective contact herbicide, algicide, desiccant, and defoliant(1) will result in its direct release to the environment(SRC).

(1) USEPA; R.E.D. Facts Database on Diquat Dibromide (85-00-7). USEPA 738-F-95-015. July 1995. Available from the Database Query page at <https://www.epa.gov/pesticides/reregistration/status.htm#top> as of Jun 17, 2002.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)



12.2.5 Environmental Fate

TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 2,000(SRC), determined from a structure estimation method(2), indicates that diquat dibromide is expected to have slight mobility in soil(SRC). Volatilization of diquat dibromide from moist soil surfaces is not expected to be an important fate process(SRC) given an estimated Henry's Law constant of 1.4×10^{-13} atm-cu m/mole(SRC), using a fragment constant estimation method(3). Diquat dibromide is not expected to volatilize from dry soil surfaces(SRC) based upon a vapor pressure of $<< 1.0 \times 10^{-7}$ mm Hg(4). Biodegradation in soil is not expected to be an important environmental fate process as diquat dibromide reached 0% of its theoretical BOD using the Japanese MITI test(5).

(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992) (3) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (4) Ahrens WH; Herbicide Handbook of the Weed Science Society of America. 7th ed. Champaign, IL: Weed Sci Soc Amer p. 109 (1994) (5) Chemicals Inspection and Testing Institute; Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Japan Chemical Industry Ecology - Toxicology and Information Center. ISBN 4-89074-101-1 (1992)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 2,000(SRC), determined from a structure estimation method(2), indicates that diquat dibromide is expected to adsorb to suspended solids and sediment(SRC). Volatilization from [water](#) surfaces is not expected(3) based upon an estimated Henry's Law constant

of 1.4×10^{-13} atm-cu m/mole(SRC), developed using a fragment constant estimation method(4). Diquat dibromide is a divalent cation(5) and cations generally adsorb to organic carbon and clay more strongly than their neutral counterparts(6). According to a classification scheme(7), a BCF range of <0.6 to 1.4(9), suggests bioconcentration in aquatic organisms is low(SRC). Diquat dibromide is stable in neutral or acid solutions; however, it hydrolyzes in alkaline waters(8). Biodegradation in water is not expected to be an important environmental fate process as diquat dibromide reached 0% of its theoretical BOD using the Japanese MITI test(9).

(1) Swann RL et al; Res Rev 85: 17-28 (1983) (2) Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992) (3) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 4-9, 15-1 to 15-29 (1990) (4) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (5) Stevenson FJ; J Environ Qual 1: 333-43 (1972) (6) Doucette WJ; pp. 141-188 in Handbook of Property Estimation Methods for Chemicals. Boethling RS, Mackay D, eds. Boca Raton, FL: Lewis Publ (2000) (7) Franke C et al; Chemosphere 29: 1501-14 (1994) (8) Ahrens WH; Herbicide Handbook of the Weed Science Society of America. 7th ed. Champaign, IL: Weed Sci Soc Amer p. 108 (1994) (9) Chemicals Inspection and Testing Institute; Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Japan Chemical Industry Ecology - Toxicology and Information Center. ISBN 4-89074-101-1 (1992)

► [Hazardous Substances Data Bank \(HSDB\)](#)

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1), diquat dibromide, which has a vapor pressure of $<< 1.0 \times 10^{-7}$ mm Hg at 25 °C(2), will exist in the particulate phase in the ambient atmosphere. Particulate-phase diquat dibromide may be removed from the air by wet and dry deposition(SRC). Diquat has an absorption maximum at 310 nm(3) and is, therefore, susceptible to UV decomposition(SRC). However, when adsorbed on particulate matter, no photodegradation occurs(4).

(1) Bidleman TF; Environ Sci Technol 22: 361-367 (1988) (2) Ahrens WH; Herbicide Handbook of the Weed Science Society of America. 7th ed. Champaign, IL: Weed Sci Soc Amer p. 109 (1994) (3) Slade P, Smith AE; Nature 213: 919-20 (1967) (4) Weber JB; Adv Chem Ser 111: 55-120 (1972)

► [Hazardous Substances Data Bank \(HSDB\)](#)

12.2.6 Environmental Biodegradation



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 dibromide 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).

(1) Thom NS, Agg AR; Proc Roy Soc London B189: 347-51 (1975) (2) Funderburk HH Jr, Bozarth GA; J Agric Food Chem 15: 563-7 (1967) (3) Simsiman GV, Chesters G; Water Res 10: 105-12 (1976) (4) Weber JB; Adv Chem Ser 111: 55-120 (1972)

► [Hazardous Substances Data Bank \(HSDB\)](#)

AEROBIC: Diquat dibromide, applied to pools at a rate of 0.3 lbs per surface acre in 1962, was present at a concentration range of a trace to 1.7 ppm in bottom muds sampled in 1966(1). Diquat dibromide, present at 100 mg/l, reached 0% of its theoretical BOD in 4 weeks using an activated sludge inoculum at 30 mg/l and the Japanese MITI test(2). Therefore this compound is not expected to biodegrade rapidly(SRC).

(1) Funderburk HH Jr, Bozarth GA; J Agric Food Chem 15: 563-7 (1967) (2) Chemicals Inspection and Testing Institute; Biodegradation

and bioaccumulation data of existing chemicals based on the CSCL Japan. Japan Chemical Industry Ecology - Toxicology and Information Center. ISBN 4-89074-101-1 (1992)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12.2.7 Environmental Abiotic Degradation



Diquat dibromide is stable in neutral or acid solutions(3); however, it hydrolyzes in alkaline waters(1,3). No rates of reaction could be located. Diquat dibromide is rapidly oxidized by chlorine oxide above pH 8.14 and below pH 7.12(2). Similar results are observed for chlorine gas(2). Therefore, diquat dibromide would dissipate rapidly from chlorinated drinking water which was slightly alkaline(2). Solutions of diquat dibromide are readily reduced, taking on an intense green color due to the formation of a water-soluble, relatively stable, free radical(4). Reduction is autooxidizable and the green color disappears on shaking the solution in air(4).

(1) Tomlin CDS, ed; *The Pesticide Manual World Compendium*. 11th ed., Surrey, England: British Crop Protection Council p. 436 (1997)
(2) Faust SD; *ACS Symp Ser 18: 572-95 (1975)* (3) Ahrens WH; *Herbicide Handbook of the Weed Science Society of America*. 7th ed. Champaign, IL: Weed Sci Soc Amer p. 108 (1994) (4) Funderburk HH Jr; pp. 283-98 in *Degradation of Herbicides*. Kearney PC, Kaufman DD, eds. NY, NY: Marcel Dekker (1969)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

Diquat dibromide has an absorption maximum at 310 nm(1) and is highly susceptible to decomposition by UV radiation(2,3). When exposed to sunlight, greater than 50 and 75% of dry diquat dibromide was decomposed to volatile products in 48 and 96 hr, respectively(3). No diquat dibromide remained in solution when exposed to UV radiation for 192 hr(3). When a solution containing 5 ppm of diquat dibromide was exposed to sunlight during May and June, 70% was degraded in 3 weeks, and picolinic acid and 1,2,3,4-tetrahydro-1-oxopyrido[1,2-a] -5-pyrazinium salt were major photoproducts(4). When adsorbed on particulate matter, no photodegradation occurs(5).

(1) Slade P, Smith AE; *Nature* 213: 919-20 (1967) (2) Sanborn JR et al; *The fate of selected herbicides in the aquatic environment*; pp.76-89 USEPA-660/3-74-025 (1977) (3) Funderburk HH Jr, Bozarth GA; *J Agric Food Chem* 15: 563-7 (1967) (4) Smith AE, Grove J; *J Agric Food Chem* 17: 609-13 (1969) (5) Weber JB; *Adv Chem Ser* 111: 55-120 (1972)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12.2.8 Environmental Bioconcentration



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).

(1) *Chemicals Inspection and Testing Institute; Biodegradation and bioaccumulation data of existing chemicals based on the CSCL Japan. Japan Chemical Industry Ecology - Toxicology and Information Center. ISBN 4-89074-101-1 (1992)* (2) Franke C et al; *Chemosphere* 29: 1501-14 (1994) (3) Garten CT Jr, Trabalka JR; *Environ Sci Technol* 17: 590-5 (1983) (4) Funderburk HH Jr, Bozarth GA; *J Agric Food Chem* 15: 563-7 (1967)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12.2.9 Soil Adsorption / Mobility



Diquat dibromide 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).

(1) USEPA; R.E.D. Facts Database on Diquat Dibromide (85-00-7). USEPA 738-F-95-015. July 1995. Available from the Database Query page at <https://www.epa.gov/pesticides/reregistration/status.htm#top> as of Jun 17, 2002. (2) Meylan WM et al; Environ Sci Technol 26: 1560-67 (1992) (3) Swann RL et al; Res Rev 85: 17-28 (1983) (4) Matthes G; Chem Plant Prot 9: 192-246 (1994) (5) Stevenson FJ; J Environ Qual 1: 333-43 (1972) (6) Doucette WJ; pp. 141-188 in Handbook of Property Estimation Methods for Chemicals. Boethling RS, Mackay D, eds. Boca Raton, FL: Lewis Publ (2000)

► [Hazardous Substances Data Bank \(HSDB\)](#)

Diquat dibromide dissolves and dissociates in aqueous solution to form cations. They are highly soluble and behave as strong electrolytes even under acid conditions. Thus, their hydrophobic-hydrophilic interaction and dissociation constants do not affect their adsorption characteristics(1). Diquat dibromide is strongly adsorbed by humic substances by an ion exchange mechanism, the reaction being accompanied by a release of hydrogen ions(1). There is also evidence that charge-transfer complexes are formed between the humic acid and the bipyridylum cation(1). The relative importance of the two mechanisms is a matter of speculation(1). Diquat dibromide was in the lowest of 5 mobility categories in soil mobility measurements on 14 montmorillonite and non-montmorillonite soils(2,4). Its mobility was not correlated with any soil properties except for clay content in the case of montmorillonite soils(2). X-ray studies reveal that the diquat dibromide is tightly adsorbed to the interlayer spacings of montmorillonite making it unavailable to microorganisms(3). Adsorption by kaolinite and vermiculite is less strong and the availability of the diquat dibromide wasn't reduced completely(3). Diquat dibromide is completely adsorbed by bentonite at pH 4.1 and 8.2 and strongly adsorbed by muck at pH 3.2 and 5.3(5).

(1) Choudry GG; Toxicol Environ Chem 6: 127-71 (1983) (2) Helling CS; Soil Sci Soc Amer Proc 35: 743-8 (1971) (3) Weber JB; Adv Chem Ser 111: 55-120 (1972) (4) Helling CS, Turner BC; Science 162: 562-3 (1968) (5) Kunze GW; pp.49-70 in Pestic Eff Soil Water Symp Columbus, OH (1965)

► [Hazardous Substances Data Bank \(HSDB\)](#)

12.2.10 Volatilization from Water / Soil



The Henry's Law constant for diquat dibromide is estimated as 1.4×10^{-13} atm-cu m/mole(SRC) using a fragment constant estimation method(1). This estimated Henry's Law constant indicates that diquat dibromide is expected to be essentially nonvolatile from water surfaces(2). Diquat dibromide is not expected to volatilize from dry soil surfaces(SRC) based upon a vapor pressure of $<< 1.0 \times 10^{-7}$ mm Hg(3).

(1) Meylan WM, Howard PH; Environ Toxicol Chem 10: 1283-93 (1991) (2) Lyman WJ et al; Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 15-1 to 15-29 (1990) (3) Ahrens WH; Herbicide Handbook of the Weed Science Society of America. 7th ed. Champaign, IL: Weed Sci Soc Amer p. 109 (1994)

► [Hazardous Substances Data Bank \(HSDB\)](#)

12.2.11 Food Survey Values



No diquat dibromide residues were reported in the 1989 California Dept of Food and Agric analysis of pesticide residues in food crops(1).

[PMID:1992493](#)

(1) Okumura D et al; *Rev Environ Contam Toxicol* 118: 87-151 (1991)

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

12.2.12 Probable Routes of Human Exposure



NIOSH (NOES Survey 1981-1983) has statistically estimated that 200 workers are potentially exposed to diquat dibromide in the US(1). The NOES Survey does not include farm workers. Occupational exposure to diquat dibromide may occur through inhalation and dermal contact with this compound at workplaces where diquat dibromide is produced or used(SRC). Monitoring data were not located that would indicate general population exposure to diquat dibromide(SRC); however, drift from aerial application in the immediate vicinity is a possibility(2).

(1) NIOSH; *National Occupational Exposure Survey (NOES) (1983)* (2) USEPA; R.E.D. *Facts Database on Diquat Dibromide (85-00-7)*. USEPA 738-F-95-015. July 1995. Available from the Database Query page at <https://www.epa.gov/pesticides/reregistration/status.htm#top> as of Jun 17, 2002.

▶ [Hazardous Substances Data Bank \(HSDB\)](#)

13 Associated Disorders and Diseases



Associated Occupational Diseases with Exposure to the Compound

[Contact dermatitis, allergic](#) [Category: Skin Disease]

▶ [Haz-Map, Information on Hazardous Chemicals and Occupational Diseases](#)

14 Literature



14.1 Consolidated References



▶ [PubChem](#)

14.2 NLM Curated PubMed Citations





▶ PubChem

14.3 Springer Nature References



▶ Springer Nature

14.4 Chemical Co-Occurrences in Literature



▶ PubChem

14.5 Chemical-Gene Co-Occurrences in Literature



▶ PubChem

14.6 Chemical-Disease Co-Occurrences in Literature



▶ PubChem

15 Patents



15.1 Depositor-Supplied Patent Identifiers



▶ PubChem

[Link to all deposited patent identifiers](#)

▶ PubChem

15.2 WIPO PATENTSCOPE



Patents are available for this chemical structure:

<https://patentscope.wipo.int/search/en/result.jsf?inchikey=ODPOAESBSUKMHD-UHFFFAOYSA-L>

▶ PATENTSCOPE (WIPO)

15.3 Chemical Co-Occurrences in Patents



▶ PubChem

15.4 Chemical-Disease Co-Occurrences in Patents



▶ PubChem

15.5 Chemical-Gene Co-Occurrences in Patents



▶ PubChem

16 Interactions and Pathways



16.1 Chemical-Target Interactions



▶ Toxin and Toxin Target Database (T3DB)

17 Biological Test Results



17.1 BioAssay Results



▶ PubChem

18 Classification



18.1 MeSH Tree



▶ Medical Subject Headings (MeSH)

18.2 ChemIDplus



▶ ChemIDplus

18.3 UN GHS Classification



▶ UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

18.4 EPA CPDat Classification





▶ EPA Chemical and Products Database (CPDat)

18.5 NORMAN Suspect List Exchange Classification



▶ NORMAN Suspect List Exchange

18.6 EPA DSSTox Classification



▶ EPA DSSTox

18.7 Consumer Product Information Database Classification



▶ Consumer Product Information Database (CPID)

18.8 EPA Substance Registry Services Tree



▶ EPA Substance Registry Services

19 Information Sources



FILTER BY SOURCE



1. ChEMBL

LICENSE

Access to the web interface of ChEMBL is made under the EBI's Terms of Use (<http://www.ebi.ac.uk/Information/termsofuse.html>). The ChEMBL data is made available on a Creative Commons Attribution-Share Alike 3.0 Unported License (<http://creativecommons.org/licenses/by-sa/3.0/>).

https://www.ebi.ac.uk/chembl/compound_report_card/CHEMBL1599022/

2. ChemIDplus

LICENSE

<https://www.nlm.nih.gov/copyright.html>

Diquat dibromide [ISO]

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=chemidplus&sourceid=0000085007>

Dipyrido(1,2-a:2',1'-c)pyrazinediium, 6,7-dihydro-, labeled with carbon-14, dibromide

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=chemidplus&sourceid=0034417680>

ChemIDplus Chemical Information Classification

<https://pubchem.ncbi.nlm.nih.gov/source/ChemIDplus>

3. EPA DSSTox

LICENSE

<https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources>

Diquat dibromide

<https://comptox.epa.gov/dashboard/DTXSID3024075>

CompTox Chemicals Dashboard Chemical Lists

<https://comptox.epa.gov/dashboard/chemical-lists/>

4. European Chemicals Agency (ECHA)

LICENSE

Use of the information, documents and data from the ECHA website is subject to the terms and conditions of this Legal Notice, and subject to other binding limitations provided for under applicable law, the information, documents and data made available on the ECHA website may be reproduced, distributed and/or used, totally or in part, for non-commercial purposes provided that ECHA is acknowledged as the source: "Source: European Chemicals Agency, <http://echa.europa.eu/>". Such acknowledgement must be included in each copy of the material. ECHA permits and encourages organisations and individuals to create links to the ECHA website under the following cumulative conditions: Links can only be made to webpages that provide a link to the Legal Notice page.

<https://echa.europa.eu/web/guest/legal-notice>

Diquat dibromide

<https://echa.europa.eu/substance-information/-/substanceinfo/100.001.436>

Diquat dibromide

<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/114925>

5. FDA Global Substance Registration System (GSRS)

LICENSE

Unless otherwise noted, the contents of the FDA website (www.fda.gov), both text and graphics, are not copyrighted. They are in the public domain and may be republished, reprinted and otherwise used freely by anyone without the need to obtain permission from FDA. Credit to the U.S. Food and Drug Administration as the source is appreciated but not required.

<https://www.fda.gov/about-fda/about-website/website-policies#linking>

DIQUAT DIBROMIDE

<https://gsrs.ncats.nih.gov/ginas/app/beta/substances/6BDV3T272W>

6. Hazardous Substances Data Bank (HSDB)

LICENSE

https://www.nlm.nih.gov/web_policies.html

DIQUAT DIBROMIDE

<https://pubchem.ncbi.nlm.nih.gov/source/hsdb/1700>

7. ILO-WHO International Chemical Safety Cards (ICSCs)

LICENSE

Creative Commons CC BY 4.0

<https://www.ilo.org/global/copyright/lang--en/index.htm>

DIQUAT DIBROMIDE

https://www.ilo.org/dyn/icsc/showcard.display?p_version=2&p_card_id=1363

8. New Zealand Environmental Protection Authority (EPA)

LICENSE

This work is licensed under the Creative Commons Attribution-ShareAlike 4.0 International licence.

<https://www.epa.govt.nz/about-this-site/general-copyright-statement/>

Diquat dibromide

<https://www.epa.govt.nz/industry-areas/hazardous-substances/guidance-for-importers-and-manufacturers/hazardous-substances-databases/>

9. The National Institute for Occupational Safety and Health (NIOSH)

LICENSE

The information provided using CDC Web site is only intended to be general summary information to the public. It is not intended to take the place of either the written law or regulations.

<https://www.cdc.gov/Other/disclaimer.html>

Dipyrido(1,2-a;2',1'-c)pyrazinediium, 6,7-dihydro-, dibromide

<https://www.cdc.gov/niosh-rtecs/JM56D290.html>

10. Consumer Product Information Database (CPID)

LICENSE

Copyright (c) 2023 DeLima Associates. All rights reserved. Unless otherwise indicated, all materials from CPID are copyrighted by DeLima Associates. No part of these materials, either text or image may be used for any purpose other than for personal use. Therefore, reproduction, modification, storage in a retrieval system or retransmission, in any form or by any means, electronic, mechanical or otherwise, for reasons other than personal use, is strictly prohibited without prior written permission.

<https://www.whatsinproducts.com/contents/view/1/6>

Diquat dibromide

<https://www.whatsinproducts.com/chemicals/view/1/613/000085-00-7>

Consumer Products Category Classification

<https://www.whatsinproducts.com/>

11. EPA Chemical and Products Database (CPDat)

LICENSE

<https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources>

<https://comptox.epa.gov/dashboard/DTXSID3024075#exposure>

EPA CPDat Classification

<https://www.epa.gov/chemical-research/chemical-and-products-database-cpdat>

12. Haz-Map, Information on Hazardous Chemicals and Occupational Diseases

LICENSE

Copyright (c) 2022 Haz-Map(R). All rights reserved. Unless otherwise indicated, all materials from Haz-Map are copyrighted by Haz-Map(R). No part of these materials, either text or image may be used for any purpose other than for personal use. Therefore, reproduction, modification, storage in a retrieval system or retransmission, in any form or by any means, electronic, mechanical or otherwise, for reasons other than personal use, is strictly

prohibited without prior written permission.
<https://haz-map.com/About>

Diquat dibromide

<https://haz-map.com/Agents/2218>

13. EPA Pesticide Ecotoxicity Database

LICENSE

<https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources>

<https://ecotox.ipmcenters.org/>

14. Hazardous Chemical Information System (HCIS), Safe Work Australia

diquat dibromide

<http://hcis.safeworkaustralia.gov.au/HazardousChemical/Details?chemicalID=1602>

15. NITE-CMC

1,1'-Ethylene-2,2'-bipyridinium dibromide - FY2006

<https://www.nite.go.jp/chem/english/ghs/06-imcg-0013e.html>

16. Regulation (EC) No 1272/2008 (Classification and Labelling) of the European Parliament and of the Council

LICENSE

The copyright for the editorial content of this source, the summaries of EU legislation and the consolidated texts, which is owned by the EU, is licensed under the Creative Commons Attribution 4.0 International licence.

<https://eur-lex.europa.eu/content/legal-notice/legal-notice.html>

diquat dibromide

<https://eur-lex.europa.eu/eli/reg/2008/1272/2023-07-31>

17. NJDOH RTK Hazardous Substance List

diquat dibromide

<http://nj.gov/health/eoh/rtkweb/documents/fs/0808.pdf>

18. SpectraBase

DIQUAT DIBROMIDE

<https://spectrabase.com/spectrum/ApzzZc0i9nl>

6,7-DIHYDRODIPYRIDO[1,2- α :2',1'-c]PYRAZINEDIIUM DIBROMIDE

<https://spectrabase.com/spectrum/58TntpYqNWy>

Diquat

<https://spectrabase.com/spectrum/KIBdFrjboHj>

Diquat

<https://spectrabase.com/spectrum/89khXhI9ZZf>

19. Springer Nature

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=15745&sourceid=16044763-21269186>

20. Toxin and Toxin Target Database (T3DB)

LICENSE

T3DB is offered to the public as a freely available resource. Use and re-distribution of the data, in whole or in part, for commercial purposes requires explicit permission of the authors and explicit acknowledgment of the source material (T3DB) and the original publication.

<http://www.t3db.ca/downloads>

Diquat dibromide

<http://www.t3db.ca/toxins/T3D4498>

21. USGS Columbia Environmental Research Center

LICENSE

<https://www.usgs.gov/foia>

DIQUAT

<https://www.cerc.usgs.gov/data/acute/qrychemdesc.asp?Chemical=D0350>

22. Wikidata

LICENSE

CCZero

<https://creativecommons.org/publicdomain/zero/1.0/>

Diquat

<https://www.wikidata.org/wiki/Q910903>

23. Wikipedia

Diquat

<https://en.wikipedia.org/wiki/Diquat>

24. Medical Subject Headings (MeSH)

LICENSE

Works produced by the U.S. government are not subject to copyright protection in the United States. Any such works found on National Library of Medicine (NLM) Web sites may be freely used or reproduced without permission in the U.S.

<https://www.nlm.nih.gov/copyright.html>

Diquat

<https://www.ncbi.nlm.nih.gov/mesh/68004178>

MeSH Tree

<http://www.nlm.nih.gov/mesh/meshhome.html>

Herbicides

<https://www.ncbi.nlm.nih.gov/mesh/68006540>

Defoliants, Chemical

<https://www.ncbi.nlm.nih.gov/mesh/68003678>

25. PubChem

<https://pubchem.ncbi.nlm.nih.gov>

26. UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)

GHS Classification Tree

http://www.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html

27. NORMAN Suspect List Exchange

LICENSE

Data: CC-BY 4.0; Code (hosted by ECI, LCSB): Artistic-2.0

<https://creativecommons.org/licenses/by/4.0/>

NORMAN Suspect List Exchange Classification

<https://www.norman-network.com/nds/SLE/>

28. EPA Substance Registry Services

LICENSE

<https://www.epa.gov/privacy/privacy-act-laws-policies-and-resources>

EPA SRS List Classification

https://sor.epa.gov/sor_internet/registry/substreg/LandingPage.do

29. PATENTSCOPE (WIPO)

SID 403432890

<https://pubchem.ncbi.nlm.nih.gov/substance/403432890>

” Cite

↓ Download

CONTENTS

Title and Summary	
1 Structures	▼
2 Names and Identifiers	▼
3 Chemical and Physical Properties	▼
4 Spectral Information	▼
5 Related Records	▼
6 Chemical Vendors	
7 Agrochemical Information	▼
8 Pharmacology and Biochemistry	▼
9 Use and Manufacturing	▼
10 Identification	▼
11 Safety and Hazards	▼
12 Toxicity	▼
13 Associated Disorders and Diseases	
14 Literature	▼
15 Patents	▼
16 Interactions and Pathways	▼
17 Biological Test Results	▼
18 Classification	▼
19 Information Sources	