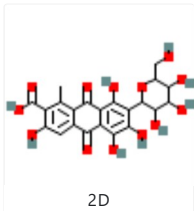
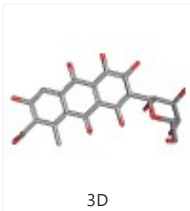


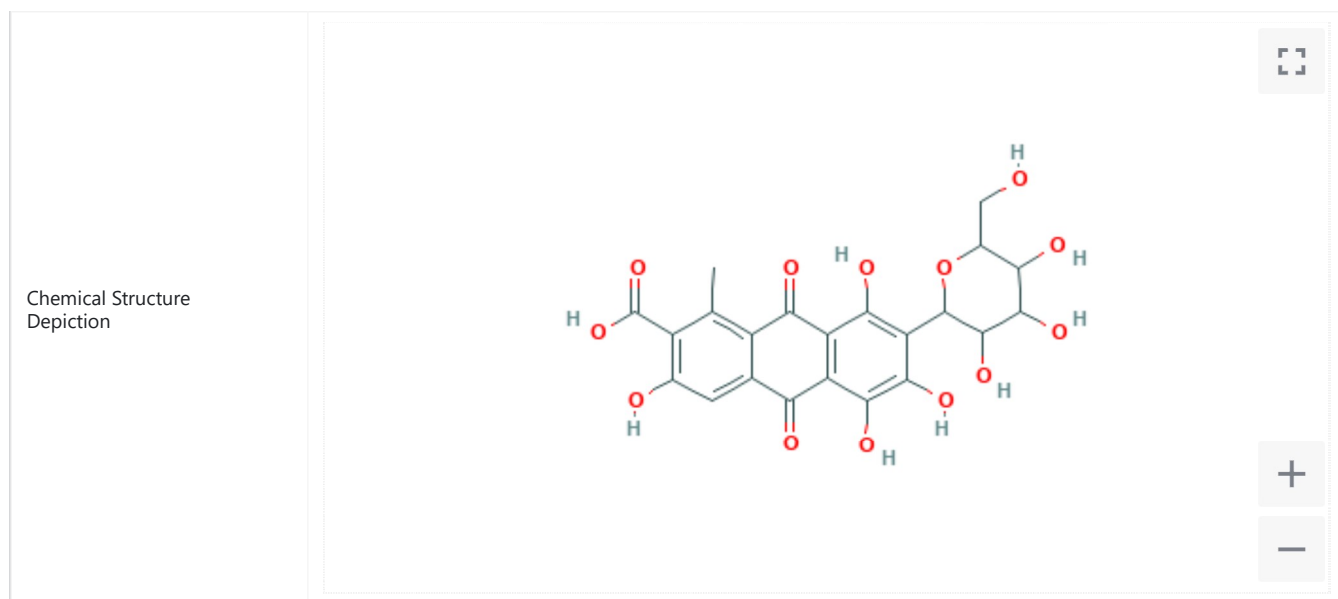
COMPOUND SUMMARY

Carmine

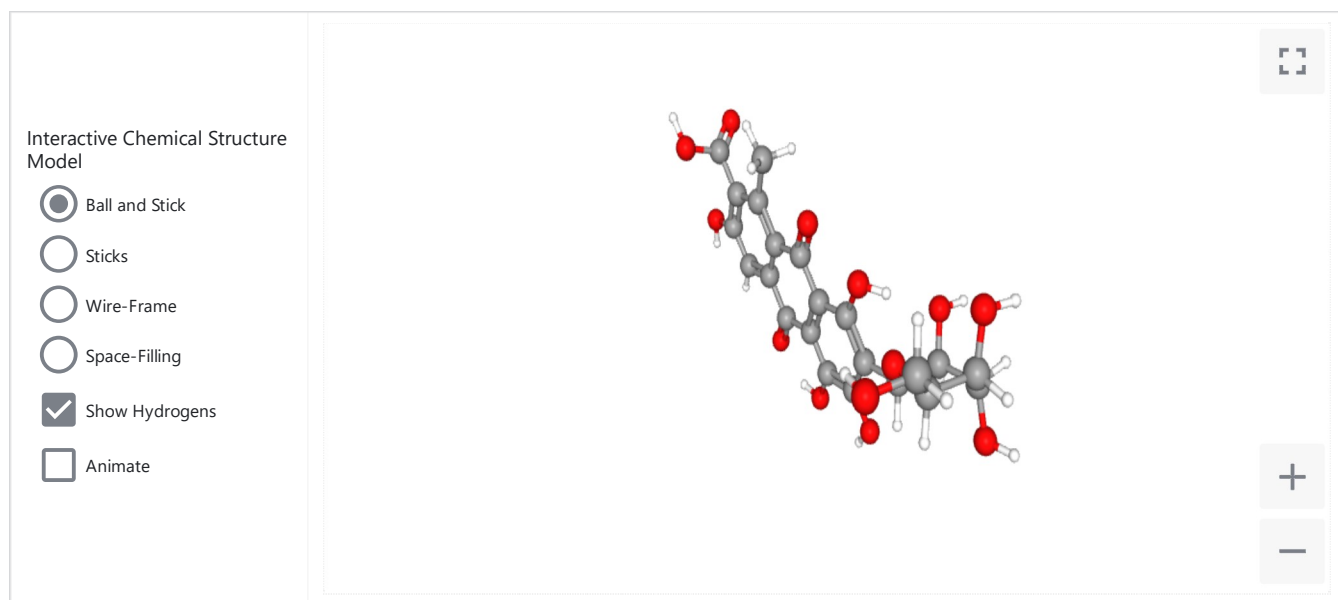
PubChem CID:	14950
Structure:	<div style="display: flex; justify-content: space-around;"><div style="text-align: center;"><p>2D</p></div><div style="text-align: center;"><p>3D</p></div></div> <p style="text-align: center;">Find Similar Structures</p>
Chemical Safety:	Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula:	$C_{22}H_{20}O_{13}$
Synonyms:	Carmine CARMINIC ACID Cochineal 1260-17-9 1343-78-8 <input type="button" value="More..."/>
Molecular Weight:	492.4 g/mol
Dates:	Modify: 2020-02-15 Create: 2005-03-26
<p>Red food colouring The source of this color is a picture of a "deep carmine pink" flower at the following website;; The source of this color is a watercolor color swatch called light carmine displayed at the following website:</p> <ul style="list-style-type: none">▶ Human Metabolome Database (HMDB) <p>Carminic acid appears as dark purplish-brown mass or bright red or dark red powder. Darkens at 248°F. Deep red color in water. Yellow to violet in acidic aqueous solutions. (NTP, 1992)</p> <ul style="list-style-type: none">▶ CAMEO Chemicals	

1 Structures ?

1.1 2D Structure ?



1.2 3D Conformer



2 Names and Identifiers



2.1 Computed Descriptors



2.1.1 IUPAC Name



3,5,6,8-tetrahydroxy-1-methyl-9,10-dioxo-7-[3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]anthracene-2-carboxylic acid

Computed by LexiChem 2.6.6 (PubChem release 2019.06.18)

▶ PubChem

2.1.2 InChI



InChI=1S/C22H20O13

/c1-4-8-5(2-6(24)9(4)22(33)34)13(25)10-11(15(8)27)16(28)12(18(30)17(10)29)21-20(32)19(31)14(26)7(3-23)35-21

/h2,7,14,19-21,23-24,26,28-32H,3H2,1H3,(H,33,34)

Computed by InChI 1.0.5 (PubChem release 2019.06.18)

▶ PubChem

2.1.3 InChI Key



DGQLVPJVVXFOQEV-UHFFFAOYSA-N

Computed by InChI 1.0.5 (PubChem release 2019.06.18)

▶ PubChem

2.1.4 Canonical SMILES



CC1=C2C(=CC(=C1C(=O)O)O)C(=O)C3=C(C2=O)C(=C(C(=C3O)O)C4C(C(C(C(O4)CO)O)O)O)O

Computed by OEChem 2.1.5 (PubChem release 2019.06.18)

▶ PubChem

2.2 Molecular Formula



C₂₂H₂₀O₁₃

Computed by PubChem 2.1 (PubChem release 2019.06.18)

▶ PubChem

2.3 Other Identifiers



2.3.1 CAS



1260-17-9

▶ DTP/NCI; EPA Chemicals under the TSCA; European Chemicals Agency (ECHA); HSDB; Human Metabolome Database (HMDB)

1343-78-8

- ▶ EPA DSSTox; European Chemicals Agency (ECHA)

1390-65-4

- ▶ European Chemicals Agency (ECHA)

2.3.2 European Community (EC) Number



215-724-4

- ▶ European Chemicals Agency (ECHA)

215-680-6

- ▶ European Chemicals Agency (ECHA)

215-023-3

- ▶ European Chemicals Agency (ECHA)

2.3.3 FEMA Number



2242

- ▶ Flavor and Extract Manufacturers Association (FEMA)

2.3.4 NSC Number



326224

- ▶ DTP/NCI

2.3.5 DSSTox Substance ID



DTXSID2045735

- ▶ EPA DSSTox

2.3.6 Wikipedia



Carmine

- ▶ Wikipedia

Carminic acid

- ▶ Wikipedia

2.4 Synonyms



2.4.1 MeSH Entry Terms



7-glucopyranosyl-3,5,6,8-tetrahydroxyl-1-methyl-9,10-dioxoanthracene-2-carboxylic acid

C.I. 75470

Carmine

carminic acid

Coccinellin

Cochineal Dye

Dye, Cochineal

Natural Red 4

► MeSH

2.4.2 Depositor-Supplied Synonyms



Carmine	Cochineal extract lake	E120
CARMINIC ACID	Sun Red No. 1	C. I. 7
Cochineal	C.I. 75470	SCHE
1260-17-9	Carmine (Coccus cacti L.)	SCHE
1343-78-8	3,5,6,8-tetrahydroxy-1-methyl-9,10-dioxo-7-[3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]anthracene-2-carboxylic acid	CTK8
C.I. Natural red 4	Cochineal (Coccus cacti L.)	FEMA
Cochineal extract	FEMA No. 2242	HMS3
B Rose liquid	FEMA No. 2330	ANW
Cochineal tincture	CCRIS 1204	MCUI
Sanred 1	EINECS 215-724-4	NSC-
Coccus cacti extract	NSC326224	LS-52
Sun Red 1	2-Anthracenecarboxylic acid, 7-.beta.-D-glucopyranosyl-9,10-dihydro-3,5,6,8-tetrahydroxy-1-methyl-9,10-dioxo-	TR-00
1390-65-4	AK105050	FT-06

► PubChem

3 Chemical and Physical Properties



3.1 Computed Properties



Property Name	Property Value	Reference
Molecular Weight	492.4 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
XLogP3-AA	0.5	Computed by XLogP3 3.0 (PubChem release 2019.06.18)
Hydrogen Bond Donor Count	9	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Hydrogen Bond Acceptor Count	13	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Rotatable Bond Count	3	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Exact Mass	492.090391 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Monoisotopic Mass	492.090391 g/mol	Computed by PubChem 2.1 (PubChem release 2019.06.18)
Topological Polar Surface Area	243 Å ²	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Heavy Atom Count	35	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	864	Computed by Cactvs 3.4.6.11 (PubChem release 2019.06.18)
Isotope Atom Count	0	Computed by PubChem
Defined Atom Stereocenter Count	0	Computed by PubChem
Undefined Atom Stereocenter Count	5	Computed by PubChem
Defined Bond Stereocenter Count	0	Computed by PubChem
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	1	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2019.01.04)

► [PubChem](#)

3.2 Experimental Properties



3.2.1 Physical Description



Carminic acid appears as dark purplish-brown mass or bright red or dark red powder. Darkens at 248°F. Deep red color in [water](#). Yellow to violet in acidic aqueous solutions. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

► [CAMEO Chemicals](#)

Solid

► [Human Metabolome Database \(HMDB\)](#)

3.2.2 Color/Form



Red monoclinic prisms from aqueous [methanol](#)

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-88

► [HSDB](#)

Dark, purplish-brown mass or bright-red powder

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 239

▶ HSDB

Deep red color in water; yellow to violet in acid solutions

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ HSDB

3.2.3 Melting Point



Decomposes at 277° F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▶ CAMEO Chemicals

136 °C (decomposes)

Lide, D.R. CRC Handbook of Chemistry and Physics 88TH Edition 2007-2008. CRC Press, Taylor & Francis, Boca Raton, FL 2007, p. 3-88

▶ HSDB

136°C

▶ Human Metabolome Database (HMDB)

3.2.4 Solubility



less than 1 mg/mL at 70° F (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▶ CAMEO Chemicals

Soluble in alcohol, concentrated sulfuric acid; slightly soluble in ether; practically insoluble in petroleum ether, benzene, chloroform

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ HSDB

In water, 1.30 g/L (1.30X10+3 mg/L) at 25 °C

Yalkowsky, S.H., He, Yan., Handbook of Aqueous Solubility Data: An Extensive Compilation of Aqueous Solubility Data for Organic Compounds Extracted from the AQUASOL dATABASE. CRC Press LLC, Boca Raton, FL. 2003., p. 1191

▶ HSDB

1.3 mg/mL at 25 °C

▶ Human Metabolome Database (HMDB)

3.2.5 Vapor Pressure



5.07X10-27 mm Hg at 25 °C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of May 21, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html>

▶ HSDB

3.2.6 Octanol/Water Partition Coefficient



log Kow = 0.97 (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of May 21, 2010: <http://www.epa.gov/oppt/exposure/pubs/episutedl.htm>

▶ HSDB

3.2.7 Optical Rotation



Specific optical rotation (water): +51.6 deg at 15 °C/654 angstroms

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ HSDB

3.2.8 pH



pH = 4.8 (yellow); pH = 6.2 (violet)

Lewis, R.J. Sr.; *Hawley's Condensed Chemical Dictionary 15th Edition*. John Wiley & Sons, Inc. New York, NY 2007., p. 239

▶ HSDB

3.2.9 Dissociation Constants



pKa1 = 2.81; pKa2 = 5.43; pKa3 = 8.10

Rasimas JP et al; *J Phys Chem 100*: 7220-9 (1996)

▶ HSDB

3.2.10 Other Experimental Properties



No distinct melting point; darkens at 120 °C

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ HSDB

Bright-red, light pieces, easily reduced to powder; practically insoluble in cold water or dil acid; partly soluble in hot water; soluble in borax, alkali hydroxides and alkali carbonates giving deep red solutions /Aluminum calcium lake/

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ HSDB

Henry's Law constant = 6.57X10⁻³² atm-cu m/mol at 25 °C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of May 21, 2010: <http://www.epa.gov/oppt/exposure/pubs/episutedl.htm>

▶ HSDB

4 Spectral Information



4.1 Mass Spectrometry



4.1.1 GC-MS



GC-MS	GC-MS Spectrum 26345 - HMDB HMDB0030658 GC-MS Spectrum 42065 - HMDB HMDB0030658
-------	--

▶ [Human Metabolome Database \(HMDB\)](#)

4.1.2 MS-MS



MS-MS	MS-MS Spectrum 83694 - HMDB HMDB0030658 MS-MS Spectrum 83695 - HMDB HMDB0030658 MS-MS Spectrum 83696 - HMDB HMDB0030658 MS-MS Spectrum 145350 - HMDB HMDB0030658 MS-MS Spectrum 145351 - HMDB HMDB0030658 MS-MS Spectrum 145352 - HMDB HMDB0030658
-------	---

▶ [Human Metabolome Database \(HMDB\)](#)

4.2 UV Spectra



UV max absorption ([water](#)): 500 nm (e = 6800); (0.02 N [hydrogen chloride](#)): 490-500 nm (e = 5800); (0.0001 N [sodium hydroxide](#)): 540 nm (e = 3450)

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ [HSDB](#)

Absorption maxima: 496 nm in [methanol](#), [ethanol](#), [1-propanol](#), [1-butanol](#), [1-hexanol](#) and [1-octanol](#)

Rasimas JP, Blanchard GJ; J Phys Chem 99: 11333-8 (1995)

▶ [HSDB](#)

UV: 22011 (Sadtler Research Laboratories Spectral Collection)

Lide, D.R., G.W.A. Milne (eds.). Handbook of Data on Organic Compounds. Volume I. 3rd ed. CRC Press, Inc. Boca Raton, FL. 1994., p. V1: 250

▶ [HSDB](#)

4.3 IR Spectra



IR Spectra	IR: 23370 (Sadtler Research Laboratories Prism Collection)
------------	--

▶ [HSDB](#)

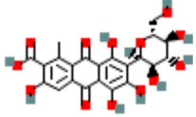
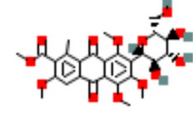
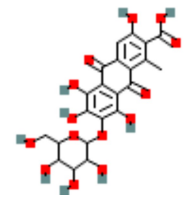
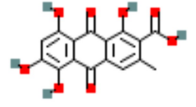
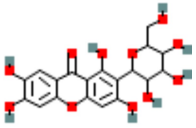
5 Related Records



5.1 Related Compounds with Annotation



164 items [View More Rows & Details](#)

SORT BY Compound CID				
Structure	Compound CID	Name	Molecular Formula	Molecular Weight, g/mol
	14749	Carminic acid	$C_{22}H_{20}O_{13}$	492.4
	135487	Methyl tetra-O-methylcarminate	$C_{27}H_{30}O_{13}$	562.5
	407495	CID 407495	$C_{22}H_{20}O_{14}$	508.4
	5315956	1,5,6,8-Tetrahydroxy-3-methyl-9,10-dioxo-9,10-dihydroanthracene-2-carboxylic acid	$C_{16}H_{10}O_8$	330.24
	5358385	Aphloiol	$C_{19}H_{18}O_{11}$	422.3

[1](#) [2](#) [3](#) ... [33](#) [Next](#) >

► PubChem

5.2 Related Compounds



Same Connectivity	33 Records
Same Parent, Connectivity	70 Records
Same Parent, Exact	6 Records

Mixtures, Components, and Neutralized Forms	5 Records
Similar Compounds	172 Records
Similar Conformers	32 Records

▶ PubChem

5.3 Substances



5.3.1 Related Substances



All	64 Records
Same	53 Records
Mixture	11 Records

▶ PubChem

5.3.2 Substances by Category



5 Categories Expanded View 

- ▶ Chemical Vendors (18)
- ▶ Curation Efforts (3)
- ▶ Governmental Organizations (4)
- ▶ Research And Development (7)
- ▶ Subscription Services (5)
- ▶ Legacy Depositors (19)

▶ PubChem

6 Chemical Vendors



Showing 1 Substance per Vendor [View All](#)

BioCrick

PubChem SID: [382155503](#)

Purchasable Chemical: [BCN2223](#)

Yuhao Chemical

PubChem SID: [347741591](#)

Purchasable Chemical: [JZ4570](#)

Ambeed

PubChem SID: [376138080](#)

Purchasable Chemical: [A137326](#)

Anward

PubChem SID: [160811412](#)

Purchasable Chemical: [ANW-43914](#)

Biosynth

PubChem SID: [332860206](#)

Purchasable Chemical: [J-005319](#)

Finetech Industry Limited

PubChem SID: [164807541](#)

Purchasable Chemical: [FT-0623494](#)

MuseChem

PubChem SID: [355153708](#)

Purchasable Chemical: [M048981](#)

TCI (Tokyo Chemical Industry)

PubChem SID: [87565653](#)

Purchasable Chemical: [C0543](#)

Ambinter

PubChem SID: [373628146](#)

Purchasable Chemical: [Amb22233210](#)

ChemTik

PubChem SID: [163089025](#)

Purchasable Chemical: [CTK8B4111](#)

Ark Pharm, Inc.

PubChem SID: [163403895](#)

Purchasable Chemical: [AK105050](#)

Tractus

PubChem SID: [204377943](#)

Purchasable Chemical: [TR-003839](#)

Norris Pharm

PubChem SID: [383343454](#)

Purchasable Chemical: [NSZB-A134683](#) (*URL not provided...*)

Parchem

PubChem SID: [316963958](#)

Purchasable Chemical: [19710](#)

Mcule

PubChem SID: [253413031](#)

Purchasable Chemical: [MCULE-5237136036](#)

► [PubChem](#)

7 Food Additives and Ingredients



7.1 FDA Substances Added to Food



Substance	CARMINE (COCCUS CACTI L.)
Used for (Technical Effect)	FLAVORING AGENT OR ADJUVANT
Document Number (21 CFR)	73.100
	73.1100
	73.2087

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

Substance	COCHINEAL EXTRACT (COCCUS CACTI L.)
Used for (Technical Effect)	FLAVORING AGENT OR ADJUVANT
Document Number (21 CFR)	73.100
	73.1100

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

7.2 Color Additive Status



FDA Color Additive Status for FOOD use

Carmines - Color additives exempt from certification and permanently listed for FOOD use. Status: GMP - 73.100

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

FDA Color Additive Status for FOOD use

Cochineal extract - Color additives exempt from certification and permanently listed for FOOD use. Status: GMP - 73.100

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

FDA Color Additive Status for DRUG use

Carmines - Color additives exempt from certification and permanently listed for DRUG use. (None of these color additives may be used in products that are for use in the area of the eye, unless otherwise indicated). Status: Drugs generally - GMP - 73.1100

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

FDA Color Additive Status for DRUG use

Cochineal extract - Color additives exempt from certification and permanently listed for DRUG use. (None of these color additives may be used in products that are for use in the area of the eye, unless otherwise indicated). Status: Drugs generally - GMP - 73.1100

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

FDA Color Additive Status for COSMETIC use

Carmines - Color additives exempt from certification and permanently listed for COSMETIC use. (None of these colors may be used in products that are for use in the area of the eye, unless otherwise indicated). Status: Cosmetics generally, including those for eye area - GMP - 73.2087

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

FDA Color Additive Status for COSMETIC use

[Carminic acid](#) - Use of the color additive is no longer authorized

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

FDA Color Additive Status for COSMETIC use

Cochineal - Use of the color additive is no longer authorized

▶ [FDA Center for Food Safety and Applied Nutrition \(CFSAN\)](#)

8 Pharmacology and Biochemistry



8.1 MeSH Pharmacological Classification



Food Coloring Agents

Natural or synthetic dyes used as coloring agents in processed foods. (See [all compounds classified as Food Coloring Agents](#).)

▶ MeSH

Coloring Agents

Chemicals and substances that impart color including soluble dyes and insoluble pigments. They are used in INKS; PAINTS; and as INDICATORS AND REAGENTS. (See [all compounds classified as Coloring Agents](#).)

▶ MeSH

8.2 Mechanism of Action



The food coloring [carminic acid](#) redox cycles to produce free radicals. These radicals, in the presence of trace amounts of [iron](#) salts, readily damage membrane lipid and degrade the carbohydrate [deoxyribose](#). Damage to membrane lipid appears to involve mainly organic [oxygen](#) radicals such as alkoxy and peroxy radicals, whereas that to [deoxyribose](#) implicates the [hydroxyl](#) radical formed in a Fenton-type reaction. Antioxidants and [iron](#) chelators prevent such damage.

[PMID:3803637](#)

Gutteridge JM, Quinlan GJ; Food Addit Contam 3 (4): 289-93 (1986)

▶ HSDB

The antitumor agent [carminic acid](#) did not bind to DNA but nicked it slowly, more rapidly when reduced in situ, & still more when prereduced at the quinone moiety.

LOWN JW ET AL, BIOORG CHEM 8(1) 17 (1979)

▶ HSDB

8.3 Human Metabolite Information



8.3.1 Metabolite Description



Description

Red food colouring The source of this color is a picture of a "deep carmine pink" flower at the following website;; The source of this color is a watercolor color swatch called light carmine displayed at the following website:.

▶ Human Metabolome Database (HMDB)

8.3.2 Cellular Locations



Cytoplasm
Extracellular

▶ Human Metabolome Database (HMDB)

9 Use and Manufacturing



9.1 Uses



Free acid in color photography; pigment for artists' paints; as bacteriological stain; reagent for [aluminum](#); rarely now as acid-base indicator or oxidimetric indicator; complexing agent for cations

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ [HSDB](#)

Colorant used in cosmetics

Rieger MM; Kirk-Othmer Encyclopedia of Chemical Technology. (2009). NY, NY: John Wiley & Sons; Cosmetics. Online Posting Date: April 17, 2009.

▶ [HSDB](#)

Coloring proprietary medicines; pigment for fine oil colors; indicators in analytical chemistry

Lewis, R.J. Sr.; Hawley's Condensed Chemical Dictionary 15th Edition. John Wiley & Sons, Inc. New York, NY 2007., p. 239

▶ [HSDB](#)

Used as dye; in inks, coloring food products and galenicals; in microscopy for making various stains /Aluminum calcium lake/

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ [HSDB](#)

Used as a food dye in products such as juices, [ice](#) cream, yogurt, and candy; as a dye in cosmetic products such as eye shadow and lipstick. /Carmine/

Cofrancesco AJ; Kirk-Othmer Encyclopedia of Chemical Technology. (2009). NY, NY: John Wiley & Sons; Dyes, Natural. Online Posting Date: April 17, 2009.

▶ [HSDB](#)

9.2 Methods of Manufacturing



Schunk, Marchlewski, Ber 27: 2979 (1894); Dimroth, Scheuer, Ann 399: 43 (1913). Revised structure: Bhatia, Venkataraman, Indian J Chem 3(2) 92 (1965).

O'Neil, M.J. (ed.). The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 299

▶ [HSDB](#)

9.3 General Manufacturing Information



EPA TSCA Commercial Activity Status

[2-Anthracenecarboxylic acid, 7-.beta.-D-glucoopyranosyl-9,10-dihydro-3,5,6,8-tetrahydroxy-1-methyl-9,10-dioxo-](#): ACTIVE

<https://www.epa.gov/tsca-inventory>

▶ [EPA Chemicals under the TSCA](#)

Carmine is normally 50% or more [carminic acid](#)

Marmion D; Kirk-Othmer Encyclopedia of Chemical Technology. (2007). New York, NY: John Wiley & Sons; Colorants for Food. Online Posting Date: September 14, 2007.

▶ [HSDB](#)

There has...been...confusion regarding differentiation between /carmine, [carminic acid](#) & cochineal/... Cochineal is red coloring material consisting of dried bodies of female insect coccus cacti. ... Active coloring matter is [carminic acid](#)... Carmine is [aluminum lake](#) of [carminic acid](#)...

Furia, T.E. (ed.). CRC Handbook of Food Additives. 2nd ed. Cleveland: The Chemical Rubber Co., 1972., p. 604

▶ [HSDB](#)

10 Identification



10.1 Analytic Laboratory Methods



TLC IDENTIFICATION OF DYES IN COSMETICS.

MARTELLI A ET AL; RELATA TECH CHIM BIOL 6(1) 157 (1974)

▶ [HSDB](#)

11 Safety and Hazards



11.1 Hazards Identification



11.1.1 GHS Classification



GHS Hazard Statements	Not Classified Reported as not meeting GHS hazard criteria by 88 of 89 companies (only ~ 1.1% companies provided GHS information). For more detailed information, please visit ECHA C&L website
-----------------------	--

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

11.1.2 Fire Hazard



Flash point data for this compound are not available. It is probably combustible. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▶ [CAMEO Chemicals](#)

11.2 First Aid Measures



11.2.1 First Aid



EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with [water](#) or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. **IMMEDIATELY** transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. **SKIN:** **IMMEDIATELY** flood affected skin with [water](#) while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and [water](#). If symptoms such as redness or irritation develop, **IMMEDIATELY** call a physician and be prepared to transport the victim to a hospital for treatment. **INHALATION:** **IMMEDIATELY** leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. **INGESTION:** **DO NOT INDUCE VOMITING.** If the victim is conscious and not convulsing, give 1 or 2 glasses of [water](#) to dilute the chemical and **IMMEDIATELY** call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. **DO NOT INDUCE VOMITING.** **IMMEDIATELY** transport the victim to a hospital. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▶ [CAMEO Chemicals](#)

11.3 Fire Fighting



Fires involving this material can be controlled with a dry chemical, [carbon dioxide](#) or [Halon](#) extinguisher. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▶ [CAMEO Chemicals](#)

11.4 Accidental Release Measures



11.4.1 Disposal Methods



SRP: 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.

▶ [HSDB](#)

11.5 Handling and Storage



11.5.1 Nonfire Spill Response



SMALL SPILLS AND LEAKAGE: If you spill this chemical, you should dampen the solid spill material with [water](#), then transfer the dampened material to a suitable container. Use absorbent paper dampened with [water](#) to pick up any remaining material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Wash all contaminated surfaces with a soap and [water](#) solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned. STORAGE PRECAUTIONS: You should store this material at ambient temperatures. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▶ [CAMEO Chemicals](#)

11.6 Exposure Control and Personal Protection



11.6.1 Protective Equipment and Clothing



RECOMMENDED RESPIRATOR: Where the neat test chemical is weighed and diluted, wear a NIOSH-approved half face respirator equipped with an organic vapor/acid gas cartridge (specific for organic vapors, HCl, acid gas and SO₂) with a dust/mist filter. (NTP, 1992)

National Toxicology Program, Institute of Environmental Health Sciences, National Institutes of Health (NTP). 1992. National Toxicology Program Chemical Repository Database. Research Triangle Park, North Carolina.

▶ [CAMEO Chemicals](#)

11.7 Stability and Reactivity



11.7.1 Air and Water Reactions



Soluble in [water](#) [Hawley].

▶ [CAMEO Chemicals](#)

11.7.2 Reactive Group



Acids, Carboxylic

Alcohols and Polyols

Phenols and Cresols

▶ CAMEO Chemicals

11.7.3 Reactivity Profile



CARMINIC ACID neutralizes bases in exothermic reactions. Incompatible with strong oxidizing agents.

▶ CAMEO Chemicals

11.8 Regulatory Information



11.8.1 FDA Requirements



The Food and Drug Administration (FDA) is revising its requirements for cochineal extract and carmine by requiring their declaration by name on the label of all food and cosmetic products that contain these color additives. This final rule responds to reports of severe allergic reactions, including anaphylaxis, to cochineal extract- containing food and carmine-containing food and cosmetics and will allow consumers who are allergic to these color additives to identify and thus avoid products that contain these color additives. This action also responds to a citizen petition submitted by the Center for Science in the Public Interest (CSPI).

74 FR 207 (1/5/2009)

▶ HSDB

12 Toxicity



12.1 Toxicological Information



12.1.1 Antidote and Emergency Treatment



/SRP:/ Immediate first aid: Ensure that adequate decontamination has been carried out. If patient is not breathing, start artificial respiration, preferably with a demand valve resuscitator, bag-valve-mask device, or pocket mask, as trained. Perform CPR if necessary. Immediately flush contaminated eyes with gently flowing [water](#). Do not induce vomiting. If vomiting occurs, lean patient forward or place on the left side (head-down position, if possible) to maintain an open airway and prevent aspiration. Keep patient quiet and maintain normal body temperature. Obtain medical attention. /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160

▶ [HSDB](#)

/SRP:/ Basic treatment: Establish a patent airway (oropharyngeal or nasopharyngeal airway, if needed). Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if needed. 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 0.9% saline (NS) 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 Cover skin burns with dry sterile dressings after decontamination

/Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160

▶ [HSDB](#)

/SRP:/ Advanced treatment: Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious, has severe pulmonary edema, or is in severe respiratory distress. Positive-pressure ventilation techniques with a bag valve mask device may be beneficial. Consider drug therapy for pulmonary edema Consider administering a beta agonist such as [albuterol](#) for severe bronchospasm Monitor cardiac rhythm and treat arrhythmias as necessary Start IV administration of D5W /SRP: "To keep open", minimal flow rate/. Use 0.9% saline (NS) or lactated Ringer's if signs of hypovolemia are present. For hypotension with signs of hypovolemia, administer fluid cautiously. Watch for signs of fluid overload Treat seizures with [diazepam](#) or [lorazepam](#) Use [proparacaine hydrochloride](#) to assist eye irrigation /Poisons A and B/

Currance, P.L. Clements, B., Bronstein, A.C. (Eds.); Emergency Care For Hazardous Materials Exposure. 3Rd edition, Elsevier Mosby, St. Louis, MO 2005, p. 160-1

▶ [HSDB](#)

12.1.2 Human Toxicity Excerpts



/HUMAN EXPOSURE STUDIES/ ... The occurrence of positive skin prick test (SPT) reactions to mites was studied in 6,464 patients: 3,164 were tested with carmine and 2,837 with shrimp. Carmine ingestion-associated symptoms were registered at the time of testing. Patients with positive SPT to carmine received a follow-up questionnaire on their symptoms 1-5 years later. RESULTS: Positive SPT reactions to carmine were seen in 94 patients (3.0%) of whom 74% also had positive SPT reactions to mites and 22% to shrimp. Carmine ingestion-associated symptoms were not dependent on concurrent mite reactivity in 39/94 (42%) patients... /Carmine/

[PMID:19439984](#)

Liippo J, Lammintausta K; Int Arch Allergy Immunol 150 (2): 179-83 (2009)

▶ [HSDB](#)

/CASE REPORTS/ ... A 42-year-old non-atopic male presented with a 5-year history of rhinoconjunctivitis and asthma on occupational exposure to food additive dusts. Symptoms increased after work. The patient had been exposed for more than 20 years. ... Skin prick

tests were performed with a battery of common inhalant allergens and spices. Cochineal, carmine lake and additive mixes used by the patient were extracted and subsequently used for skin prick test, bronchial provocation and in vitro measurements (specific IgE, Western blot and chromatographic fractionation). ... Prick tests were positive to carmine and carmine-containing additives; carmine-specific IgE and bronchial challenge tests were also positive (PC20 = 0.0004 mg/mL and 1.6 kU/L). Western blot showed IgE binding to bands of about 30 kDa on cochineal extract and a diffuse pattern at 40-97 kDa on carmine. This result was confirmed by gel filtration chromatography and dot blot. Carmine completely inhibited IgE binding to cochineal extract... /Carmine/

[PMID:16215325](#)

Ferrer A et al; Int Arch Allergy Immunol 138 (3): 243-50 (2005)

▶ [HSDB](#)

/CASE REPORTS/ ... A 33-year-old female ... recurrently exhibited urticaria accompanied by vomiting, diarrhea and dyspnea after taking red-colored food. From her history, ... cochineal dye /was suspected/ to be the cause of her symptoms. Oral provocation test using cochineal dye-stained red-colored boiled-fish-paste induced urticaria and respiratory symptoms. Furthermore the prick tests and the scratch tests with cochineal dye and [carminic acid](#), the major ingredient of cochineal dye, were also positive. These results indicate that type 1 allergy to cochineal dye caused urticaria in this patient. Thereafter, she avoided the foods containing a cochineal dye and showed a complete clinical remission... /Cochineal dye/

[PMID:18195555](#)

Kotobuki Y et al; Alerugi 56 (12): 1510-4 (2007)

▶ [HSDB](#)

/CASE REPORTS/ ... A woman with documented carmine hypersensitivity ... reported anaphylaxis 90 minutes after ingestion of a generic [azithromycin](#). ... Investigations revealed that this was an allergy to the carmine dye in the tablet's coating rather than to the antibiotic. ... Patients with a carmine hypersensitivity should actively check with their pharmacy or prescribing physician to verify their medications are free of this offending agent. /Carmine/

[PMID:19331724](#)

Greenhawt M et al; Allergy Asthma Proc 30 (1): 95-101 (2009)

▶ [HSDB](#)

For more Human Toxicity Excerpts (Complete) data for [Carminic acid](#) (14 total), please visit the [HSDB record page](#).

▶ [HSDB](#)

12.1.3 Non-Human Toxicity Excerpts



/LABORATORY ANIMALS: Subchronic or Prechronic Exposure/ Cochineal (C), a scarlet material extracted from the powdered pregnant insect, *Dactylopius Coceus* Costa, is used as a color food additive in the form of [aluminum](#) lakes. A 13 week subchronic toxicity study was conducted to investigate the effects of simultaneous administration of C and [aluminum potassium sulfate](#) (A). Male and female Wistar rats (5-weeks-old, 15 rats/group) were given diets containing 0.75%A and 0.75%C (1.5%AC), 1.5%A and 1.5%C (3%AC), 3%C alone or 3%A alone. The following results were obtained. 1) No toxic symptoms or death occurred in any treated group. Body weight gain in male rats of the 3%A group decreased significantly. 2) Serum levels of phospholipids, triglycerides (TG) and total [cholesterol](#) in male rats and TG in female rats fed 3%C, 3%A or 3%AC were significantly decreased at the 13th week. The serum level of [glutamate](#) dehydrogenase (GIDH) in male rats treated with 1.5% or 3%AC was increased at the 4th week but no difference from control was observed at the 13th week. 3) No histopathological changes attributable to A and/or C administration were observed. In this 13-week oral toxicity study, no dose-dependent synergistic effects of simultaneous administration of C and A were found except for an increase in serum GIDH. /Cochineal/

[PMID:8854902](#)

Kawasaki Y et al; Eisei Shikenjo Hokoku (112): 48-56 (1994)

▶ [HSDB](#)

/LABORATORY ANIMALS: Chronic Exposure or Carcinogenicity/ Carmine was fed continuously to groups of 54 males and 54 females at dietary levels providing 50, 150 or 500 mg/kg body weight/day for up to 109 wk. As a control, groups of 90 males and 90 females were fed the basal diet for the same period. The rats were derived from parents fed the same dietary levels for 60 days before mating

and throughout pregnancy and were thus potentially exposed in utero. There were no adverse effects upon survival, growth or intakes of food and [water](#). No changes associated with treatment were found during the periodic measurement of hematology or renal function, or in the serum chemistry or organ weights at the end of the study. Tumor incidence was not affected, and variations in the distribution of the non-tumor pathology were not considered to be due to treatment. It was concluded that carmine administered to rats in utero and for up to 109 wk is not carcinogenic and that the no-untoward-effect level is 500 mg carmine/kg body weight/day. /Carmine/

[PMID:3692396](#)

Ford GP et al; Food Chem Toxicol 25 (12): 897-902 (1987)

▶ [HSDB](#)

/LABORATORY ANIMALS: Chronic Exposure or Carcinogenicity/ The carcinogenicity of cochineal, a red coloring used in food and other products, was studied in a 2-yr bioassay in B6C3F1 mice. Groups of 50-55 mice of each sex were given 0, 3 or 6% cochineal in the diet for 2 yr. Mice of all groups developed tumours including hepatocellular adenomas or carcinomas, pulmonary adenomas or adenocarcinomas and lymphomas or lymphatic leukaemias, and the incidences of these tumours were not significantly different in treated and control groups. The results indicate that cochineal lacks carcinogenicity in mice and are consistent with those of in vitro short-term assays of cochineal and of [carminic acid](#), an active principle of cochineal. /Cochineal/

[PMID:1937288](#)

Mori H et al; Food Chem Toxicol 29 (9): 585-8 (1991)

▶ [HSDB](#)

/LABORATORY ANIMALS: Chronic Exposure or Carcinogenicity/ Injections of 0.5% [carminic acid](#) and [lactic acid](#) (2.8%) in distilled [water](#) into transplanted sc tumors of jensen rats inhibited tumor growth in 68% of rats. After 2-3 wk tumors eliminated through skin.

MIHAIL N ET AL, NATURWISSENSCHAFTEN 57(10) 500 (1970)

▶ [HSDB](#)

For more Non-Human Toxicity Excerpts (Complete) data for [Carminic acid](#) (11 total), please visit the [HSDB record page](#).

▶ [HSDB](#)

12.2 Ecological Information



12.2.1 Environmental Fate/Exposure Summary



[Carminic acid](#)'s production and use as a colorant in cosmetics, and as pigments and stains in photography and chemistry applications may result in its release to the environment through various waste streams. [Carminic acid](#) occurs as a glycoside in the body of the cochineal insect, *Coccus cacti*, of the order Homoptera. If released to air, an estimated vapor pressure of 5.07X10⁻²⁷ mm Hg at 25 °C indicates [carminic acid](#) will exist solely in the particulate phase in the atmosphere. Particulate-phase [carminic acid](#) will be removed from the atmosphere by wet or dry deposition. [Carminic acid](#) contains chromophores that absorb at wavelengths >290 nm, and therefore may be susceptible to direct photolysis by sunlight; its UV absorption maxima is approximately 500 nm in [water](#) and primary aliphatic alcohols. If released to soil, [carminic acid](#) is expected to have moderate mobility based upon an estimated Koc of 440. The pKa values of [carminic acid](#) are 2.81, 5.43 and 8.10, indicating that this compound will almost entirely exist in anion form in the environment and anions generally do not adsorb more strongly to soils containing organic [carbon](#) and clay than their neutral counterparts. Volatilization from moist soil is not expected because the acid exists as an anion and anions do not volatilize. If released into [water](#), [carminic acid](#) is expected to adsorb to suspended solids and sediment based upon the estimated Koc. Biodegradation data were not available. The pKa values indicates [carminic acid](#) will exist almost entirely in the anion form at pH values of 5 to 9 and therefore volatilization from [water](#) surfaces is not expected to be an important fate process. An estimated BCF of 3.2 suggests the potential for bioconcentration in aquatic organisms is low. Hydrolysis is not expected to be an important environmental fate process since this compound lacks functional groups that hydrolyze under environmental conditions. Occupational exposure to [carminic acid](#) may occur through dermal contact with this compound at workplaces where [carminic acid](#) is produced or used. Use data indicate that the general population may be exposed to [carminic acid](#) via ingestion of food and beverages containing [carminic acid](#) dyes, and dermal contact with cosmetic products containing [carminic acid](#). (SRC)

▶ HSDB

12.2.2 Natural Pollution Sources



Carminic acid occurs as a glucosidal coloring matter from the scale insect *Coccus cacti* L., Homoptera (cochineal)(1).

(1) O'Neil MJ, ed; *The Merck Index. 14th ed., Whitehouse Station, NJ: Merck And Co, Inc., p. 299 (2006)*

▶ HSDB

12.2.3 Artificial Pollution Sources



Carminic acid's production and use as a colorant in cosmetics(1) and as pigments and stains in photography and chemistry applications(2) may result in its release to the environment through various waste streams(SRC).

(1) Rieger MM; *Kirk-Othmer Encyclopedia of Chemical Technology. (2009). New York, NY: John Wiley & Sons; Cosmetics. Online Posting Date: April 17, 2009* (2) O'Neil MJ, ed; *The Merck Index: an Encyclopedia of Chemicals And Drugs. 14th ed., Whitehouse Station, NJ: Merck And Co, Inc., p. 299 (2006)*

▶ HSDB

12.2.4 Environmental Fate



TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 440(SRC), determined from a structure estimation method(2), indicates that **carminic acid** is expected to have moderate mobility in soil(SRC). The pKa values of **carminic acid** are 2.81, 5.43 and 8.10(3), indicate that this compound will almost entirely exist in anion form in the environment and anions generally do not adsorb more strongly to soils containing organic **carbon** and clay than their neutral counterparts(4). Volatilization from moist soil is not expected because the acid exists as an anion and anions do not volatilize(SRC). **Carminic acid** is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 5.07X10⁻²⁷ mm Hg at 25 °C(SRC), determined from a fragment constant method(5). Biodegradation data in soil were not available(SRC, 2010).

(1) Swann RL et al; *Res Rev 85: 17-28 (1983)* (2) US EPA; *Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of May 21, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html>* (3) Rasimas JP et al; *J Phys Chem 100: 7220-9 (1996)* (4) Doucette WJ; pp. 141-188 in *Handbook of Property Estimation Methods for Chemicals. Boethling RS, Mackay D, eds. Boca Raton, FL: Lewis Publ (2000)* (5) Lyman WJ; p. 31 in *Environmental Exposure From Chemicals Vol I, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985)*

▶ HSDB

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 440(SRC), determined from a structure estimation method(2), indicates that **carminic acid** is expected to adsorb to suspended solids and sediment(SRC). The pKa values of 2.81, 5.43 and 8.10(3) indicate **carminic acid** will exist almost entirely in the anion form at pH values of 5 to 9 and therefore volatilization from **water** surfaces is not expected to be an important fate process(SRC). According to a classification scheme(4), an estimated BCF of 3.2(SRC), from an estimated log Kow of 0.97(5) and a regression-derived equation(2), suggests the potential for bioconcentration in aquatic organisms is low(SRC). Biodegradation data in **water** were not available(SRC, 2010).

(1) Swann RL et al; *Res Rev 85: 17-28 (1983)* (2) US EPA; *Estimation Program Interface (EPI) Suite. Ver. 4.0. Jan, 2009. Available from, as of May 21, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html>* (3) Rasimas JP et al; *J Phys Chem 100: 7220-9 (1996)* (4) Franke C et al; *Chemosphere 29: 1501-14 (1994)* (5) Meylan WM, Howard PH; *J Pharm Sci 84: 83-92 (1995)*

▶ HSDB

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1), **carminic acid**, which has an estimated vapor pressure of 5.07X10⁻²⁷ mm Hg at 25 °C(SRC), determined from a fragment constant method(2), is expected to exist solely in the particulate phase in the ambient atmosphere. Particulate-phase **carminic acid** may be removed from the air by wet or dry deposition(SRC). **Carminic acid** contains chromophores that absorb at wavelengths >290 nm(3), and therefore may be susceptible to direct photolysis by sunlight(SRC); its UV absorption maxima is approximately 500 nm in **water**(4) and primary aliphatic alcohols(5).

(1) Bidleman TF; *Environ Sci Technol 22: 361-367 (1988)* (2) Lyman WJ; p. 31 in *Environmental Exposure From Chemicals Vol I, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985)* (3) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods. Washington, DC: Amer Chem Soc pp. 8-12 (1990)* (4) O'Neil MJ, ed; *The Merck Index. 14th ed., Whitehouse Station, NJ: Merck And Co, Inc., p. 299 (2006)* (5) Rasimas JP, Blanchard GJ; *J Phys Chem 99: 11333-8 (1995)*

▶ HSDB

12.2.5 Environmental Abiotic Degradation



Carminic acid is not expected to undergo hydrolysis in the environment due to the lack of functional groups that hydrolyze under environmental conditions(1). **Carminic acid** contains chromophores that absorb at wavelengths >290 nm(1), and therefore may be susceptible to direct photolysis by sunlight(SRC). **Carminic acid**'s UV absorption maxima in **water** is 500 nm(2); in primary aliphatic alcohols (**methanol**, **ethanol**, **1-propanol**, **1-butanol**, **1-hexanol** and **1-octanol**) the absorption maxima was measured as 496 nm(3).

(1) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods*. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990) (2) O'Neil MJ, ed; *The Merck Index*. 14th ed., Whitehouse Station, NJ: Merck And Co, Inc., p. 299 (2006) (3) Rasimas JP, Blanchard GJ; *J Phys Chem* 99: 11333-8 (1995)

▶ HSDB

12.2.6 Environmental Bioconcentration



An estimated BCF of 3.2 was calculated in fish for **carminic acid**(SRC), using an estimated log Kow of 0.97(1) and a regression-derived equation(2). According to a classification scheme(3), this BCF suggests the potential for bioconcentration in aquatic organisms is low(SRC).

(1) Meylan WM, Howard PH; *J Pharm Sci* 84: 83-92 (1995) (2) US EPA; *Estimation Program Interface (EPI) Suite*. Ver. 4.0. Jan, 2009. Available from, as of May 21, 2010: <http://www.epa.gov/oppt/exposure/pubs/episuite.html> (3) Franke C et al; *Chemosphere* 29: 1501-14 (1994)

▶ HSDB

12.2.7 Soil Adsorption/Mobility



Using a structure estimation method based on molecular connectivity indices(1), the Koc of **carminic acid** can be estimated to be 440(SRC). According to a classification scheme(2), this estimated Koc value suggests that **carminic acid** is expected to have moderate mobility in soil. The pKa values of **carminic acid** are 2.81, 5.43 and 8.10(3), indicating that this compound will almost entirely exist in anion form the environment and anions generally do not adsorb more strongly to soils containing organic **carbon** and clay than their neutral counterparts(4).

(1) Meylan WM et al; *Environ Sci Technol* 26: 1560-67 (1992) (2) Swann RL et al; *Res Rev* 85: 17-28 (1983) (3) Rasimas JP et al; *J Phys Chem* 100: 7220-9 (1996) (4) Doucette WJ; pp. 141-188 in *Handbook of Property Estimation Methods for Chemicals*. Boethling RS, Mackay D, eds. Boca Raton, FL: Lewis Publ (2000)

▶ HSDB

12.2.8 Volatilization from Water/Soil



The pKa values of 2.81, 5.43 and 8.10(1) indicate **carminic acid** will exist almost entirely in the anion form at pH values of 5 to 9 and therefore volatilization from **water** surfaces is not expected to be an important fate process(SRC). Volatilization from moist soil is not expected because the acid exists as an anion and anions do not volatilize(SRC). **Carminic acid** is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 5.07X10⁻²⁷ mm Hg(SRC), determined from a fragment constant method(2).

(1) Rasimas JP et al; *J Phys Chem* 100: 7220-9 (1996) (2) Lyman WJ; p. 31 in *Environmental Exposure From Chemicals Vol I*, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985)

▶ HSDB

12.2.9 Probable Routes of Human Exposure



Occupational exposure to **carminic acid** may occur through dermal contact with this compound at workplaces where **carminic acid** is produced or used. Use data indicate that the general population may be exposed to **carminic acid** via ingestion of food and beverages containing **carminic acid** dyes, and dermal contact with cosmetic products containing **carminic acid**. (SRC)

▶ [HSDB](#)

13 Literature



13.1 NLM Curated PubMed Citations



All NLM Curated PubMed Citations

administration and dosage
 adverse effects
 analogs and derivatives
 analysis
 chemical synthesis
 chemistry
 history
 isolation and purification
 metabolism
 pharmacokinetics
 pharmacology
 standards
 toxicity

► PubChem

13.2 Metabolite References



1 item

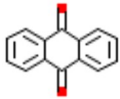
PMID	Reference
	Yannai, Shmuel. (2004) Dictionary of food compounds with CD-ROM: Additives, flavors, and ingredients. Boca Raton: Chapman & Hall/CRC.

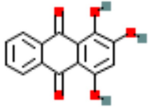
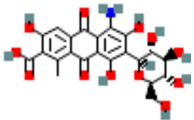
► Human Metabolome Database (HMDB)

13.3 Chemical Co-Occurrences in Literature



Showing 3 of 25 View More Co-Occurrence and Evidence Data

Chemical	Evidence from <input type="text" value="All Time"/>
 <p>Anthraquinone CID 6780</p>	<p>19 articles Download CSV View in PubMed</p> <p>Spiroketalcarminic Acid, a Novel Minor Anthraquinone Pigment in Cochineal Extract Used in Food Additives. PMID 28674282; Chemical & pharmaceutical bulletin 2017 Sep; 65(9):883-887 Name matches: anthraquinone <i>carminic acid</i></p> <p>Identification of anthraquinone coloring matters in natural red dyes by electrospray mass spectrometry coupled to capillary electrophoresis. PMID 14696204; Journal of mass spectrometry : JMS 2003 Dec; 38(12):1252-1258 Name matches: anthraquinone <i>carminic acid</i></p> <p>Structure elucidation and chromatographic identification of anthraquinone components of cochineal (Dactylopius coccus) detected in historical objects. PMID 24267092; Analytica chimica acta 2013 Dec; 804(?):264-272 Name matches: anthraquinone <i>carminic acid</i>; <i>e120</i></p>

Chemical	Evidence from All Time
 <p>Purpurin CID 6683</p>	<p>14 articles Download CSV View in PubMed</p> <p>Protection against Trp-P-2 mutagenicity by purpurin: mechanism of in vitro antimutagenesis. PMID 10792014; Mutagenesis 2000 May; 15(3):223-228 Name matches: 1,2,4-trihydroxy-9,10-anthraquinone; purpurin <i>carminic acid</i></p> <p>Inhibition of human cytochrome P450 1B1, 1A1 and 1A2 by antigenotoxic compounds, purpurin and alizarin. PMID 12379470; Mutation research 2002 Oct; 508(1-2):147-156 Name matches: purpurin <i>carminic acid</i></p> <p>Investigation of red natural dyes used in historical objects by HPLC-DAD-MS. PMID 16736555; Annali di chimica 2006 ; 96(1-2):75-84 Name matches: purpurin <i>carminic acid</i></p>
 <p>5-Amino-3,6,8-trihydroxy-1-methyl-9,10-dioxo-7-[(2S,3R,4R,5S,6R)-3,4,5-trihydroxy-6-(hydroxymethyl)oxan-2-yl]anthracene-2-carboxylic Acid CID 102023189</p>	<p>9 articles Download CSV View in PubMed</p> <p>HPLC/PDA determination of carminic acid and 4-aminocarminic acid using relative molar sensitivities with respect to caffeine. PMID 29447580; Food additives & contaminants. Part A, Chemistry, analysis, control, exposure & risk assessment 2018 May; 35(5):838-847 Name matches: 4-aminocarminic acid <i>carminic acid</i></p> <p>Revised procedures for the certification of carmine (C.I. 75470, Natural red 4) as a biological stain. PMID 17510809; Biotechnic & histochemistry : official publication of the Biological Stain Commission 2007 Feb; 82(1):13-15 Name matches: 4-aminocarminic acid <i>c.i. 75470; carminic acid</i></p> <p>Chromatographic and spectroscopic identification and recognition of ammoniacal cochineal dyes and pigments. PMID 26985877; Spectrochimica acta. Part A, Molecular and biomolecular spectroscopy 2016 Jun; 162(?):86-92 Name matches: 4-aminocarminic acid <i>carminic acid</i></p>

► PubChem

13.4 Chemical-Gene Co-Occurrences in Literature



Showing 3 of 94 [View More Co-Occurrence and Evidence Data](#)

Gene/Protein/Enzyme	Evidence from All Time
<p>Hyaluronan Binding Protein 2</p>	<p>3 articles Download CSV View in PubMed</p> <p>Promoting effects of carminic acid-enriched cochineal extracts on capsular invasive thyroid carcinomas through targeting activation of angiogenesis in rats. PMID 22687987; The Journal of toxicological sciences 2012 ; 37(3):475-482 Name matches: phbp <i>carminic acid</i></p> <p>Polyamine-promoted autoactivation of plasma hyaluronan-binding protein. PMID 19817990; Journal of thrombosis and haemostasis : JTH 2010 Mar; 8(3):559-566 Name matches: phbp <i>carminic acid</i></p> <p>Lac color inhibits development of rat thyroid carcinomas through targeting activation of plasma hyaluronan-binding protein. PMID 22715430; Experimental biology and medicine (Maywood, N.J.) 2012 Jun; 237(6):728-738 Name matches: phbp <i>carminic acid</i></p>
<p>Complement C1q Binding Protein</p>	<p>3 articles Download CSV View in PubMed</p> <p>Promoting effects of carminic acid-enriched cochineal extracts on capsular invasive thyroid carcinomas through targeting activation of angiogenesis in rats. PMID 22687987; The Journal of toxicological sciences 2012 ; 37(3):475-482 Name matches: hyaluronan-binding protein 1 <i>carminic acid</i></p>

Gene/Protein/Enzyme	Evidence from	All Time
	<p>Polyamine-promoted autoactivation of plasma hyaluronan-binding protein. PMID 19817990; Journal of thrombosis and haemostasis : JTH 2010 Mar; 8(3):559-566 Name matches: hyaluronan-binding protein 1 <i>carminic acid</i></p> <p>Lac color inhibits development of rat thyroid carcinomas through targeting activation of plasma hyaluronan-binding protein. PMID 22715430; Experimental biology and medicine (Maywood, N.J.) 2012 Jun; 237(6):728-738 Name matches: hyaluronan-binding protein 1 <i>carminic acid</i></p>	
Aldo-keto Reductase Family 1 Member D1	<p>2 articles</p> <p>Human and murine steroid 5β-reductases (AKR1D1 and AKR1D4): insights into the role of the catalytic glutamic acid. PMID 30928400; Chemico-biological interactions 2019 May; 305(?):163-170 Name matches: akr1d1 <i>e120</i></p> <p>Structure and catalytic mechanism of human steroid 5beta-reductase (AKR1D1). PMID 18848863; Molecular and cellular endocrinology 2009 Mar; 301(1-2):191-198 Name matches: akr1d1 <i>e120</i></p>	<p>Download CSV View in PubMed</p>

► PubChem

13.5 Chemical-Disease Co-Occurrences in Literature



Showing 3 of 25 View More Co-Occurrence and Evidence Data

Disease	Evidence from	All Time
Hypersensitivity	<p>12 articles</p> <p>Allergy to carminic acid: in vitro evidence of involvement of protein-binding hapten PMID 30740350; Asia Pacific allergy 2019 Jan; 9(1):e2 Name matches: allergy <i>carminic acid</i></p> <p>An oral challenge test with carmine red (E120) in skin prick test positive patients. PMID 26549338; European annals of allergy and clinical immunology 2015 Nov; 47(6):206-210 Name matches: allergy <i>e120</i></p> <p>Allergy to carmine red (E120) is not dependent on concurrent mite allergy. PMID 19439984; International archives of allergy and immunology 2009 ; 150(2):179-183 Name matches: allergic reactions; allergy <i>e120</i></p>	<p>Download CSV View in PubMed</p>
Anaphylaxis	<p>7 articles</p> <p>Allergy to carminic acid: in vitro evidence of involvement of protein-binding hapten PMID 30740350; Asia Pacific allergy 2019 Jan; 9(1):e2 Name matches: anaphylaxis <i>carminic acid</i></p> <p>Anaphylactic reactions to ingested carmine (E120). PMID 9404569; Allergy 1997 Nov; 52(11):1133-1137 Name matches: anaphylactic reaction; anaphylactic reactions <i>e120</i></p> <p>Cochineal dye-induced immediate allergy: Review of Japanese cases and proposed new diagnostic chart. PMID 29705083; Allergology international : official journal of the Japanese Society of Allergology 2018 Oct; 67(4):496-505 Name matches: anaphylaxis <i>carminic acid</i></p>	<p>Download CSV View in PubMed</p>
Asthma, Occupational	<p>4 articles</p> <p>[Asthma and allergy due to carmine dye]. PMID 13679965; Anales del sistema sanitario de Navarra 2003 ; 26 Suppl 2(?):65-73 (Review Article) Name matches: occupational asthma <i>carminic acid; e120</i></p> <p>Carmine (E-120)-induced occupational asthma revisited. PMID 12589365; The Journal of allergy and clinical immunology 2003 Feb; 111(2):415-419 Name matches: occupational asthma <i>carminic acid</i></p>	<p>Download CSV View in PubMed</p>

Disease	Evidence from <input data-bbox="540 159 833 201" type="text" value="All Time"/>
	Occupational asthma and food allergy due to carmine. PMID 9788693; Allergy 1998 Sep; 53(9):897-901 Name matches: occupational asthma <i>e120</i>

▶ [PubChem](#)

14 Patents



14.1 Depositor-Supplied Patent Identifiers



25 items [View More Rows & Details](#)

SORT BY Relevance			
Patent ID	Title	Submitted Date	Granted Date
US2017231889	Sunscreen Compositions Comprising Colour Pigments	2017-05-04	
US8268014	HAIR DYEING COMPOSITION	2012-01-26	
US8257448	HAIR DYEING COMPOSITION	2012-01-19	
US2011033400	SUNSCREEN COMPOSITIONS COMPRISING COLOUR PIGMENTS	2011-02-10	
US6312697	Inhibitory effect of synthetic and natural colorants on carcinogenesis		2001-11-06

[1](#) [2](#) [3](#) ... [5](#) [Next](#) >

[▶ PubChem](#)

[Link to all deposited patent identifiers](#)

[▶ PubChem](#)

14.2 WIPO PATENTSCOPE



Patents are available for this chemical structure:

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

[▶ PATENTSCOPE \(WIPO\)](#)

15 Biological Test Results



15.1 BioAssay Results



5 items [View More Details](#)

SORT BY Activity Value						
Activity	Activity Value, μM	Activity Type	Target Name	BioAssay Name	BioAssay AID	Substance SID
Inactive				NCI In Vivo Anticancer Drug Screen. Data for tumor model P388 Leukemia (intraperitoneal) in CD2F1 (CDF1) mice	330	574551
Inactive				A screen for compounds that inhibit growth of Escherichia coli	1053175	178117701
Inactive				High throughput screen for small molecule inhibitors of a hypoxia-regulated fluorescent biosensor in Mycobacterium tuberculosis	1159583	178117701
Inactive				A screen for compounds that are lethal to S. aureus RN4220 with the processive glycosyltransferase UgtP deleted	1259309	178117701
Inactive				A screen for compounds that are lethal to S. aureus RN4220	1259311	178117701

[PubChem](#)

16 Classification



16.1 Ontologies



16.1.1 MeSH Tree



Showing 1 of 1

Carmine

Coloring matter from the insect *Coccus cacti* L. It is used in foods, pharmaceuticals, toiletries, etc., as a dye, and also has use as a microscopic stain and biological marker.

LINKED RECORDS

[Compounds: 5](#) [Substances: 120](#) [PubMed Abstracts: 308](#)

CLASSIFICATION (PARENT NODES)

MeSH Tree > Technology And Food And Beverages Category > Food And Beverages > Food > Food Ingredients > Food Additives > Food Coloring Agents

▶ MeSH

16.1.2 WIPO IPC

Showing 5 of 54 [View More](#)

A61Q1/02 - Preparations containing skin colorants, e.g. pigments

LINKED RECORDS

[Compounds: 45,528](#) [Substances: 69,083](#) [Patents: 4,986](#)

CLASSIFICATION (PARENT NODES)

International Patent Classification > HUMAN NECESSITIES > HEALTH; LIFE-SAVING; AMUSEMENT Category > A61 - MEDICAL OR VETERINARY SCIENCE; A61Q - SPECIFIC USE OF COSMETICS OR SKIN PREPARATIONS > A61Q1/00 - Make-up Preparations; Body Powders; Preparations For Removing Make-up

A61Q1/04 - for lips

LINKED RECORDS

[Compounds: 27,943](#) [Substances: 42,275](#) [Patents: 2,167](#)

CLASSIFICATION (PARENT NODES)

International Patent Classification > HUMAN NECESSITIES > HEALTH; LIFE-SAVING; AMUSEMENT Category > A61 - MEDICAL OR VETERINARY SCIENCE; A61Q - SPECIFIC USE OF COSMETICS OR SKIN PREPARATIONS > A61Q1/00 - Make-up Preparations; Body Powders; Preparations For Removing Make-up > A61Q1/02 - Preparations Containing Skin Colorants, E.g. Pigments

A61Q1/08 - for cheeks, e.g. rouge

LINKED RECORDS

[Compounds: 9,754](#) [Substances: 14,124](#) [Patents: 439](#)

CLASSIFICATION (PARENT NODES)

International Patent Classification > HUMAN NECESSITIES > HEALTH; LIFE-SAVING; AMUSEMENT Category > A61 - MEDICAL OR VETERINARY SCIENCE; A61Q - SPECIFIC USE OF COSMETICS OR SKIN PREPARATIONS > A61Q1/00 - Make-up Preparations; Body Powders; Preparations For Removing Make-up > A61Q1/02 - Preparations Containing Skin Colorants, E.g. Pigments

A61Q1/10 - for eyes, e.g. eyeliner, mascara

LINKED RECORDS

Compounds: 26,859 Substances: 40,345 Patents: 2,020

CLASSIFICATION (PARENT NODES)

International Patent Classification > HUMAN NECESSITIES > HEALTH; LIFE-SAVING; AMUSEMENT Category

A61 - MEDICAL OR VETERINARY SCIENCE; A61Q - SPECIFIC USE OF COSMETICS OR SKIN PREPARATIONS; A61Q1/00 - Make-up Preparations; Body Powders; Preparations For Removing Make-up

A61Q1/02 - Preparations Containing Skin Colorants, E.g. Pigments

A61Q5/10 - Preparations for permanently dyeing the hair

LINKED RECORDS

Compounds: 71,468 Substances: 121,579 Patents: 3,654

CLASSIFICATION (PARENT NODES)

International Patent Classification > HUMAN NECESSITIES > HEALTH; LIFE-SAVING; AMUSEMENT Category

A61 - MEDICAL OR VETERINARY SCIENCE; A61Q - SPECIFIC USE OF COSMETICS OR SKIN PREPARATIONS; A61Q5/00 - Preparations For Care Of The Hair

▶ WIPO

16.1.3 CAMEO Chemicals



Showing 3 of 3

Acids, Carboxylic

Reactive group: Acids, Carboxylic

LINKED RECORDS

Compounds: 226 Substances: 23,779

CLASSIFICATION (PARENT NODES)

CAMEO Chemical Reactivity Classification

Alcohols and Polyols

Reactive group: Alcohols and Polyols

LINKED RECORDS

Compounds: 617 Substances: 32,371

CLASSIFICATION (PARENT NODES)

CAMEO Chemical Reactivity Classification

Phenols and Cresols

Reactive group: Phenols and Cresols

LINKED RECORDS

Compounds: 307 Substances: 18,699

CLASSIFICATION (PARENT NODES)

CAMEO Chemical Reactivity Classification

▶ CAMEO Chemicals

16.1.4 UN GHS Classification



Showing 1 of 1

Not Classified

No hazards have been classified (by majority companies[ECHA] or information source)

LINKED RECORDS

[Compounds: 1,764](#) [Substances: 77,242](#)

CLASSIFICATION (PARENT NODES)

GHS Classification Tree

- ▶ [UN Globally Harmonized System of Classification and Labelling of Chemicals \(GHS\)](#)

17 Information Sources



FILTER BY SOURCE ALL SOURCES

1. CAMEO Chemicals

CARMINIC ACID

<https://cameochemicals.noaa.gov/chemical/19959>

CAMEO Chemical Reactivity Classification

<https://cameochemicals.noaa.gov/browse/react>

2. Human Metabolome Database (HMDB)

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<http://www.hmdb.ca/citing>

Carmine red

<http://www.hmdb.ca/metabolites/HMDB0030658>

3. HSDB

Carminic acid

<https://pubchem.ncbi.nlm.nih.gov/source/hsdb/912>

4. DTP/NCI

Carmine

<https://dtp.cancer.gov/dtpstandard/servlet/dwindex?searchtype=NSC&outputformat=html&searchlist=326224>

5. EPA Chemicals under the TSCA

LICENSE

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

2-Anthracenecarboxylic acid, 7-.beta.-D-glucopyranosyl-9,10-dihydro-3,5,6,8-tetrahydroxy-1-methyl-9,10-dioxo-

<https://www.epa.gov/chemicals-under-tsca>

6. EPA DSSTox

LICENSE

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

Cochineal

<https://comptox.epa.gov/dashboard/DTXSID2045735>

7. European Chemicals Agency (ECHA)

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

Carmine

<https://echa.europa.eu/substance-information/-/substanceinfo/100.014.295>

Cochineal (dye)

<https://echa.europa.eu/substance-information/-/substanceinfo/100.014.255>

carminic acid

<https://echa.europa.eu/substance-information/-/substanceinfo/100.013.658>

Carminic acid

<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/60355>

8. FDA Center for Food Safety and Applied Nutrition (CFSAN)

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

Carmine

<https://www.fda.gov/ForIndustry/ColorAdditives/ColorAdditiveInventories/ucm106626.htm>

CARMINE (COCCUS CACTI L.)

<https://www.accessdata.fda.gov/scripts/fdcc/?set=FoodSubstances&id=CARMINE>

COCHINEAL EXTRACT (COCCUS CACTI L.)

<https://www.accessdata.fda.gov/scripts/fdcc/?set=FoodSubstances&id=COCHINEALEXTRACT>

9. Flavor and Extract Manufacturers Association (FEMA)**CARMINE (COCCUS CACTI L.)**

<https://www.femaflavor.org/flavor-library/carmine-coccus-cacti-l>

10. Wikipedia**carmine**

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

carminic acid

https://en.wikipedia.org/wiki/Carminic_acid

11. MeSH**Carmine**

<https://www.ncbi.nlm.nih.gov/mesh/68002329>

MeSH Tree

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

Food Coloring Agents

<https://www.ncbi.nlm.nih.gov/mesh/68005505>

Coloring Agents

<https://www.ncbi.nlm.nih.gov/mesh/68004396>

12. PubChem

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

13. WIPO**International Patent Classification**

<http://www.wipo.int/classifications/ipc/>

14. 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

15. PATENTSCOPE (WIPO)**SID 403655180**

<https://pubchem.ncbi.nlm.nih.gov/substance/403655180>