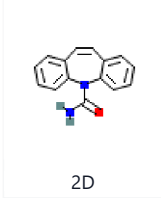
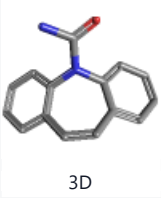
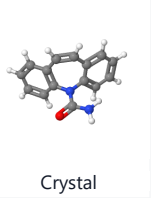


COMPOUND SUMMARY

Carbamazepine

PubChem CID	2554
Structure	 2D  3D  Crystal
Chemical Safety	 Irritant  Health Hazard Laboratory Chemical Safety Summary (LCSS) Datasheet
Molecular Formula	C ₁₅ H ₁₂ N ₂ O
Synonyms	carbamazepine 298-46-4 Tegretol Carbamazepen Finlepsin View More...
Molecular Weight	236.27 g/mol <i>Computed by PubChem 2.1 (PubChem release 2021.05.07)</i>
Dates	Create: 2005-03-25 Modify: 2023-08-12
Description	Carbamazepine is a dibenzoazepine that is 5H-dibenzo[b,f]azepine carrying a carbamoyl substituent at the azepine nitrogen, used as an anticonvulsant. It has a role as an anticonvulsant, an EC 3.5.1.98 (histone deacetylase) inhibitor, a mitogen, a glutamate transporter activator, an antimanic drug, an analgesic, a non-narcotic analgesic, an environmental contaminant, a xenobiotic, a drug allergen and a sodium channel blocker. It is a dibenzoazepine and a member of ureas. ► ChEBI Carbamazepine, also known as Tegretol, is an anticonvulsant drug and analgesic drug used to control seizures and to treat pain resulting from trigeminal neuralgia. It was initially approved by the FDA in 1965. Aside from the above uses, this drug is also given to control the symptoms of bipolar 1. Interestingly, carbamazepine was the first anticonvulsant used to treat individuals with bipolar disorder.

[▶ DrugBank](#)

Carbamazepine is a Mood Stabilizer. The mechanism of action of carbamazepine is as a Cytochrome P450 3A4 Inducer, and Cytochrome P450 1A2 Inducer, and Cytochrome P450 2B6 Inducer, and Cytochrome P450 2C9 Inducer, and Cytochrome P450 2C19 Inducer. The physiologic effect of carbamazepine is by means of Decreased Central Nervous System Disorganized Electrical Activity.

[▶ FDA Pharm Classes](#)[View More...](#)

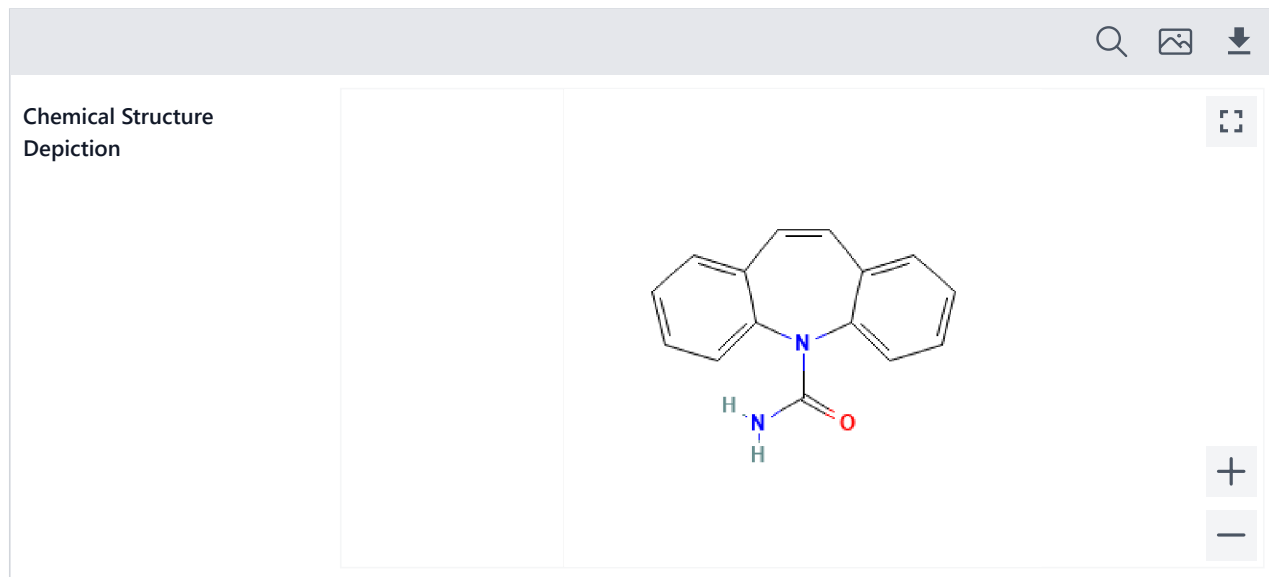
Contents

Title and Summary	
1 Structures	▼
2 Names and Identifiers	▼
3 Chemical and Physical Properties	▼
4 Spectral Information	▼
5 Related Records	▼
6 Chemical Vendors	
7 Drug and Medication 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	

1 Structures

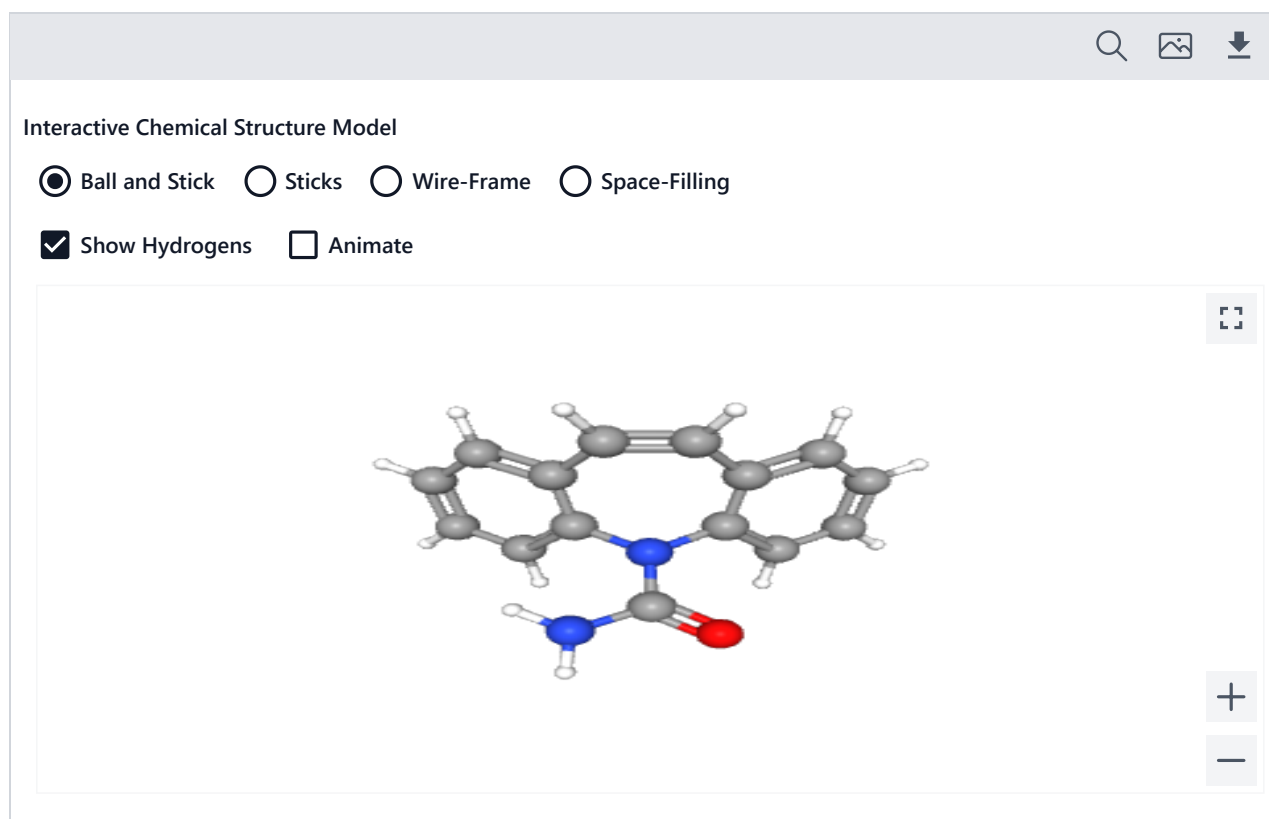


1.1 2D Structure



► PubChem

1.2 3D Conformer



« First < Previous Conformer 1 of 2 Next > Last »

► PubChem

1.3 Crystal Structures



1 of 23	View All
CCDC Number	185919
Associated Article	DOI:10.1002/jps.10455
Crystal Structure Data	DOI:10.5517/cc67gd8
Crystal Structure Depiction	

► The Cambridge Structural Database

2 Names and Identifiers



2.1 Computed Descriptors



2.1.1 IUPAC Name



benzo[b][1]benzazepine-11-carboxamide

Computed by Lexichem TK 2.7.0 (PubChem release 2021.05.07)

► PubChem

2.1.2 InChI



InChI=1S/C₁₅H₁₂N₂O/c16-15(18)17-13-7-3-1-5-11(13)9-10-12-6-2-4-8-14(12)17/h1-10H,(H2,16,18)

Computed by InChI 1.0.6 (PubChem release 2021.05.07)

[▶ PubChem](#)

2.1.3 InChIKey



FFGPTBGBLSHEPO-UHFFFAOYSA-N

Computed by InChI 1.0.6 (PubChem release 2021.05.07)

[▶ PubChem](#)

2.1.4 Canonical SMILES



C1=CC=C2C(=C1)C=CC3=CC=CC=C3N2C(=O)N

Computed by OEChem 2.3.0 (PubChem release 2021.05.07)

[▶ PubChem](#)

2.2 Molecular Formula



C₁₅H₁₂N₂O

Computed by PubChem 2.1 (PubChem release 2021.05.07)

[▶ Wikipedia; PubChem](#)

2.3 Other Identifiers



2.3.1 CAS



298-46-4

[▶ CAS Common Chemistry; ChemIDplus; DrugBank; DTP/NCI; EPA DSSTox; European Chemicals Agency \(ECHA\); FDA GI...](#)

2.3.2 Related CAS



85756-57-6 (di-hydrate)

[▶ ChemIDplus](#)

2.3.3 European Community (EC) Number



206-062-7

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

2.3.4 NSC Number



755920

► DTP/NCI

169864

► DTP/NCI

2.3.5 UNII



33CM23913M

► FDA Global Substance Registration System (GSRS)

2.3.6 DSSTox Substance ID



DTXSID4022731

► EPA DSSTox

2.3.7 Nikkaji Number



J8.590A

► Japan Chemical Substance Dictionary (Nikkaji)

2.3.8 Wikipedia



Carbamazepine

► Wikipedia

2.3.9 Wikidata



Q410412

► Wikidata

2.3.10 NCI Thesaurus Code



C341

► NCI Thesaurus (NCIt)

2.3.11 RXCUI



2002

► NLM RxNorm Terminology

2.3.12 Pharos Ligand ID



7U7WXCCXPYL

► Pharos

2.3.13 Metabolomics Workbench ID



42899

► Metabolomics Workbench

2.3.14 ChEMBL ID



CHEMBL108

► ChEMBL

2.4 Synonyms



2.4.1 MeSH Entry Terms



Amizepine	Finlepsin
Carbamazepine	Neurotol
Carbamazepine Acetate	Tegretol
Carbamazepine Anhydrous	
Carbamazepine Dihydrate	
Carbamazepine Hydrochloride	
Carbamazepine L-Tartrate (4:1)	
Carbamazepine Phosphate	
Carbamazepine Sulfate (2:1)	
Carbazepin	
Epitol	

► Medical Subject Headings (MeSH)

2.4.2 Depositor-Supplied Synonyms



carbamazepine	Neurotol	Tegretol-Xr	benzo[b][1]benzaz
298-46-4	Timonil	Carbamazepinum	5H-Dibenz(b,f)aze
Tegretol			

Carbamazepine	Epitol	Teril	5-Carbamyl-5H-di
Finlepsin	5H-Dibenz[b,f]azepine-5-carboxamide	Geigy 32883	5-Carbamoyl-5H-c
Biston	Carbamezepine	Carbamazepin	Calepsin
Equetro	Karbamazepin	Carbamazepina	Carbamazepine Ar
Tegretal	Carbatrol	Amizepin	5-Carbamoyl-5H-c
5H-Dibenzo[b,f]azepine-5-carboxamide	Stazepine	Bipotrol	Karbelex
Carbazepine	Telesmin	Carnexiv	Neurotop

► PubChem

3 Chemical and Physical Properties

3.1 Computed Properties

Property Name	Property Value	Reference
Molecular Weight	236.27 g/mol	Computed by PubChem 2.1 (PubChem release 2021.05.07)
XLogP3	2.5	Computed by XLogP3 3.0 (PubChem release 2021.05.07)
Hydrogen Bond Donor Count	1	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Hydrogen Bond Acceptor Count	1	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Rotatable Bond Count	0	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Exact Mass	236.094963011 g/mol	Computed by PubChem 2.1 (PubChem release 2021.05.07)
Monoisotopic Mass	236.094963011 g/mol	Computed by PubChem 2.1 (PubChem release 2021.05.07)
Topological Polar Surface Area	46.3Å ²	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
Heavy Atom Count	18	Computed by PubChem
Formal Charge	0	Computed by PubChem
Complexity	326	Computed by Cactvs 3.4.8.18 (PubChem release 2021.05.07)
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
Undefined Bond Stereocenter Count	0	Computed by PubChem
Covalently-Bonded Unit Count	1	Computed by PubChem
Compound Is Canonicalized	Yes	Computed by PubChem (release 2021.05.07)

[▶ PubChem](#)

3.2 Experimental Properties



3.2.1 Physical Description



Solid

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

3.2.2 Color / Form



Crystals from absolute [ethanol](#) and [benzene](#)

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. 298

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

White to off-white powder

Physicians Desk Reference 61st ed, Thomson PDR, Montvale, NJ 2007., p. 3171

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

3.2.3 Boiling Point



399.6±45.0

<https://www.lookchem.com/Carbamazepine/>

[▶ DrugBank](#)

3.2.4 Melting Point



189-192

<https://www.lookchem.com/Carbamazepine/>

[▶ DrugBank](#)

190.2 °C

Lide, D.R. *CRC Handbook of Chemistry and Physics 86TH Edition 2005-2006*. CRC Press, Taylor & Francis, Boca Raton, FL 2005, p. 3-140

[▶ Hazardous Substances Data Bank \(HSDB\); Human Metabolome Database \(HMDB\)](#)

3.2.5 Solubility



>35.4 [ug/mL] (The mean of the results at pH 7.4)

► [Burnham Center for Chemical Genomics](#)

Sol in alcohol, [acetone](#), [propylene glycol](#); practically insol in [water](#)

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. 298

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

Soluble in [chloroform](#), [dimethylformamide](#), [ethylene glycol monomethyl ether](#), or [methanol](#); only slightly soluble in [ethanol](#) or glacial [acetic acid](#)

Gerhartz, W. (exec ed.). *Ullmann's Encyclopedia of Industrial Chemistry*. 5th ed. Vol A1: Deerfield Beach, FL: VCH Publishers, 1985 to Present., p. VA3 : 18 (1985)

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

In [water](#), 18 mg/L at 25 °C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver.3.12. Nov 30, 2004. Available from, as of Jun 7, 2007: <https://www.epa.gov/oppt/exposure/pubs/episuitedi.htm>

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

1.52e-01 g/L

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

3.2.6 Vapor Pressure



1.84X10⁻⁷ mm Hg at 25 °C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver.3.12. Nov 30, 2004. Available from, as of Jun 7, 2007: <https://www.epa.gov/oppt/exposure/pubs/episuitedi.htm>

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

3.2.7 LogP



2.77

<http://www.t3db.ca/toxins/T3D2826>

► [DrugBank](#)

log Kow = 2.45

Dal Pozzo A et al; *Int J Pharm* 50: 97-101 (1989)

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

2.3

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

3.2.8 LogS



-3.2

<http://www.t3db.ca/toxins/T3D2826>

► [DrugBank](#)

3.2.9 Henry's Law Constant



Henry's Law constant = 1.08X10⁻⁷ atm-cu m/mol at 25 °C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver.3.12. Nov 30, 2004. Available from, as of Jun 7, 2007:

<https://www.epa.gov/oppt/exposure/pubs/episuite.html>

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

3.2.10 Stability / Shelf Life



To study the photostability of carbamazepine polymorphs, the pure materials on the tablet surface were evaluated without physical damage by means of Fourier-transform infrared reflection-absorption infrared spectrometry (FT-IR-RAS) and colorimetric measurement of the carbamazepine polymorphs I, II, and III, after photodegradation at 2 irradiation intensities under a near-UV fluorescent lamp. The surface of sample pellets of all crystalline forms turned gradually from white to yellow-orange upon exposure to light, and the discoloration rate of form II was faster than that of forms I and III, indicating that form II was the most unstable of the three. The semilogarithmic plots of the photodegradation profiles of the various polymorphs were straight lines, including the induction period, indicating that degradation of the drug on the surface followed first-order kinetics. The induction periods of all forms were not significantly different. However, the degradation rate constant of form II was 5.1 and 1.5 times larger than those of forms I and III, respectively.

[PMID:8027920](#)

Matsuda Y et al; J Pharm Pharmacol 46: 162-7 (1994)

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

3.2.11 Ionization Efficiency



Ionization mode	Positive
logIE	2.4
pH	2.7
Instrument	Agilent XCT
Ion source	Electrospray ionization
Additive	formic acid (5.3nM)
Organic modifier	MeCN (80%)

Reference

DOI:

► [Kruve Lab, Ionization & Mass Spectrometry, Stockholm University](#)

3.2.12 Dissociation Constants



pKa

15.96, -3.8

<http://www.t3db.ca/toxins/T3D2826>

► [DrugBank](#)

pKa = 13.9

[PMID:12448549](#)

Jones OAH et al; Water Res 36: 5013-22 (2002)

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

3.2.13 Collision Cross Section



150.3 Å² [M+H]⁺ [CCS Type: TW, Method: Major Mix IMS/Tof Calibration Kit (Waters)]

<https://www.sciencedirect.com/science/article/pii/S0021967318301894>

► [CCSbase](#)

149 Å² [M+H]⁺ [CCS Type: TW, Method: calibrated with polyalanine and drug standards]

<https://pubs.acs.org/doi/abs/10.1021/acs.analchem.7b01709>

► [CCSbase](#)

150 Å² [M+H]⁺ [CCS Type: DT, Method: single field calibrated]

<https://pubs.rsc.org/en/content/articlelanding/2018/ay/c7ay02808c>

► [CCSbase](#)

158.54 Å² [M+Na]⁺

149.11 Å² [M+H]⁺

S61 | UJICCSLIB | Collision Cross Section (CCS) Library from UJI | [DOI:10.5281/zenodo.3549476](https://doi.org/10.5281/zenodo.3549476)

► [NORMAN Suspect List Exchange](#)

3.2.14 Kovats Retention Index



Standard non-polar	2296, 2259, 2259, 2290, 2285, 2310, 2337, 2340, 2280.2, 2316.8, 2275, 2270, 2290, 2310, 2290
Semi-standard non-polar	2397.4, 2332.5, 2306.3, 2347.5, 2335.1, 2312, 2314

► NIST Mass Spectrometry Data Center

3.2.15 Other Experimental Properties



Hydroxyl radical reaction rate constant = 8.08×10^{-11} cu cm/molec-sec at 25 °C (est)

US EPA; Estimation Program Interface (EPI) Suite. Ver.3.12. Nov 30, 2004. Available from, as of Jun 7, 2007:
<https://www.epa.gov/oppt/exposure/pubs/episuite.html>

► Hazardous Substances Data Bank (HSDB)

STABLE TO HYDROLYSIS

Testa, B. and P. Jenner. Drug Metabolism: Chemical & Biochemical Aspects. New York: Marcel Dekker, Inc., 1976., p. 148

► Hazardous Substances Data Bank (HSDB)

3.3 SpringerMaterials Properties



15N nuclear magnetic resonance spectrum

Chemical shift

Spin-spin coupling constant

► SpringerMaterials

4 Spectral Information



4.1 1D NMR Spectra

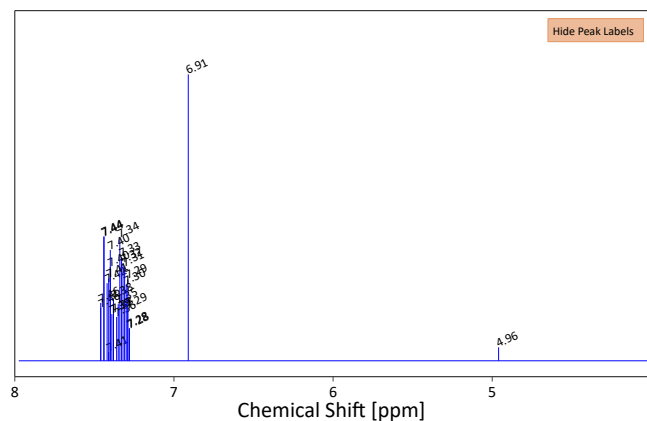


4.1.1 1H NMR Spectra



1 of 2	
Spectra ID	2324
Instrument Type	JEOL
Frequency	400 MHz
Solvent	CDCl ₃
Shifts [ppm]:Intensity	7.42:271.00, 7.32:340.00, 7.36:153.00, 6.91:1000.00, 7.34:428.00, 7.28:114.00, 7.35:198.00, 7.38:167.00, 7.33:361.00, 7.41:31.00, 4.96:47.00, 7.29:284.00, 7.40:328.00, 7.29:181.00, 7.30:264.00, 7.38:216.00, 7.40:387.00, 7.44:435.00, 7.46:186.00, 7.46:202.00, 7.31:329.00, 7.41:288.00, 7.44:432.00, 7.39:163.00, 7.28:112.00

Thumbnail

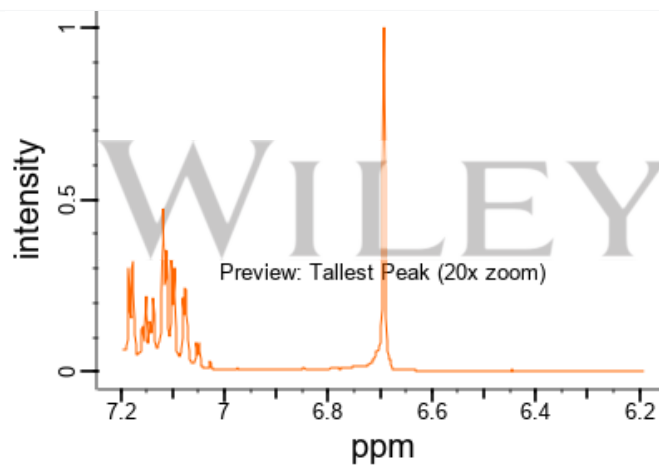


► [Human Metabolome Database \(HMDB\)](#)

2 of 2

Source of Spectrum	Sigma-Aldrich Co. LLC.
Source of Sample	Sigma-Aldrich Co. LLC.
Catalog Number	309486
Copyright	Copyright © 2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2021 John Wiley & Sons, Inc. All Rights Reserved.

Thumbnail



► [SpectraBase](#)

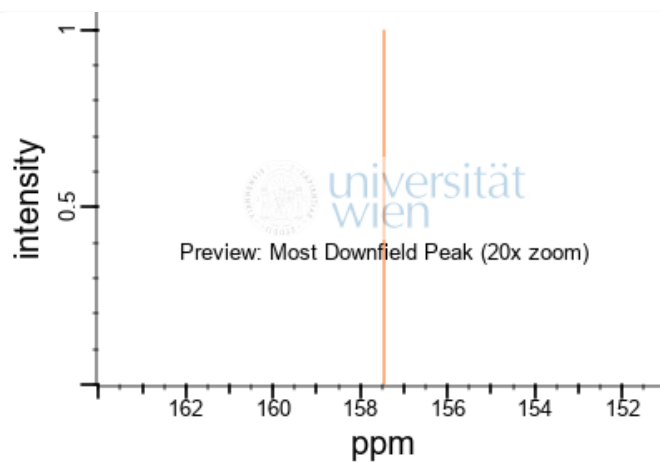
4.1.2 13C NMR Spectra



1 of 2

Copyright	Copyright © 2016-2021 W. Robien, Inst. of Org. Chem., Univ. of Vienna. All Rights Reserved.
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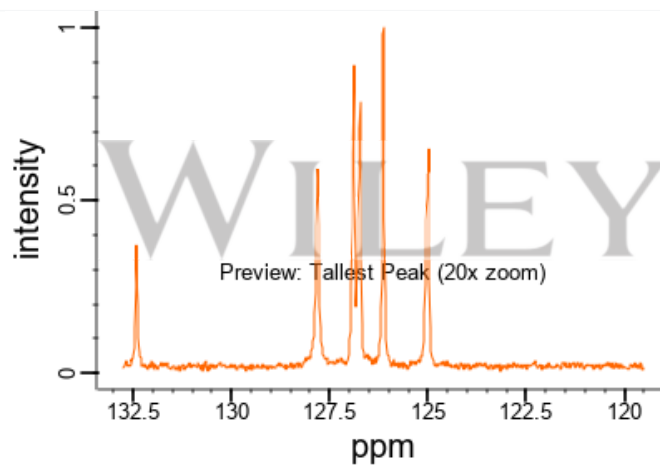
Thumbnail

[► SpectraBase](#)

2 of 2

Source of Spectrum	Sigma-Aldrich Co. LLC.
Source of Sample	Sigma-Aldrich Co. LLC.
Catalog Number	309486
Copyright	Copyright © 2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2021 John Wiley & Sons, Inc. All Rights Reserved.

Thumbnail

[► SpectraBase](#)

4.2 Mass Spectrometry



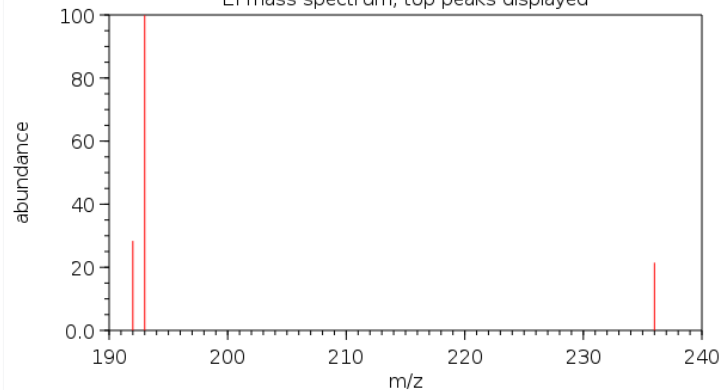
4.2.1 GC-MS



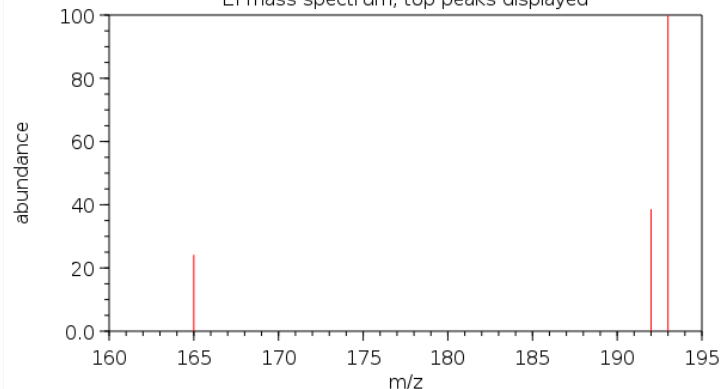
1 of 10

[View All](#)

NIST Number	236284
-------------	--------

Library	Main library
Total Peaks	90
m/z Top Peak	193
m/z 2nd Highest	192
m/z 3rd Highest	236
Thumbnail	Carbamazepine EI mass spectrum, top peaks displayed  abundance m/z © 2014 by the U.S. Secretary of Commerce.

► [NIST Mass Spectrometry Data Center](#)

2 of 10	View All
NIST Number	286365
Library	Replicate library
Total Peaks	109
m/z Top Peak	193
m/z 2nd Highest	192
m/z 3rd Highest	165
Thumbnail	Carbamazepine EI mass spectrum, top peaks displayed  abundance m/z © 2014 by the U.S. Secretary of Commerce.

[► NIST Mass Spectrometry Data Center](#)

4.2.2 MS-MS

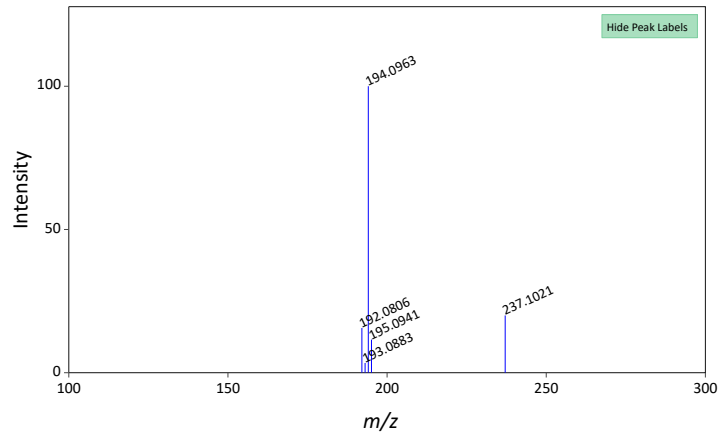


1 of 10		View All
Spectra ID	2226189	
Ionization Mode	Positive	
SPLASH	splash10-000i-0090000000-01c635992f1dc0325f99	
Top 5 Peaks	237.102 100 238.1052 14.48 194.0964 8.57	
Thumbnail		

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

2 of 10		View All
Spectra ID	2228533	
Ionization Mode	Positive	
SPLASH	splash10-0006-0910000000-9ca4cd5a8ec9aea2fed3	
Top 5 Peaks	194.0963 100 237.1021 19.98 192.0806 15.60 195.0941 11.56 193.0883 3.39	

Thumbnail



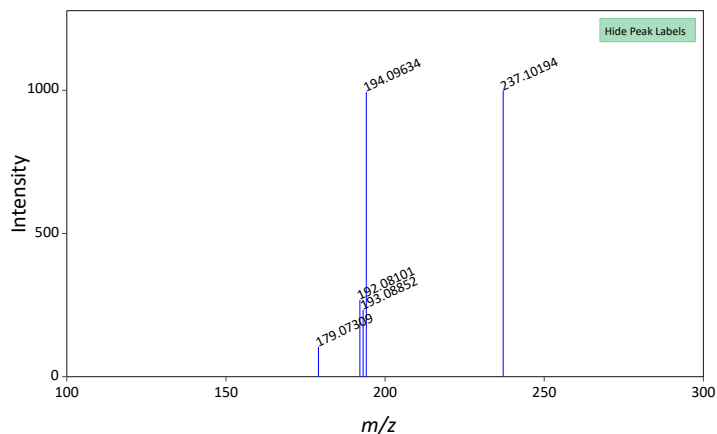
► [Human Metabolome Database \(HMDB\)](#)

4.2.3 LC-MS



1 of 40		View All
Accession ID	MSBNK-ACES_SU-AS000160	
Authors	ACESx, Jonathan W. Martin Group	
Instrument	QExactive Orbitrap HF-X (Thermo Scientific)	
Instrument Type	LC-ESI-QFT	
MS Level	MS2	
Ionization Mode	POSITIVE	
Ionization	ESI	
Collision Energy	Ramp 20%-70% (nominal)	
Fragmentation Mode	HCD	
Column Name	Waters; Acquity UPLC BEH C18, 2.1 x 100 mm, 1.7 um, Waters	
Retention Time	13.9213	
Top 5 Peaks	237.10194 999 194.09634 994 192.08101 268 193.08852 234 179.07309 104	
SPLASH	splash10-000f-0950000000-c8b6bbff2c2a1597cc91	

Thumbnail



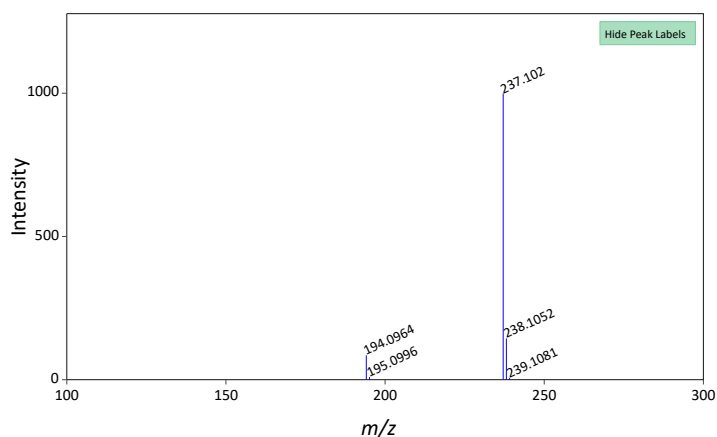
License

CC BY

[► MassBank Europe](#)

2 of 40		View All ↗
Accession ID	MSBNK-Athens_Univ-AU112001	
Authors	Nikiforos Alygizakis, Anna Bletsou, Nikolaos Thomaidis, University of Athens	
Instrument	Bruker maXis Impact	
Instrument Type	LC-ESI-QTOF	
MS Level	MS2	
Ionization Mode	POSITIVE	
Ionization	ESI	
Collision Energy	10 eV	
Fragmentation Mode	CID	
Column Name	Acclaim RSLC C18 2.2um, 2.1x100mm, Thermo	
Retention Time	7.3 min	
Precursor m/z	237.1022	
Precursor Adduct	[M+H] ⁺	
Top 5 Peaks	237.102 999 238.1052 144 194.0964 85 195.0996 9 239.1081 6	
SPLASH	splash10-000i-0090000000-be63f70e101a786a369b	

Thumbnail



License

CC BY-SA

[► MassBank Europe](#)

4.2.4 Other MS



1 of 5

[View All](#)

Other MS

MASS: 42308 (NIST/EPA/[MSDC](#) Mass Spectral Database, 1990 version)[► Hazardous Substances Data Bank \(HSDB\)](#)

2 of 5

[View All](#)

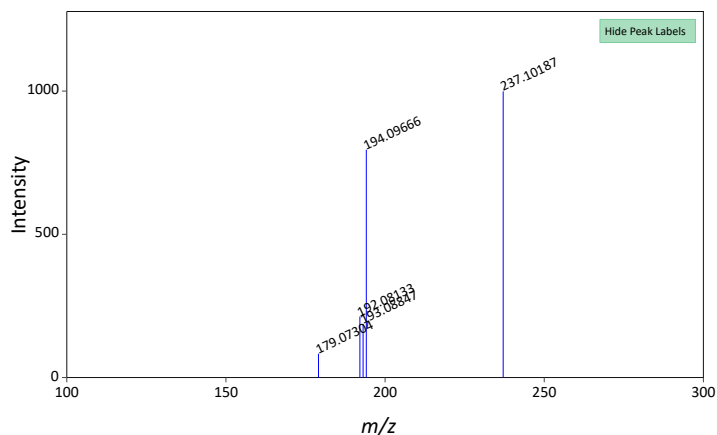
Accession ID	MSBNK-ACES_SU-AS000089
Authors	ACESx, Jonathan W. Martin Group
Instrument	QExactive Orbitrap HF-X (Thermo Scientific)
Instrument Type	LC-APCI-QFT
MS Level	MS2
Ionization Mode	POSITIVE
Ionization	APCI
Collision Energy	Ramp 20%-70% (nominal)
Fragmentation Mode	HCD
Column Name	Waters; Acquity UPLC BEH C18, 2.1 x 100 mm, 1.7 um, Waters
Retention Time	13.8553
Precursor m/z	237.1023
Top 5 Peaks	237.10187 999 194.09666 795

192.08133 213
193.08847 187
179.07304 83

SPLASH

[splash10-000f-0960000000-a3033693b0019d1b04c5](#)

Thumbnail



License

CC BY

[► MassBank Europe](#)

4.3 UV Spectra



UV: 1277 (Absorption Spectra in the UV and visible Regions, Academic Press, New York)

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. V3: 2458*

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

4.4 IR Spectra



4.4.1 FTIR Spectra



1 of 2

Technique

KBr WAFER

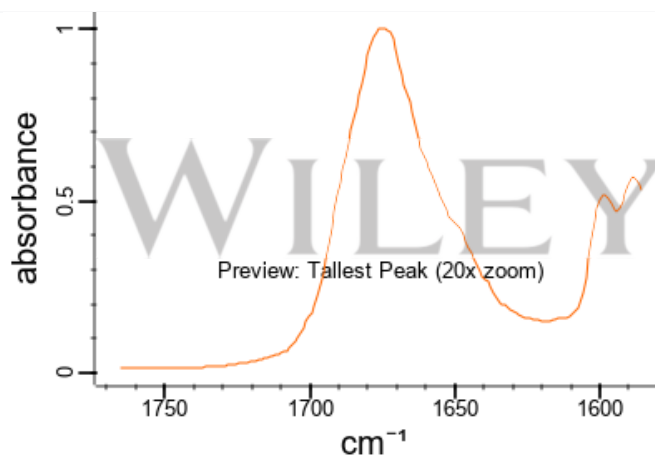
Source of Sample

Geigy Chemical Corporation

Copyright

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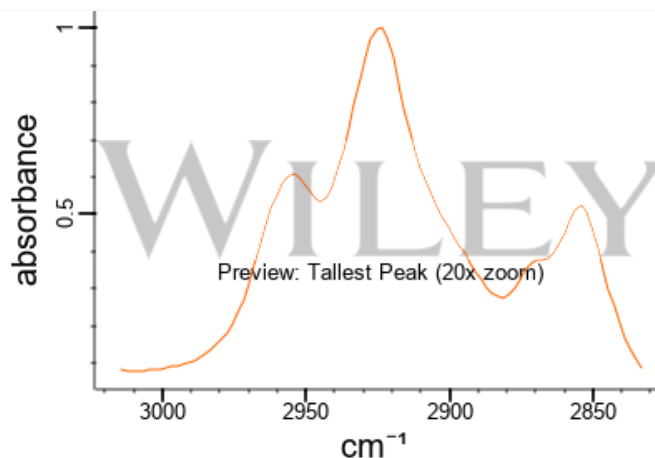
Thumbnail

[► SpectraBase](#)

2 of 2

Technique	Mull
Source of Spectrum	Sigma-Aldrich Co. LLC.
Source of Sample	Aldrich
Catalog Number	309486
Copyright	Copyright © 2018-2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2018-2021 John Wiley & Sons, Inc. All Rights Reserved.

Thumbnail

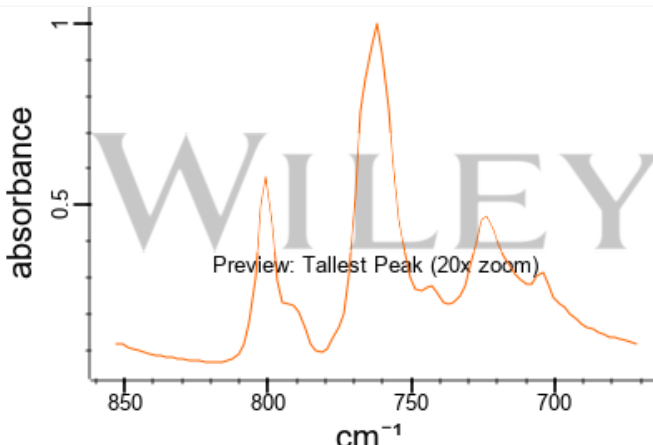
[► SpectraBase](#)

4.4.2 ATR-IR Spectra

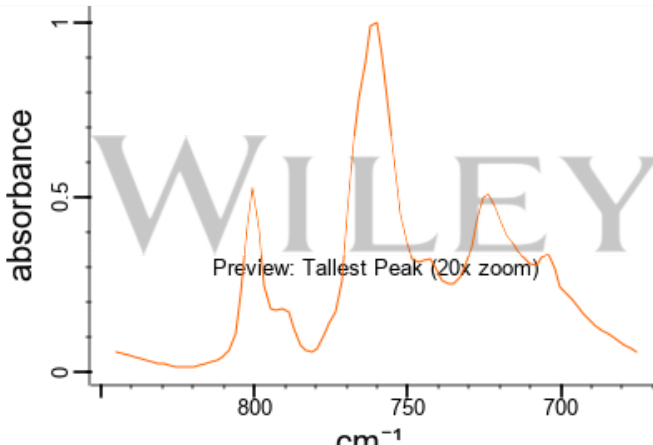


1 of 2

Instrument Name	Bio-Rad FTS
-----------------	-------------

Technique	ATR-Neat (DuraSamplIR II)
Source of Spectrum	Forensic Spectral Research
Source of Sample	Alltech Associates, Inc., Grace Davison Discovery Sciences
Catalog Number	01788
Lot Number	101
Copyright	Copyright © 2009-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

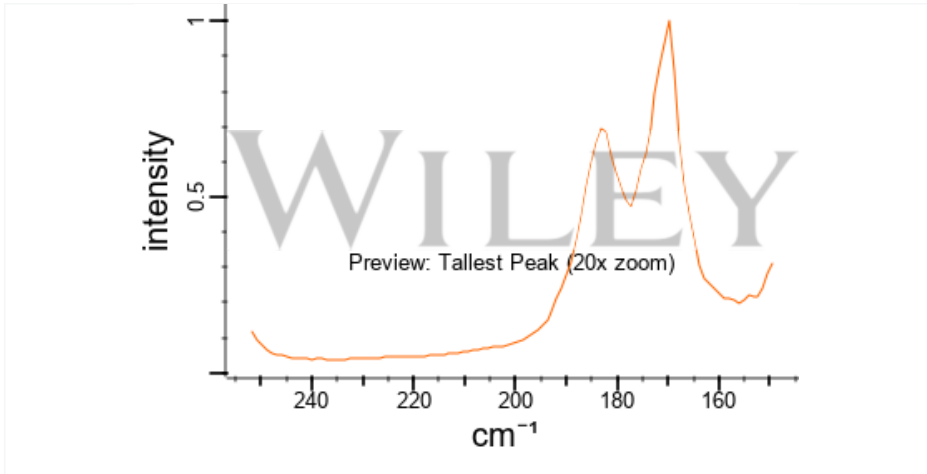
► [SpectraBase](#)

2 of 2	
Source of Sample	Aldrich
Catalog Number	309486
Copyright	Copyright © 2018-2021 Sigma-Aldrich Co. LLC. - Database Compilation Copyright © 2018-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

► [SpectraBase](#)

4.5 Raman Spectra



Technique	FT-Raman
Source of Spectrum	Forensic Spectral Research
Source of Sample	Alltech Associates, Inc., Grace Davison Discovery Sciences
Catalog Number	01788
Lot Number	101
Copyright	Copyright © 2012-2021 John Wiley & Sons, Inc. All Rights Reserved.
Thumbnail	

► [SpectraBase](#)

4.6 Other Spectra



Intense mass spectral peaks: 165 m/z, 193 m/z, 236 m/z

Pfleger, K., H. Maurer and A. Weber. Mass Spectral and GC Data of Drugs, Poisons and their Metabolites. Parts I and II. Mass Spectra Indexes. Weinheim, Federal Republic of Germany. 1985., p. 388

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

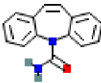
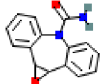
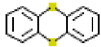
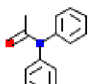
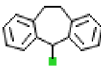
5 Related Records



5.1 Related Compounds with Annotation



1,314 items	
Search	SORT BY Neighbor Type - A to Z

	carbamazepine, 298-46-4, Tegretol, Carbamazepen, Finlepsin, ... Compound CID: 2554 Neighbor Type: 2D+3D Annotation Types Count: 14
	36507-30-9, Carbamazepine 10,11-epoxide, Carbamazepine-10,11-epoxide, Carbamazepine epoxide, 10,11-Epoxycarbamazepine, ... Compound CID: 2555 Neighbor Type: 2D+3D Annotation Types Count: 13
	THIANTHRENE, 92-85-3, Thianthren, Thiaanthrene, 9,10-Dithiaanthracene, ... Compound CID: 7109 Neighbor Type: 2D+3D Annotation Types Count: 8
	N,N-Diphenylacetamide, 519-87-9, Diphenylacetamide, N-Acetyldiphenylamine, ACETAMIDE, N,N-DIPHENYL-, ... Compound CID: 10615 Neighbor Type: 2D+3D Annotation Types Count: 9
	1210-33-9, 5-Chloro-10,11-dihydro-5H-dibenzo[a,d]cycloheptene, 5-Chlorodibenzosuberane, Dibenzosuberyl chloride, 5-chloro-10,11-dihydro-5H-dibenzo[a,d][7]annulene, ... Compound CID: 14587 Neighbor Type: 2D+3D Annotation Types Count: 7

<< First < Previous Page 1 of 263 Next > Last >>

[► PubChem](#)

5.2 Related Compounds



Same Connectivity Count	12
Same Parent, Connectivity Count	45
Same Parent, Exact Count	33
Mixtures, Components, and Neutralized Forms Count	143
Similar Compounds Count	194
Similar Conformers Count	1157

[► PubChem](#)

5.3 Substances



5.3.1 Related Substances



All Count	584
Same Count	375
Mixture Count	209

► [PubChem](#)

5.3.2 Substances by Category



8 categories	↓
Chemical Vendors (100)	+
Curation Efforts (33)	+
Governmental Organizations (51)	+
Journal Publishers (6)	+
NIH Initiatives (36)	+
Research and Development (78)	+
Subscription Services (2)	+
Legacy Depositors (129)	+

► [PubChem](#)

5.4 Entrez Crosslinks



PubMed Count	6892
Protein Structures Count	1
Taxonomy Count	10
OMIM Count	95
Gene Count	2224

► [PubChem](#)

5.5 NCBI LinkOut



Provider	Information
----------	-------------



SIDER Side Effect
Resource

Chemical Information: biological properties - Side effects of carbamazepine



Scitegrity
database

Other Literature Sources: supplemental materials - This is a controlled substance. Complete access to the full Controlled Substances Squared application for 24 hours

► NCBI

6 Chemical Vendors



71 vendors



Sigma-Aldrich

PubChem SID: [329749228](#)

Purchasable Chemical: [1093001_USP](#)

PubChem SID: [329770347](#)

Purchasable Chemical: [94496_SIAL](#)

PubChem SID: [348356808](#)

Purchasable Chemical: [BP974_SIAL](#)

Aaron Chemicals LLC

PubChem SID: [406519665](#)

Purchasable Chemical: [AR00I67M](#)

AKos Consulting & Solutions

PubChem SID: [107782849](#)

Purchasable Chemical: [AKOS003235644](#)

PubChem SID: [310912420](#)

Purchasable Chemical: [AKOS025397243](#)

Vitas-M Laboratory

PubChem SID: [57820361](#)

Purchasable Chemical: [STK177357](#)

PubChem SID: [313005708](#)

Purchasable Chemical: [STL453548](#)

Hangzhou APiChem Technology

PubChem SID: [316897826](#)

Purchasable Chemical: [AC-9538](#)

Accela ChemBio Inc.

PubChem SID: [381133978](#)

Purchasable Chemical: [SY002823](#)

VladaChem

PubChem SID: [381009161](#)

Purchasable Chemical: [VL264170-1g](#)

PubChem SID: [381026009](#)

Purchasable Chemical: [VL281442-100G](#)

Ambeed

PubChem SID: [376144810](#)

Purchasable Chemical: [A242924](#)

Cooke Chemical Co., Ltd

PubChem SID: [478263455](#)

Purchasable Chemical: [A3325112](#)

PubChem SID: [482000326](#)

Purchasable Chemical: [S9665248](#)

Amadis Chemical

PubChem SID: [131309399](#)

Purchasable Chemical: [A820074](#)

THE BioTek

PubChem SID: [434144121](#)

Purchasable Chemical: [bt-262717](#)

AbaChemScene

PubChem SID: [210279387](#)

Purchasable Chemical: [CS-2225](#)

EnaminePubChem SID: [473738124](#)Purchasable Chemical: [EN300-21678](#)PubChem SID: [475388457](#)Purchasable Chemical: [Z104508594](#)**BioChemPartner**PubChem SID: [375587713](#)Purchasable Chemical: [BCP21380](#)**3B Scientific (Wuhan) Corp**PubChem SID: [375202001](#)Purchasable Chemical: [3B2-1613](#)**AbMole Bioscience**PubChem SID: [387060832](#)Purchasable Chemical: [M3354](#)**Clearsynth**PubChem SID: [387209260](#)Purchasable Chemical: [CS-EB-02315](#)PubChem SID: [313076628](#)Purchasable Chemical: [CS-O-07528](#)PubChem SID: [387214115](#)Purchasable Chemical: [CS-T-69345](#)**BOC Sciences**PubChem SID: [254760639](#)Purchasable Chemical: [298-46-4](#)**Thermo Fisher Scientific**PubChem SID: [459195617](#)Purchasable Chemical: [GID_900000000130564](#)PubChem SID: [459204521](#)Purchasable Chemical: [GID_900000000275946](#)PubChem SID: [459204522](#)Purchasable Chemical: [GID_900000000275953](#)**Finetech Industry Limited**PubChem SID: [164788106](#)Purchasable Chemical: [FT-0602927](#)PubChem SID: [273220836](#)Purchasable Chemical: [FT-0696814](#)**A2B Chem**PubChem SID: [444111224](#)Purchasable Chemical: [AI46758](#)PubChem SID: [480543899](#)Purchasable Chemical: [AW55419](#)**Clinivex**PubChem SID: [463917556](#)Purchasable Chemical: [RCLTRC175840](#)**Allbio Pharm Co., Ltd**PubChem SID: [440974619](#)Purchasable Chemical: [AB00235](#)**3WAY PHARM INC**PubChem SID: [438620050](#)Purchasable Chemical: [SWOT-05073](#)**Biosynth**PubChem SID: [459123889](#)Purchasable Chemical: [BC166161](#)PubChem SID: [255369877](#)Purchasable Chemical: [Q-200792](#)**Chemenu Inc.**PubChem SID: [354295268](#)Purchasable Chemical: [CM121802](#)**RR Scientific**PubChem SID: [472465320](#)Purchasable Chemical: [R007377](#)**Yuhao Chemical**PubChem SID: [318239917](#)Purchasable Chemical: [LT7077](#)**Acadechem**

PubChem SID: 321911500	Purchasable Chemical: ACDS-027115
VWR, Part of Avantor	
PubChem SID: 384255069	Purchasable Chemical: 101094-492
Sinfoo Biotech	
PubChem SID: 404789989	Purchasable Chemical: S011458
Alfa Chemistry	
PubChem SID: 347757082	Purchasable Chemical: 298-46-4
PubChem SID: 438482749	Purchasable Chemical: AP298464
PubChem SID: 438474205	Purchasable Chemical: AP298464-A
ChemDiv	
PubChem SID: 482744666	Purchasable Chemical: 6190-0703
DC Chemicals	
PubChem SID: 350096052	Purchasable Chemical: DC9193
J&H Chemical Co.,Ltd	
PubChem SID: 469077831	Purchasable Chemical: JH892926
AA BLOCKS	
PubChem SID: 374220922	Purchasable Chemical: AA0015FU
PubChem SID: 479871503	Purchasable Chemical: AA01CCDB
Activate Scientific	
PubChem SID: 340566713	Purchasable Chemical: AS42170
MuseChem	
PubChem SID: 355038809	Purchasable Chemical: A001114
LGC Standards	
PubChem SID: 340508184	Purchasable Chemical: DRE-C10968500
PubChem SID: 340514443	Purchasable Chemical: LGCAMP0076.00-01
PubChem SID: 340515258	Purchasable Chemical: LGCFOR0076.00
Achemtek	
PubChem SID: 381379642	Purchasable Chemical: 0104-005894
Starshine Chemical	
PubChem SID: 464480039	Purchasable Chemical: starbld0719595
TargetMol	
PubChem SID: 312694432	Purchasable Chemical: T0943
Ambinter	
PubChem SID: 369131647	Purchasable Chemical: Amb22167477
MolCore BioPharmatech	
PubChem SID: 446189405	Purchasable Chemical: DY445516
PubChem SID: 378124583	Purchasable Chemical: MC445516
Key Organics/BIONET	
PubChem SID: 187072638	Purchasable Chemical: KS-5146
BioCrick	
PubChem SID: 382159611	Purchasable Chemical: BCC4378

Adooq BioSciencePubChem SID: [383471044](#)Purchasable Chemical: [A10179](#)**Lan Pharmatech**PubChem SID: [463993364](#)

Purchasable Chemical: LAN-B89106

abcr GmbHPubChem SID: [316538418](#)Purchasable Chemical: [AB348186](#)**Chem-Space.com Database**PubChem SID: [434467268](#)Purchasable Chemical: [CSSB00000499772](#)**Oakwood Products**PubChem SID: [312605105](#)Purchasable Chemical: [242225](#)**Yick-Vic Chemicals & Pharmaceuticals (HK) Ltd.**PubChem SID: [441072140](#)

Purchasable Chemical: PH-0699

OtavaChemicalsPubChem SID: [441631166](#)Purchasable Chemical: [3065611](#)**MedChemexpress MCE**PubChem SID: [210281710](#)Purchasable Chemical: [HY-B0246](#)**MolPort**PubChem SID: [88205973](#)Purchasable Chemical: [MolPort-000-710-574](#)PubChem SID: [189562362](#)Purchasable Chemical: [MolPort-023-220-275](#)**Tocris Bioscience**PubChem SID: [252157781](#)Purchasable Chemical: [4098](#)**CSNpharm**PubChem SID: [384651248](#)Purchasable Chemical: [CSN16283](#)**TCI (Tokyo Chemical Industry)**PubChem SID: [87566126](#)Purchasable Chemical: [C1095](#)**AbovChem LLC**PubChem SID: [319554904](#)

Purchasable Chemical: HY-B0246

Life ChemicalsPubChem SID: [252091532](#)Purchasable Chemical: [F0348-2551](#)**BLD Pharm**PubChem SID: [375433495](#)Purchasable Chemical: [BD33108](#)**AstaTech, Inc.**PubChem SID: [445664296](#)Purchasable Chemical: [AC2074](#)**Santa Cruz Biotechnology, Inc.**PubChem SID: [472953715](#)Purchasable Chemical: [sc-202518](#)**CymitQuimica**PubChem SID: [470556974](#)Purchasable Chemical: [CQ_298-46-4](#)**Smolecule**PubChem SID: [438450808](#)Purchasable Chemical: [S522628](#)**001Chemical**

PubChem SID: 375743995	Purchasable Chemical: DY445516
ChemShuttle	
PubChem SID: 322059205	Purchasable Chemical: 141432
DAOGE BIOPHARMA	
PubChem SID: 442070112	Purchasable Chemical: DG21-14278
Selleck Chemicals	
PubChem SID: 347912849	Purchasable Chemical: S1693
BenchChem	
PubChem SID: 446073178	Purchasable Chemical: B1668303
AEchem Scientific Corp., USA	
PubChem SID: 307090534	Purchasable Chemical: AE023053

► [PubChem](#)

7 Drug and Medication Information



7.1 Drug Indication



Carbamazepine is indicated for the treatment of epilepsy and pain associated with true trigeminal neuralgia. In particular, carbamazepine has shown efficacy in treating mixed seizures, partial seizures with complex symptoms, and generalized tonic-clonic seizures. Carbamazepine is also indicated for the treatment of manic episodes and mixed manic-depressive episodes caused by bipolar I disorder. Some off-label, unapproved uses of carbamazepine include the treatment of alcohol withdrawal syndrome and restless leg syndrome.

► [DrugBank](#)

FDA Label

► [DrugBank](#)

7.2 LiverTox Summary



Carbamazepine is an aromatic anticonvulsant that is widely used in therapy of epilepsy and trigeminal neuralgia and is a well established cause of clinically apparent liver injury which can be severe and even fatal.

► [LiverTox](#)

7.3 Drug Classes



Anticonvulsants

► [LiverTox](#)

7.4 Drug Transformations



Carbamazepine has known transformation products that include [Carbamazepine-10,11-epoxide](#), Carbamazepine-10,11-dihydro-10,11-dihydroxy, and [Iminostilbene](#).

S66 | EAWAGTPS | Parent-Transformation Product Pairs from Eawag | [DOI:10.5281/zenodo.3754448](https://doi.org/10.5281/zenodo.3754448)

► [NORMAN Suspect List Exchange](#)

7.5 FDA Medication Guides



1 of 4				View All
Drug	Active Ingredient	Form;Route	Company	Date
Carbatrol	Carbamazepine	CAPSULE, EXTENDED RELEASE;ORAL	TAKEDA PHARMS USA	04/11/2023

► [FDA Medication Guides](#)

2 of 4				View All
Drug	Active Ingredient	Form;Route	Company	Date
Equetro	Carbamazepine	CAPSULE, EXTENDED RELEASE;ORAL	VALIDUS PHARMS	10/14/2022

► [FDA Medication Guides](#)

3 of 4				View All
Drug	Active Ingredient	Form;Route	Company	Date
Tegretol	Carbamazepine	SUSPENSION;ORAL	NOVARTIS	03/20/2018
Tegretol	Carbamazepine	TABLET, CHEWABLE;ORAL	NOVARTIS	03/20/2018
Tegretol	Carbamazepine	TABLET;ORAL	NOVARTIS	03/20/2018

► [FDA Medication Guides](#)

7.6 WHO Essential Medicines



Drug	Drug Classes	Formulation	Indication
Carbamazepine	Anticonvulsants/antiepileptics	(1) Oral - Liquid: 100 mg per 5 mL; (2) Oral - Solid: 200 mg (scored); 100 mg (scored); 100 mg (chewable); 200 mg (chewable)	Epilepsy or seizures [co-prescribed with N03AF01]
Carbamazepine	Medicines used in bipolar disorders	Oral - Solid: 100 mg scored; 200 mg scored	Bipolar or related disorders [co-prescribed with N03AF01]

► [WHO Model Lists of Essential Medicines](#)

7.7 FDA Approved Drugs



84 items							
Search				SORT BY Marketing Status - Z to A			
Drug	Ingredient(s)	Dosage Form/Route	Strength	Marketing Status	Company	Application Number	Production Number
TEGRETOL	CARBAMAZEPINE	TABLET;ORAL	200MG	Prescription	NOVARTIS	016608	001
TEGRETOL	CARBAMAZEPINE	SUSPENSION;ORAL	100MG/5ML	Prescription	NOVARTIS	018927	001
TEGRETOL-XR	CARBAMAZEPINE	TABLET, EXTENDED RELEASE;ORAL	100MG	Prescription	NOVARTIS	020234	001
TEGRETOL-XR	CARBAMAZEPINE	TABLET, EXTENDED RELEASE;ORAL	200MG	Prescription	NOVARTIS	020234	002
TEGRETOL-XR	CARBAMAZEPINE	TABLET, EXTENDED RELEASE;ORAL	400MG	Prescription	NOVARTIS	020234	003
<< First < Previous Page 1 of 17 Next > Last >>							

► [Drugs@FDA](#)

7.8 FDA Orange Book



42 items			
Search			SORT BY Trade Name - A to Z
Trade Name	Marketing Status	Application Number	Applicant
CARBAMAZEPINE	Prescription	A078986	APOTEX INC
CARBAMAZEPINE	Prescription	A076697	NOSTRUM LABORATORIES INC
CARBAMAZEPINE	Prescription	A201106	TARO PHARMACEUTICAL INDUSTRIES LTD
CARBAMAZEPINE	Prescription	A078592	TEVA PHARMACEUTICALS USA
CARBATROL	Prescription	N020712	TAKEDA PHARMACEUTICALS USA INC
<< First < Previous Page 1 of 9 Next > Last >>			

7.9 FDA National Drug Code Directory



133 items Download				
Search		SORT BY Start Marketing Date - Most Recent		
Product NDC	Start Marketing Date	Dosage Form	Strength	Labeler
70518-3825	2023-08-09	TABLET, EXTENDED RELEASE	400 mg/1	REMEDYREPACK INC.
70518-3773	2023-06-22	TABLET, EXTENDED RELEASE	100 mg/1	REMEDYREPACK INC.
68084-444	2023-05-22	TABLET	200 mg/1	American Health Packaging
70518-3699	2023-04-03	TABLET, EXTENDED RELEASE	200 mg/1	REMEDYREPACK INC.
70518-3694	2023-03-30	TABLET, CHEWABLE	100 mg/1	REMEDYREPACK INC.

► [National Drug Code \(NDC\) Directory](#)

7.10 Drug Labels



Drug and label

109 items

Q

Search

SORT BY

Date - Most Recent

▼

CARBAMAZEPINE TABLET, EXTENDED RELEASE

Drug: Carbamazepine

Download: [PDF label](#)

Data File: [XML](#)

Ingredient (UNII): CARBAMAZEPINE (UNII:33CM23913M)

Description:

Carbamazepine USP, is an anticonvulsant and specific analgesic for trigeminal neuralgia, available for oral administration as extended-release tablets of 100 mg, 200 mg and 400 mg. Its chemical name is 5 H-dibenz[...

Indication:

Carbamazepine is indicated for use as an anticonvulsant drug. Evidence supporting efficacy of carbamazepine as an anticonvulsant was derived from active drug-controlled studies that enrolled patients with the following...

Category:

Human prescription

Company:

REMEDYREPACK INC.

Date:

2025-06-22

CARBAMAZEPINE TABLET, EXTENDED RELEASE

Drug: Carbamazepine

Download: [PDF label](#)

Data File: [XML](#)

Ingredient (UNII): CARBAMAZEPINE (UNII:33CM23913M)

Description: Carbamazepine USP, is an anticonvulsant and specific analgesic for trigeminal neuralgia, available for oral administration as extended-release tablets of 100 mg, 200 mg and 400 mg. Its chemical name is 5 H-dibenz[...

Indication: Carbamazepine is indicated for use as an anticonvulsant drug. Evidence supporting efficacy of carbamazepine as an anticonvulsant was derived from active drug-controlled studies that enrolled patients with the following...

Category: Human prescription **Company:** REMEDYREPACK INC. **Date:** 2023-06-19

CARBAMAZEPINE TABLET, EXTENDED RELEASE CARBAMAZEPIN (CARBAMAZEPINE) TABLET, EXTENDED RELEASE

Drug: Carbamazepine **Download:** [PDF label](#) **Data File:** [XML](#)

Ingredient (UNII): CARBAMAZEPINE (UNII:33CM23913M)

Description: Carbamazepine, USP is an anticonvulsant and specific analgesic for trigeminal neuralgia, available for oral administration as extended-release tablets of 100 mg, 200 mg, and 400 mg. Its chemical name is...

Indication: Carbamazepine is indicated for use as an anticonvulsant drug. Evidence supporting efficacy of carbamazepine as an anticonvulsant was derived from active drug-controlled studies that enrolled patients with the following...

Category: Human prescription **Company:** Upsher-Smith Laboratories, LLC **Date:** 2023-06-15

CARBAMAZEPINE TABLET

Drug: Carbamazepine **Download:** [PDF label](#) **Data File:** [XML](#)

Ingredient (UNII): CARBAMAZEPINE (UNII:33CM23913M)

Description: Carbamazepine USP, is an anticonvulsant and specific analgesic for trigeminal neuralgia, available for oral administration as chewable tablets of 100 and 200 mg, tablets of 200 mg, extended-release tablets of 100 mg, 200 mg,...

Indication: Carbamazepine is indicated for use as an anticonvulsant drug. Evidence supporting efficacy of carbamazepine as an anticonvulsant was derived from active drug-controlled studies that enrolled patients with the following...

Category: Human prescription **Company:** REMEDYREPACK INC. **Date:** 2023-06-13

CARBAMAZEPINE CAPSULE, EXTENDED RELEASE

Drug: Carbamazepine **Download:** [PDF label](#) **Data File:** [XML](#)

Ingredient (UNII): CARBAMAZEPINE (UNII:33CM23913M)

Description: Carbamazepine extended-release capsules are an anticonvulsant and specific analgesic for trigeminal neuralgia, available for oral administration as 100 mg, 200 mg and 300 mg extended-release capsules of Carbamazepine, USP...

Indication: Carbamazepine extended-release capsules are indicated for use as an anticonvulsant drug. Evidence supporting efficacy of carbamazepine as an anticonvulsant was derived from active drug-controlled studies that enrolled...

Category: Human prescription **Company:** Bryant Ranch Prepack **Date:** 2023-06-12

« First < Previous Page 1 of 22 Next > Last »

► DailyMed

Active ingredient and drug

109 items



Q Search

SORT BY Ingredient - A to Z



Ingredient	Drug	Label	Data File	Data SetID
CARBAMAZEPINE (UNII:33CM23913M)	Carbamazepine	Drug PDF label	XML	c13bc0b8-7900-4ef4-98ed-e1315a08d95d
CARBAMAZEPINE (UNII:33CM23913M)	Carbamazepine	Drug PDF label	XML	8e06995c-26c9-4ef3-9421-16a2360db628
CARBAMAZEPINE (UNII:33CM23913M)	CARBAMAZEPINE	Drug PDF label	XML	988cce8b-eb9f-4bf7-85bc-a736575d98b1
CARBAMAZEPINE (UNII:33CM23913M)	Carbamazepine	Drug PDF label	XML	bf2e0dfa-d6ca-4961-9627-b666266f58f1
CARBAMAZEPINE (UNII:33CM23913M)	CARBAMAZEPINE	Drug PDF label	XML	6903e7ef-8b5c-4b64-a87d-62ff1f02bc75

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Page **1** of 22
[Next](#)
[Last](#)

► [DailyMed](#)

7.11 Clinical Trials



7.11.1 ClinicalTrials.gov



69 items	Download
Search	SORT BY Date - Most Recent
A Trial to Evaluate the Effects of Itraconazole and Carbamazepine on the Pharmacokinetics of Emraclidine and of Emraclidine on the Pharmacokinetics of Metformin in Healthy Adult Participants CTID: NCT05965219 Phase: Phase 1 Status: Recruiting Date: 2023-08-10	
Open-label Trial to Evaluate the Effect Carbamazepine on Darigabat Pharmacokinetics in Healthy Adult Participants CTID: NCT05824143 Phase: Phase 1 Status: Completed Date: 2023-08-03	
A Study of the Effects of Itraconazole or Carbamazepine on LY3537982 in Healthy Participants CTID: NCT05860933 Phase: Phase 1 Status: Recruiting Date: 2023-07-19	
A Study to Assess the Effect of Multiple Doses of Itraconazole, Gemfibrozil, or Carbamazepine on BMS-986278 in Healthy Participants CTID: NCT05932303 Phase: Phase 1 Status: Not yet recruiting Date: 2023-07-06	

Population Pharmacokinetics of Antiepileptic in Pediatrics

CTID: [NCT03196466](#)

Status: Recruiting

Date: 2023-07-03

« First < Previous Page 1 of 14 Next > Last »

► [ClinicalTrials.gov](#)

7.11.2 EU Clinical Trials Register



21 items		↓
Search		SORT BY Date - Most Recent ▾
Randomised factorial design controlled trial comparing carbamazepine, levetiracetam or active monitoring combined with or without sleep behaviour intervention in treatment naive children with rolandic epilepsy		
EudraCT: 2018-003893-29		
Phase: Phase 4 Status: Prematurely Ended		
Date: 2019-04-12		
An open label phase I/IIa trial repurposing carbamazepine (CBZ) for the treatment of skeletal dysplasia in children.		
EudraCT: 2018-002633-38		
Phase: Phase 1 Status: GB - no longer in EU/EEA, Ongoing		
Date: 2018-11-19		
EFFICACY AND TOLERABILITY OF LOW VS. STANDARD DAILY DOSES OF ANTIEPILEPTIC DRUGS IN NEWLY DIAGNOSED, PREVIOUSLY UNTREATED EPILEPSY (STANDLOW). A MULTICENTER, RANDOMIZED, SINGLE-BLIND, PARALLEL GROUP TRIAL.		
EudraCT: 2018-000781-10		
Phase: Phase 4 Status: Ongoing		
Date: 2018-05-31		
PREemptive Pharmacogenomic testing for Preventing Adverse drug REactions		
EudraCT: 2016-003325-41		
Phase: Phase 4 Status: Ongoing		
Date: 2017-06-09		
Prophylactic treatment of vestibular paroxysmia with carbamazepine: a prospective, randomized, placebo-controlled, cross-over, multi-center trial		
EudraCT: 2015-000388-15		
Phase: Phase 3 Status: Prematurely Ended		
Date: 2016-08-31		
« First < Previous Page 1 of 5 Next > Last »		

► [EU Clinical Trials Register](#)

7.12 Therapeutic Uses



Analgesics, Non-Narcotic; Anticonvulsants

National Library of Medicine's Medical Subject Headings online file (MeSH, 1999)

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

Carbamazepine has been shown to be effective in certain psychiatric disorders including schizoaffective illness, resistant schizophrenia, and dyscontrol syndrome, associated with limbic system dysfunction. /NOT included in US or Canadian product labeling/

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Carbamazepine is used for the detoxification of alcoholics. It has been found to be effective in rapidly relieving anxiety and distress of acute alcohol withdrawal and for such symptoms as seizures, hyperexcitability, and sleep disturbances. /NOT included in US product labeling/

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Carbamazepine is used alone or with other agents such as [clofibrate](#) or [chlorpropamide](#) in the treatment of partial central diabetes insipidus. /NOT included in US or Canadian product labeling/

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

For more Therapeutic Uses (Complete) data for CARBAMAZEPINE (10 total), please visit the [HSDB record page](#).

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

7.13 Drug Warnings



There have been a few cases of seizures and/or respiratory depression in neonates born to women receiving carbamazepine concomitantly with other anticonvulsant agents. A few cases of vomiting, diarrhea, and/or decreased feeding also have been reported in neonates born to women receiving carbamazepine; these symptoms may represent a neonatal withdrawal syndrome

McEvoy, G.K. (ed.). American Hospital Formulary Service. AHFS Drug Information. American Society of Health-System Pharmacists, Bethesda, MD. 2007., p. 2223

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

Carbamazepine should not be used prophylactically during long periods of remission in trigeminal neuralgia.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Although carbamazepine has ... been reported to relieve dystonic attacks in children, reduce migraine attacks, and relieve intractable hiccups in some patients, its therapeutic efficacy in such cases has not been established.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Carbamazepine is not indicated for atypical or generalized absence seizures (petit mal) or myoclonic or atonic seizures.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

For more Drug Warnings (Complete) data for CARBAMAZEPINE (30 total), please visit the [HSDB record page](#).

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

8 Pharmacology and Biochemistry



8.1 Pharmacodynamics



****General effects**** Carbamazepine treats seizures and the symptoms of trigeminal neuralgia by inhibiting [sodium](#) channels. In bipolar 1 disorder, carbamazepine has been found to decrease mania symptoms in a clinically significant manner according to the Young Mania Rating Scale (YMRS). Carbamazepine has a narrow therapeutic index. ****A note on genetic variation and carbamazepine use**** In studies of Han Chinese ancestry patients, a pronounced association between the HLA-B*1502 genotype and Steven Johnson syndrome and/or toxic epidermal necrolysis (SJS/TEN) resulting from carbamazepine use was observed.

► [DrugBank](#)

8.2 MeSH Pharmacological Classification



Cytochrome P-450 CYP3A Inducers

Drugs and compounds that induce the synthesis of CYTOCHROME P-450 CYP3A. (See [all compounds classified as Cytochrome P-450 CYP3A Inducers](#).)

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

Anticonvulsants

Drugs used to prevent SEIZURES or reduce their severity. (See [all compounds classified as Anticonvulsants](#).)

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

Antimanic Agents

Agents that are used to treat bipolar disorders or mania associated with other affective disorders. (See [all compounds classified as Antimanic Agents](#).)

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

Analgesics, Non-Narcotic

A subclass of analgesic agents that typically do not bind to OPIOID RECEPTORS and are not addictive. Many non-narcotic analgesics are offered as NONPRESCRIPTION DRUGS. (See [all compounds classified as Analgesics, Non-Narcotic.](#))

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

Sodium Channel Blockers

A class of drugs that act by inhibition of sodium influx through cell membranes. Blockade of sodium channels slows the rate and amplitude of initial rapid depolarization, reduces cell excitability, and reduces conduction velocity. (See [all compounds classified as Sodium Channel Blockers.](#))

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

8.3 FDA Pharmacological Classification



1 of 2	
FDA UNII	33CM23913M
Active Moiety	CARBAMAZEPINE
Pharmacological Classes	Physiologic Effects [PE] - Decreased Central Nervous System Disorganized Electrical Activity
Pharmacological Classes	Established Pharmacologic Class [EPC] - Mood Stabilizer
Pharmacological Classes	Mechanisms of Action [MoA] - Cytochrome P450 3A4 Inducers
Pharmacological Classes	Mechanisms of Action [MoA] - Cytochrome P450 1A2 Inducers
Pharmacological Classes	Mechanisms of Action [MoA] - Cytochrome P450 2B6 Inducers
Pharmacological Classes	Mechanisms of Action [MoA] - Cytochrome P450 2C9 Inducers
Pharmacological Classes	Mechanisms of Action [MoA] - Cytochrome P450 2C19 Inducers
FDA Pharmacology Summary	Carbamazepine is a Mood Stabilizer. The mechanism of action of carbamazepine is as a Cytochrome P450 3A4 Inducer, and Cytochrome P450 1A2 Inducer, and Cytochrome P450 2B6 Inducer, and Cytochrome P450 2C9 Inducer, and Cytochrome P450 2C19 Inducer. The physiologic effect of carbamazepine is by means of Decreased Central Nervous System Disorganized Electrical Activity.

► [FDA Pharm Classes](#)

2 of 2	
Non-Proprietary Name	CARBAMAZEPINE
Pharmacological Classes	Cytochrome P450 1A2 Inducers [MoA]; Cytochrome P450 3A4 Inducers [MoA]; Cytochrome P450 2C19 Inducers [MoA]; Mood Stabilizer [EPC]; Decreased Central Nervous System Disorganized Electrical Activity [PE]; Cytochrome P450 2C9 Inducers [MoA]; Cytochrome P450 2B6 Inducers [MoA]

► [National Drug Code \(NDC\) Directory](#)

8.4 ATC Code



N03AF01

S76 | LUXPHARMA | Pharmaceuticals Marketed in Luxembourg | Pharmaceuticals marketed in Luxembourg, as published by d'Gesondheetskeess (CNS, la caisse nationale de sante, www.cns.lu), mapped by name to structures using CompTox by R. Singh et al. (in prep.). List downloaded from <https://cns.public.lu/en/legislations/textes-coordonnes/liste-med-comm.html>. Dataset DOI:10.5281/zenodo.4587355

S66 | EAWAGTPS | Parent-Transformation Product Pairs from Eawag | DOI:10.5281/zenodo.3754448

S66 | EAWAGTPS | Parent-Transformation Product Pairs from Eawag | DOI:10.5281/zenodo.3754448

S66 | EAWAGTPS | Parent-Transformation Product Pairs from Eawag | DOI:10.5281/zenodo.3754448

► NORMAN Suspect List Exchange

N - Nervous system

N03 - Antiepileptics

N03A - Antiepileptics

N03AF - Carboxamide derivatives

N03AF01 - Carbamazepine

► WHO Anatomical Therapeutic Chemical (ATC) Classification

8.5 Absorption, Distribution and Excretion



Absorption

The bioavailability of carbamazepine is in the range of 75-85% of an ingested dose. After one 200 mg oral extended-release dose of carbamazepine in a pharmacokinetic study, the C_{max} carbamazepine was measured to be 1.9 ± 0.3 mcg/mL. The T_{max} was 19 ± 7 hours. After several doses of 800 mg every 12 hours, the peak concentrations of carbamazepine were measured to be 11.0 ± 2.5 mcg/mL. The T_{max} was reduced to 5.9 ± 1.8 hours. Extended-release carbamazepine demonstrated linear pharmacokinetics over a range of 200–800 mg. ****Effect of food on absorption**** A meal containing high-fat content increased the rate of absorption of one 400 mg dose but not the AUC of carbamazepine. The elimination half-life remained unchanged between fed and fasting state. The pharmacokinetics of an extended-release carbamazepine dose was demonstrated to be similar when administered in the fasted state or with food. Based on these findings, food intake is unlikely to exert significant effects on carbamazepine absorption.

► DrugBank

Route of Elimination

After an oral dose of radiolabeled carbamazepine, 72% of the administered radioactive dose was detected in the urine and the remainder of the ingested dose was found in the feces. Carbamazepine is mainly excreted as hydroxylated and conjugated metabolites, and minimal amounts of unchanged drug.

► DrugBank

Volume of Distribution

The volume of distribution of carbamazepine was found to be 1.0 L/kg in one pharmacokinetic study. Another study indicates that the volume of distribution of carbamazepine ranges between 0.7 to 1.4 L/kg. Carbamazepine crosses the placenta, and higher concentrations of this drug are found in the liver and kidney as opposed to lung and brain tissue. Carbamazepine crosses variably through the blood-brain barrier.

► [DrugBank](#)

Clearance

In a pharmacokinetic study, the apparent oral clearance of carbamazepine was 25 ± 5 mL/min after one dose of carbamazepine and 80 ± 30 mL/min after several doses.

► [DrugBank](#)

Absorption: Slow and variable, but almost completely absorbed from gastrointestinal tract.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Patients in whom carbamazepine monotherapy is discontinued for preoperative EEG/video monitoring often display toxicity if their previous maintenance dosage is resumed, even after a few days without carbamazepine. To determine whether this is due to rapid reversibility of autoinduction of carbamazepine metabolism, single-dose studies of carbamazepine pharmacokinetics were performed before and after discontinuation for monitoring in 6 adults receiving carbamazepine monotherapy. The carbamazepine-free period was 5.7 ± 1.1 days (mean $\pm$ SD). The pharmacokinetic parameters of carbamazepine before and after discontinuation were volume of distribution 1.28 ± 0.29 versus 1.22 ± 0.33 L/kg, elimination half-life ($t_{1/2}$) 13.7 ± 1.67 versus 22.2 ± 2.36 hr ($p < 0.001$), and clearance 1.54 ± 0.39 versus 0.92 ± 0.32 L/kg/day ($p = 0.012$). Assuming that deinduction is a first-order process, a deinduction $t_{1/2}$ of 3.84 days was obtained by log linear regression analysis. We showed that after carbamazepine discontinuation half of the enzymatic autoinduction is already lost after 3.84 days, indicating very rapid deinduction. Our results also provide the necessary information to predict clearance and appropriate dosage reduction for carbamazepine at time of reintroduction.

[PMID:8112245](#)

Schaffler L et al; Epilepsia 35 (1): 195-8 (1994)

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

This study was designed to evaluate the usefulness of carbamazepine as a probe in screening for host factor influences on human drug metabolism. Nine healthy nonsmoking volunteers ingested a single oral dose of carbamazepine in doses ranging from 400 to 500 milligrams. Fluorescence polarization immunoassay measurements of carbamazepine concentrations in plasma and plasma ultrafiltrates from 0 to 48 hours after dosing were used to calculate clearance, volume of distribution, and clearance of plasma unbound drug. Blood samples collected 48 hours after dosing gave single sample estimates of carbamazepine clearance which were closest to multiple sample values for clearance. This was also the case for plasma total carbamazepine and plasma unbound carbamazepine. In calculating all single sample estimates of clearance, a value of 1.1 L/kg was used for V and a value of 4.3 L/kg was used to calculate the single sample estimates of clearance of plasma unbound drug. The mean prediction error was less than 5 percent errant for clearance and less than 1 percent errant for clearance of plasma unbound drug when the parameters were calculated from 48 hour concentrations of plasma total carbamazepine or plasma unbound carbamazepine, respectively. ...

[PMID:2773507](#)

Bachmann KA et al; Xenobiotica 19 (7): 711-719 (1989)

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

A fatal overdose of carbamazepine with both timely antemortem and postmortem carbamazepine concentrations /was reported/. Carbamazepine concentrations were 47.7 ug/mL 2 hr antemortem and 53 ug/mL at 9 hr postmortem. The slight rise in drug concentration may reflect continued absorption of the drug in the last 2 hr before death. Postmortem carbamazepine concentrations drawn from a peripheral vessel in this patient appeared to reflect drug concentrations at the time of death.

[PMID:11714170](#)

Spiller HA, Carlisle RD; J Forensic Sci 46 (6): 1510-2 (2001)

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

For more Absorption, Distribution and Excretion (Complete) data for CARBAMAZEPINE (15 total), please visit the [HSDB record page](#).

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

8.6 Metabolism / Metabolites



Carbamazepine is largely metabolized in the liver. CYP3A4 hepatic enzyme is the major enzyme that metabolizes carbamazepine to its active metabolite, [carbamazepine-10,11-epoxide](#), which is further metabolized to its trans-diol form by the enzyme epoxide hydrolase. Other hepatic cytochrome enzymes that contribute to the metabolism of carbamazepine are CYP2C8, CYP3A5, and CYP2B6. Carbamazepine also undergoes hepatic glucuronidation by UGT2B7 enzyme and several other metabolic reactions occur, resulting in the formation of minor [hydroxy](#) metabolites and quinone metabolites. Interestingly, carbamazepine induces its own metabolism. This leads to enhanced clearance, reduced half-life, and a reduction in serum levels of carbamazepine.

► [DrugBank](#)

The pharmacokinetics of a single oral dose of [carbamazepine-10,11-epoxide](#), (100 mg) were compared in 10 patients on chronic monotherapy with [lamotrigine](#), (200-300 mg/day) and in 10 drug-free healthy control subjects. [Carbamazepine-10,11-epoxide](#) pharmacokinetic parameters in lamotrigide-treated patients were found to be similar to those observed in controls (half-life: 7.2 + or - 1.6 vs 6.1 + or - 0.9 hr; apparent oral clearance: 110.8 + or - 53.1 vs 120.5 + or - 29.9 ml/h/kg; apparent volume of distribution: 1.08 + or 0.37 vs 1.04 + or - 0.25 l/kg respectively; means + or - s.d.). These data indicate that, contrary to previous suggestions, lamotrigide has no effect on the metabolic disposition of [carbamazepine-10,11-epoxide](#).

[PMID:7698101](#)

Pisani F et al; Epilepsy Res 19 (3): 245-8 (1994)

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

Placental transfer and metabolism of carbamazepine was studied in a dual recirculating placental cotyledon perfusion system and was also evaluated in 16 pairs of maternal venous and cord blood samples. ... Carbamazepine added into the maternal circulation crosses the placenta in the beginning quicker than [antipyrine](#) which is in agreement with the different lipid solubilities of these compounds. Because the transfer rates of [antipyrine](#) and carbamazepine were about the same, the mechanism of transfer of carbamazepine is probably similar to that of [antipyrine](#) (passive diffusion). No metabolites of carbamazepine could be detected in the perfusate by high-performance liquid chromatography or gas chromatography/mass spectrometry. With the

improved HPLC methodology for carbamazepine metabolites, six metabolites were detected in clinical samples, including [10-hydroxy-10,11-dihydro-carbamazepine](#) (10-OH-CBZ), which has been described earlier in only 1 uremic patient. Relative levels of metabolites showed significant individual differences. Carbamazepine crosses perfused placenta rapidly, but this does not contribute to carbamazepine metabolites detected in maternal and fetal circulation.

[PMID:7614907](#)

Pienimäki P et al; Epilepsia 36 (3): 241-8 (1995)

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

The aim of this work was to study the transport across the blood-brain barrier, blood and liver distribution kinetics, metabolic interaction and local liver metabolism of carbamazepine in the rat, using microdialysis with the internal standard technique as in vivo calibration method. Carbamazepine and its major metabolite, [carbamazepine-10,11-epoxide](#), are homogeneously distributed to hippocampus and cerebellum. The ratios of the areas under the concentration-time curve for both brain regions to blood areas under the concentration-time curve were not different from unity for carbamazepine; they were 0.46 ± 0.08 (hippocampus) and 0.45 ± 0.05 (cerebellum) for [carbamazepine-10,11-epoxide](#). In addition, the disposition of carbamazepine and [carbamazepine-10,11-epoxide](#) in blood and liver, after a single dose of carbamazepine, was studied in control animals and in rats after pretreatment with [clomipramine](#). A 2-fold increase in the blood areas under concentration curve of carbamazepine and a decrease to 33% of the blood areas under concentration curve of [carbamazepine-10,11-epoxide](#) in the pretreated group demonstrate the metabolic inhibition of [carbamazepine-10,11-epoxide](#) formation by [clomipramine](#). The ratios of the areas under concentration curve [carbamazepine-10,11-epoxide](#) to the areas under the concentration curve carbamazepine, as a measure of [carbamazepine-10,11-epoxide](#) formation, were not different for blood and liver within the control and the [clomipramine](#)-pretreated groups, but the ratios were significantly lower for liver and blood in the [clomipramine](#) group compared with the control animals. In addition, carbamazepine was administered locally in the extracellular fluid of the liver via the microdialysis probe. The liver metabolic ratio, expressed as the ratio of the formed [carbamazepine-10,11-epoxide](#) concentration to the carbamazepine concentration administered, ranged from $18.2 \pm 1.2\%$ to $19.6 \pm 1.6\%$.

[PMID:7891336](#)

Van Belle K et al; J Pharmacol Exp Ther 272 (3): 1217-22 (1995)

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

Carbamazepine has known human metabolites that include [3-Hydroxycarbamazepine](#), [Carbamazepine 10,11-epoxide](#), [2-Hydroxycarbamazepine](#), and 9-Hydroxycarbamazepine.

S73 | METXBIODB | Metabolite Reaction Database from BioTransformer | DOI:10.5281/zenodo.4056560

► [NORMAN Suspect List Exchange](#)

Hepatic. CYP3A4 is the primary isoform responsible for the formation of [carbamazepine-10,11-epoxide](#). This metabolite is active and shown to be equipotent to carbamazepine as an anticonvulsant. Carbamazepine is more rapidly metabolized to the aforementioned metabolite in younger patients than in adults. It also undergoes glucuronidation via UGT2B7, however this finding has been disputed. Route of Elimination: 72% of the dose is in the urine while 28% is in the feces. Hydroxylated and conjugated metabolites are largely what was recovered in the urine. 3% of the dose is recovered as unchanged carbamazepine. Half Life: Initial half-life values range from 25-65 hours, decreasing to 12-17 hours on repeated doses.

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

8.7 Biological Half-Life



The mean elimination half-life of carbamazepine was 35 to 40 hours after one dose of carbamazepine extended-release formulations. The half-life ranged from 12-17 hours after several doses of carbamazepine. One pharmacokinetic study determined the elimination half-life of carbamazepine to range between 27 to 36.8 hours in healthy volunteers.

► [DrugBank](#)

Initial single dose: May range from 25 to 65 hours. Chronic dosing: May decrease to 8 to 29 hours (average 12 to 17 hours) because of autoinduction of metabolism.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Carbamazepine-10,11-epoxide: 5 to 8 hours. /[Carbamazepine-10,11-epoxide/](#)

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

8.8 Mechanism of Action



Carbamazepine's mechanism of action is not fully elucidated and is widely debated. One major hypothesis is that carbamazepine inhibits **sodium** channel firing, treating seizure activity. Animal research studies have demonstrated that carbamazepine exerts its effects by lowering polysynaptic nerve response and inhibiting post-tetanic potentiation. In both cats and rats, carbamazepine was shown to decrease pain caused by infraorbital nerve stimulation. A decrease in the action potential in the nucleus ventralis of the thalamus in the brain and inhibition of the lingual mandibular reflex were observed in other studies after carbamazepine use. Carbamazepine causes the above effects by binding to voltage-dependent **sodium** channels and preventing action potentials, which normally lead to stimulatory effects on nerves. In bipolar disorder, carbamazepine is thought to increase **dopamine** turnover and increase **GABA** transmission, treating manic and depressive symptoms. A common issue that has arisen is resistance to this drug in up to 30% of epileptic patients, which may occur to altered metabolism in patients with variant genotypes. A potential therapeutic target to combat carbamazepine resistance has recently been identified as the EPHX1 gene promoter, potentially conferring resistance to carbamazepine through methylation.

► [DrugBank](#)

Anticonvulsant: Exact mechanism unknown; may act postsynaptically by limiting the ability of neurons to sustain high frequency repetitive firing of action potentials through enhancement of **sodium** channel inactivation; in addition to altering neuronal excitability, may act presynaptically to block the release of neurotransmitter by blocking presynaptic **sodium** channels and the firing of action potentials, which in turn decreases synaptic transmission.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Antineuralgic: Exact mechanism unknown; may involve [gamma-aminobutyric acid](#) (GABAB) receptors, which may be linked to [calcium](#) channels.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Antimanic; antipsychotic: Exact mechanism is unknown; may be related to either the anticonvulsant or the antineuralgic effects of carbamazepine, or to its effects on neurotransmitter modulator systems.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

Antidiuretic: Exact mechanism unknown; may exert a hypothalamic effect on the osmoreceptors mediated via secretion of antidiuretic hormone (ADH), or may have a direct effect on the renal tubule.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 703

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

For more Mechanism of Action (Complete) data for CARBAMAZEPINE (8 total), please visit the [HSDB record page](#).

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

8.9 Human Metabolite Information



8.9.1 Cellular Locations



Membrane

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

8.9.2 Metabolite Pathways



Carbamazepine Metabolism Pathway

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

8.10 Biochemical Reactions



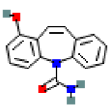
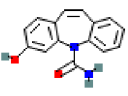
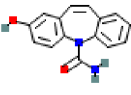
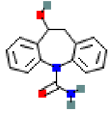
3 items				
Reaction	PubChem Pathway	Source	Taxonomy	
Hydrogen Ion + Carbamazepine + NADH + Oxygen → Carbamazepine-10,11-epoxide + NAD + Water	Carbamazepine Metabolism Pathway	PathBank	Homo sapiens (human)	

Hydrogen Ion + NADPH + Carbamazepine + Oxygen → 3-Hydroxycarbamazepine + NADPH + Water	Carbamazepine Metabolism Pathway	PathBank	Homo sapiens (human)
Carbamazepine → Carbamazepine 2,3-epoxide	Carbamazepine Metabolism Pathway	PathBank	Homo sapiens (human)

► [PubChem](#)

8.11 Transformations



9 items Download								
Search				SORT BY Predecessor Name - A to Z				
Predecessor	Predecessor Name	Successor	Successor Name	Transformation	Enzyme	Evidence	DOI	
	carbamazepine		Carbamazepine 10,11-epoxide	Epoxidation of 1,2-disubstituted alkene / Human Phase I	CYP3A4 CYP2C8	10.1186/s13321-018-0324-5		
	carbamazepine		9-Hydroxycarbamazepine	Aromatic hydroxylation of fused benzene ring / Human Phase I	CYP3A4 CYP2C8	10.1186/s13321-018-0324-5		
	carbamazepine		3-Hydroxycarbamazepine	Aromatic hydroxylation of fused benzene ring / Human Phase I	CYP3A4 CYP2C8	10.1186/s13321-018-0324-5		
	carbamazepine		2-Hydroxycarbamazepine	Aromatic hydroxylation of fused benzene ring / Human Phase I	CYP3A4 CYP2C8	10.1186/s13321-018-0324-5		
	Carbamazepine		Licarbazepine	Metabolism		PMID:7614907		

► [NORMAN Suspect List Exchange](#)

9 Use and Manufacturing



9.1 Uses



EPA CPDat Chemical and Product Categories

3 items 
anticonvulsant Categorization Type: Reported Functional Use
antiepileptic Categorization Type: Reported Functional Use
antiepileptic, psychotropic Categorization Type: Reported Functional Use

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 \(CPDat\)](#)

Analgesic/antiepileptic drug

Ashford, R.D. *Ashford's Dictionary of Industrial Chemicals*. London, England: Wavelength Publications Ltd., 1994., p. 175

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

In the treatment of pain associated with trigeminal neuralgia

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 288

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

THERAP CAT: Anticonvulsant

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 288

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

MEDICATION

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

For the treatment of epilepsy and pain associated with true trigeminal neuralgia.

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

9.1.1 Use Classification



Human Drugs -> FDA Approved Drug Products with Therapeutic Equivalence Evaluations (Orange Book) -> Active Ingredients

► [FDA Orange Book](#)

Pharmaceuticals

S72 | NTUPHTW | *Pharmaceutically Active Substances from National Taiwan University* | [DOI:10.5281/zenodo.3955664](https://doi.org/10.5281/zenodo.3955664)

► [NORMAN Suspect List Exchange](#)

Pharmaceuticals -> Nervous System -> Antiepileptics -> Carboxamide derivatives

S66 | EAWAGTPS | *Parent-Transformation Product Pairs from Eawag* | [DOI:10.5281/zenodo.3754448](https://doi.org/10.5281/zenodo.3754448)

► [NORMAN Suspect List Exchange](#)

9.2 Methods of Manufacturing



THERMAL DEAMMONIATION OF 2-(O-AMINOSTYRYL)ANILINE HYDROCHLORIDE TO FORM **5H-DIBENZ(B,F)AZEPINE** FOLLOWED BY CONDENSATION WITH **CARBAMOYL CHLORIDE** IN THE PRESENCE OF **SODAMIDE**

SRI

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

Prepn: W. Schindler, US 2948718 (1960 to Geigy).

O'Neil, M.J. (ed.). *The Merck Index - An Encyclopedia of Chemicals, Drugs, and Biologicals*. Whitehouse Station, NJ: Merck and Co., Inc., 2006., p. 288

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

Iminostilbene + **phosgene** + **ammonia** (phosgenation/dehydrochlorination)

Ashford, R.D. *Ashford's Dictionary of Industrial Chemicals*. London, England: Wavelength Publications Ltd., 1994., p. 175

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

5H-dibenz(b,f)azepine is first reacted with **phosgene** and then with **ammonia**.

Ullmann's Encyclopedia of Industrial Chemistry. 6th ed. Vol 1: Federal Republic of Germany: Wiley-VCH Verlag GmbH & Co. 2003 to Present, p. V3 461 (2003)

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

9.3 Formulations / Preparations



Oral: Capsules, extended-release: 200 mg Carbatrol (with **povidone**), (Shire US); 300 mg Carbatrol (with **povidone**), (Shire US). Suspension: 100 mg/5 mL Carbamazepine Suspension, (Actavis), Carbamazepine Suspension, (Morton Grove), Carbamazepine Suspension, (Taro); Tegretol (with **propylene glycol**), (Novartis). Tablets: 200 mg Epitol (scored), (Teva), Tegretol (scored), (Novartis). Tablets, chewable: 100 mg Tegretol (scored), (Novartis). Tablets, extended-release: 100 mg Tegretol-XR (with **mannitol**), (Novartis); 200 mg Tegretol-XR (with **mannitol**), (Novartis); 400 mg Tegretol-XR (with **mannitol**), (Novartis).

McEvoy, G.K. (ed.). *American Hospital Formulary Service. AHFS Drug Information*. American Society of Health-System Pharmacists, Bethesda, MD. 2007., p. 2225

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

9.4 Consumption Patterns



Amount used per year in the UK: 40.348.75 kg

[PMID:12448549](#)

Jones OAH et al; Water Res 36: 5013-22 (2002)

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

(1995) estimated prescription amount in Germany was calculated to be 80 tons

Pfluger P, Dietrich DR; pp 11-17 in Amer Chem Soc, ACS Symp Ser, 791(Pharmaceuticals and personal care products in the environment): 11-17 (2001)

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

9.5 U.S. Production



(1977) PROBABLY GREATER THAN 4.54X10+5 GRAMS

SRI

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

(1979) PROBABLY GREATER THAN 4.54X10+5 GRAMS

SRI

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

10 Identification



10.1 Analytic Laboratory Methods



Analyte: carbamazepine; matrix: chemical identification; procedure: infrared absorption spectrophotometry with comparison to standards

U.S. Pharmacopeia. The United States Pharmacopeia, USP 30/The National Formulary, NF 25; Rockville, MD: U.S. Pharmacopeial Convention, Inc., p1615 (2007)

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

Analyte: carbamazepine; matrix: chemical purity; procedure: liquid chromatography with detection at 230 nm and comparison to standards

U.S. Pharmacopeia. The United States Pharmacopeia, USP 30/The National Formulary, NF 25; Rockville, MD: U.S. Pharmacopeial Convention, Inc., p1615 (2007)

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

Analyte: carbamazepine; matrix: pharmaceutical preparation (oral suspension; tablet); procedure: infrared absorption spectrophotometry with comparison to standards (chemical identification)

U.S. Pharmacopeia. The United States Pharmacopeia, USP 30/The National Formulary, NF 25; Rockville, MD: U.S. Pharmacopeial Convention, Inc., p1616 (2007)

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

Analyte: carbamazepine; matrix: pharmaceutical preparation (oral suspension; tablet); procedure: liquid chromatography with detection at 230 nm and comparison to standards (chemical purity)

U.S. Pharmacopeia. The United States Pharmacopeia, USP 30/The National Formulary, NF 25; Rockville, MD: U.S. Pharmacopeial Convention, Inc., p1616 (2007)

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

For more Analytic Laboratory Methods (Complete) data for CARBAMAZEPINE (8 total), please visit the [HSDB record page](#).

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

10.2 Clinical Laboratory Methods



Analyte: carbamazepine; matrix: blood (serum); procedure: high-performance liquid chromatography with ultraviolet detection at 214 nm

Capparella M et al; J Chromatogr A, 691: 141-150 (1995). As cited in: Lunn G, Schmuff N; HPLC Methods for Pharmaceutical Analysis. New York, NY: John Wiley & Sons, 1997, p.224

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

Analyte: carbamazepine; matrix: blood (plasma); procedure: high-performance liquid chromatography with ultraviolet detection at 220 nm

Lanchote VL et al; Ther Drug Monit, 27: 47-52 (1995). As cited in: Lunn G, Schmuff N; HPLC Methods for Pharmaceutical Analysis. New York, NY: John Wiley & Sons, 1997, p.224

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

Analyte: carbamazepine; matrix: blood (serum); procedure: high-performance liquid chromatography with ultraviolet detection at 254 nm

Nimura N et al; J Chromatogr A, 689: 203-210 (1995). As cited in: Lunn G, Schmuff N; HPLC Methods for Pharmaceutical Analysis. New York, NY: John Wiley & Sons, 1997, p.225

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

Analyte: carbamazepine; matrix: blood (serum); procedure: high-performance liquid chromatography with ultraviolet detection at 212 nm; limit of detection: 10 ng/mL

Pienimäki P et al; J Chromatogr B, 673: 97-105 (1995). As cited in: Lunn G, Schmuff N; HPLC Methods for Pharmaceutical Analysis. New York, NY: John Wiley & Sons, 1997, p.226

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

For more Clinical Laboratory Methods (Complete) data for CARBAMAZEPINE (17 total), please visit the [HSDB record page](#).

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

11 Safety and Hazards



11.1 Hazards Identification



11.1.1 GHS Classification



Pictogram(s)	  Irritant Health Hazard
Signal	<u>Danger</u>
GHS Hazard Statements	H302 (96.62%): Harmful if swallowed [Warning Acute toxicity, oral] H317 (94.69%): May cause an allergic skin reaction [Warning Sensitization, Skin] H334 (92.27%): May cause allergy or asthma symptoms or breathing difficulties if inhaled [Danger Sensitization, respiratory] H361 (11.59%): Suspected of damaging fertility or the unborn child [Warning Reproductive toxicity]
Precautionary Statement Codes	P203, P261, P264, P270, P272, P280, P284, P301+P317, P302+P352, P304+P340, P318, P321, P330, P333+P313, P342+P316, P362+P364, P405, and P501 (The corresponding statement to each P-code can be found at the GHS Classification page.)
ECHA C&L Notifications Summary	<i>Aggregated GHS information provided by 208 companies from 24 notifications to the ECHA C&L Inventory. Each notification may be associated with multiple companies.</i> <i>Reported as not meeting GHS hazard criteria by 1 of 208 companies. For more detailed information, please visit ECHA C&L website.</i> <i>Of the 23 notification(s) provided by 207 of 208 companies with hazard statement code(s).</i> <i>Information may vary between notifications depending on impurities, additives, and other factors. 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.</i>

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

11.1.2 Hazard Classes and Categories



Acute Tox. 4 (96.62%)

Skin Sens. 1 (94.69%)

Resp. Sens. 1 (92.27%)

Repr. 2 (11.59%)

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

11.2 Accidental Release Measures



11.2.1 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 \(HSDB\)](#)

11.3 Handling and Storage



11.3.1 Storage Conditions



Carbamazepine tablets, extended-release tablets, and chewable tablets should be stored in tight, light-resistant containers at temperatures not exceeding 30 °C. Carbamazepine extended-release capsules should be stored in tight, light-resistant containers at 15-25 °C. Because dissolution characteristics and associated oral bioavailability of carbamazepine tablets may be affected substantially by moisture, patients should be cautioned to keep containers of the tablets tightly closed and in a dry location, away from areas with excessive moisture (e.g., showers, bathrooms, humidifiers). Carbamazepine tablets may lose one-third or more of their oral bioavailability when exposed to excessive moisture. Tablets continuously exposed to 97% relative humidity at room temperature for 2 weeks become hardened and dissolve poorly.

McEvoy, G.K. (ed.). *American Hospital Formulary Service. AHFS Drug Information. American Society of Health-System Pharmacists, Bethesda, MD. 2007.*, p. 2225

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

11.4 Regulatory Information



11.4.1 FDA Requirements



Manufacturers, packers, and distributors of drug and drug products for human use are responsible for complying with the labeling, certification, and usage requirements as prescribed by the Federal Food, Drug, and Cosmetic Act, as amended (secs 201-902, 52 Stat. 1040 et seq., as amended; 21 U.S.C. 321-392).

21 CFR 200-299, 300-499, 820, and 860 (4/1/93)

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

The Approved Drug Products with Therapeutic Equivalence Evaluations List identifies currently marketed prescription drug products, incl carbamazepine approved on the basis of safety and effectiveness by FDA under sections 505 of the Federal Food, Drug, and Cosmetic Act.

DHHS/FDA; *Electronic Orange Book-Approved Drug Products with Therapeutic Equivalence Evaluations. Available from, as of July 24, 2007: <https://www.fda.gov/cder/ob/>*

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

12 Toxicity



12.1 Toxicological Information



12.1.1 Toxicity Summary



Toxicity information Oral LDLO (female): 1920 mg/kg/17W (intermittent); Oral LDLO (male): 54 mg/kg/9D (intermittent) Oral LD50 (rat): 1957 mg/kg Overdose information The initial signs of carbamazepine overdose occur 1-3 hours post ingestion. These signs and symptoms may vary in case of an overdose between carbamazepine and other drugs. Carbamazepine may cause various cardiovascular, neurological, respiratory, urinary symptoms as well as laboratory abnormalities including leukocytosis, reduced leucocytes, acetonuria, and glycosuria. Neuromuscular symptoms may occur initially, followed by mild cardiac symptoms such as tachycardia, hypertension, or hypotension. Higher doses of carbamazepine may cause more severe cardiovascular effects. Restlessness, muscular twitching, tremor, dilated pupils, nystagmus, psychomotor disturbances, and other neurological symptoms may occur. Hyperreflexia in the initial stages of overdose may be followed by hyporeflexia. Nausea, vomiting, urinary retention, dizziness or drowsiness may also occur. In cases of overdose, contact the local poison control center. Ensure to provide supportive and symptomatic treatment, which may include monitoring and careful supervision by a medical professional. The possibility of overdose with multiple drugs must be considered in the case of carbamazepine overdose. Maintain an adequate airway, [oxygen](#), in addition to ventilation. Vital signs should be monitored.

► [DrugBank](#)

Carbamazepine inhibits sustained repetitive firing by blocking use-dependent [sodium](#) channels. Pain relief is believed to be associated with blockade of synaptic transmission in the trigeminal nucleus and seizure control with reduction of post-tetanic potentiation of synaptic transmission in the spinal cord. Carbamazepine also possesses anticholinergic, central antidiuretic, antiarrhythmic, muscle relaxant, antidepressant (possibly through blockade of [norepinephrine](#) release), sedative, and neuromuscular-blocking properties.

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

12.1.2 Hepatotoxicity



Prospective studies indicate that a sizeable proportion of patients taking carbamazepine have transient serum aminotransferase elevations (ranging from 1% to 22%). These elevations are usually benign, not associated with liver histological abnormalities and usually resolve even with drug continuation. In addition, most patients on carbamazepine develop mild-to-moderate elevations in gamma glutamyltranspeptidase (GGT) levels, probably indicative of hepatic enzyme induction rather than liver injury. Marked aminotransferase elevations (more than 5 fold elevated) occur less frequently.

Clinically apparent hepatotoxicity from carbamazepine is uncommon but well described, there being several hundred cases reported in the literature. Carbamazepine hepatotoxicity most often occurs in the setting of anticonvulsant hypersensitivity syndrome with onset of fever, followed by rash, facial edema, lymphadenopathy, elevations in white count and eosinophilia or atypical lymphocytosis, 1 to 8 weeks after starting therapy (Case 1 and 2). This syndrome is usually referred to as Drug Rash with Eosinophilia and Systemic Symptoms [DRESS]. The most frequent form of systemic involvement in DRESS syndrome is liver injury. The liver involvement ranges from mild and transient elevations in serum enzymes to abrupt onset of an acute hepatitis-like syndrome that can be severe and even fatal. However, the most common pattern of enzyme elevations in carbamazepine related DRESS

syndrome is a mixed or cholestatic injury. Liver biopsy shows the cholestatic injury with focal hepatocellular necrosis, prominence of eosinophils and occasionally granulomas. In fatal cases, liver histology also shows bridging, submassive or massive necrosis. Other systemic involvement in carbamazepine induced DRESS syndrome includes myositis, nephritis and pneumonitis. Carbamazepine induced DRESS syndrome has also been linked to several cases of vanishing bile duct syndrome in which a severe cholestatic hepatitis with immunoallergic features is followed by persistence of cholestasis with itching, jaundice and prominent elevations in alkaline phosphatase levels. In most instances, vanishing bile duct syndrome gradually improves with time, but some instances are severe and unremitting, leading eventually to end stage liver disease and death or need for liver transplantation several months or even years after onset (Case 3).

Carbamazepine hepatotoxicity can also occur without immunoallergic features in which case the latency to onset can be as long as 6 to 12 months after starting. The cases of carbamazepine liver injury without immunoallergic features tend to be hepatocellular rather than cholestatic or mixed and are more likely to be severe (Case 4).

Carbamazepine is a commonly listed agent in case series of acute liver failure.

Likelihood score: A (Well established cause of clinically apparent liver injury).

► [LiverTox](#)

12.1.3 Drug Induced Liver Injury



Compound	carbamazepine
DILI Annotation	Most-DILI-Concern
Severity Grade	7
Label Section	Warnings and precautions
References	M Chen, V Vijay, Q Shi, Z Liu, H Fang, W Tong. FDA-Approved Drug Labeling for the Study of Drug-Induced Liver Injury, Drug Discovery Today, 16(15-16):697-703, 2011. PMID:21624500 DOI:10.1016/j.drudis.2011.05.007 M Chen, A Suzuki, S Thakkar, K Yu, C Hu, W Tong. DILIRank: the largest reference drug list ranked by the risk for developing drug-induced liver injury in humans. Drug Discov Today 2016, 21(4): 648-653. PMID:26948801 DOI:10.1016/j.drudis.2016.02.015

► [Drug Induced Liver Injury Rank \(DILIRank\) Dataset](#)

12.1.4 Carcinogen Classification



Carcinogen Classification	No indication of carcinogenicity to humans (not listed by IARC).
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► [Toxin and Toxin Target Database \(T3DB\)](#)

12.1.5 Health Effects



May cause a potentially dangerous rash that may develop into Stevens Johnson syndrome, an extremely rare but potentially fatal skin disease.

12.1.6 Effects During Pregnancy and Lactation



● Summary of Use during Lactation

Breastfeeding during carbamazepine monotherapy does not appear to adversely affect infant growth or development, and breastfed infants had higher IQs and enhanced verbal abilities than nonbreastfed infants at 6 years of age in one study. A safety scoring system finds carbamazepine possible to use during breastfeeding. If carbamazepine is required by the mother, it is not a reason to discontinue breastfeeding.

Carbamazepine and its active metabolite have relatively high levels in breastmilk and breastfed infants have serum levels that are sometimes measurable, but usually well below the anticonvulsant therapeutic range. Most infants have had no adverse reactions, but sedation, poor sucking, withdrawal reactions and 3 cases of hepatic dysfunction have been reported. These have all been complicated because of intrauterine exposure and, in some cases, concurrent drug therapy. Monitor the infant for jaundice, drowsiness, adequate weight gain, and developmental milestones, especially in younger, exclusively breastfed infants and when using combinations of anticonvulsant or psychotropic drugs. One author recommends monitoring infant serum carbamazepine levels, liver enzymes, and a complete blood count during therapy.

● Effects in Breastfed Infants

No adverse effects were noted by the mothers in 3 breastfed infants during maternal carbamazepine and [phenytoin](#) therapy.

An epileptic woman taking carbamazepine 1 gram and [primidone](#) 1 gram daily during pregnancy and postpartum breastfed her infant for 5 weeks and noted no difference in activity in the infant before and after nursing.

A probable case of drug-induced drowsiness occurred in a newborn whose mother was taking [primidone](#), carbamazepine and [phenytoin](#) (dosages not stated). At day 30, breastfeeding was discontinued because of the drowsiness that occurred after each feeding and poor weight gain. The same group of researchers found that 15 partially breastfed infants whose mothers were taking various anticonvulsants, including carbamazepine, gained weight at a slower rate during the first 5 days postpartum than did 75 infants of epileptic mothers who bottle fed or control mothers taking no medications.

A 10-week-old breastfed infant whose mother was taking [clemastine](#), [phenytoin](#) and carbamazepine was drowsy, refused to feed, was irritable, and had high-pitched crying. These side effects were possibly caused by [clemastine](#) in breastmilk, but carbamazepine could also have contributed.

Poor sucking, vomiting and lack of weight gain was reported in a partially breastfed 4-week-old whose mother was taking carbamazepine monotherapy in a dose of 11 mg/kg daily.

Weak sucking occurred in 1 of 15 breastfed infants whose mothers were on carbamazepine monotherapy, but a causal relationship could not be confirmed.

A breastfed infant whose mother was taking [primidone](#) 375 mg, [phenobarbital](#) 90 mg, and carbamazepine 800 mg daily did well despite a saliva [phenobarbital](#) level of 3.4 mg/L. At 7 months of age, after the mother abruptly stop nursing, the infant had a number of "startle reactions" and infantile seizures occurred which were confirmed by an abnormal electroencephalogram. Continued [phenobarbital](#) administration to the infant for 15 months controlled the seizures and no more occurred up to 5 years of age.

A 3-week-old infant whose mother was taking carbamazepine monotherapy 600 mg daily during pregnancy and postpartum had persistent jaundice from birth. Cholestasis and elevated hepatic transaminases were found. Jaundice slowly resolved after discontinuation of breastfeeding on day 17 of life, but transaminase values

increased to a peak 6.5 weeks after discontinuation of breastfeeding. Cholestatic hepatitis was possibly caused by carbamazepine exposure in utero and in breastmilk.

An infant was born to a mother who was taking carbamazepine monotherapy 400 mg daily during pregnancy and postpartum. The infant was exclusively breastfed for 9 days, then partially breastfed. Jaundice was present at birth and serum gamma-glutamyltransferase (GGT) levels were elevated and remained elevated for at least 25 days, even after [bilirubin](#) levels decreased. The infant had a rare form of ABO incompatibility, but this was not thought to fully explain the elevated GGT levels. At 2, 4 and 6 months of age, the infant was developing normally. Serum carbamazepine levels were 1.8 and 1.1 mg/L at 2 days and 63 days of age. The transient hepatic dysfunction was possibly caused by carbamazepine exposure in utero and in breastmilk.

In a telephone follow-up study, mothers reported no side effects among 6 infants exposed to carbamazepine (ages and dosages not stated) in breastmilk.

One author reported a mother who was taking [clonazepam](#) 6 mg daily and carbamazepine 1400 mg daily. The infant had serum [clonazepam](#) levels of about 40% of the mother's serum level. Her infant was described as "somewhat lazy at the breast and tired." Carbamazepine levels were not reported.

Possible drug-induced seizure-like activity and cyanosis occurred in a breastfed 3-week-old whose mother was taking [fluoxetine](#), carbamazepine and [buspirone](#) during pregnancy and postpartum.

A breastfed 3-month-old whose mother was taking carbamazepine 200 mg in the morning and 300 mg at bedtime had normal liver function tests.

A fullterm infant whose mother was taking carbamazepine 400 mg daily during pregnancy and postpartum developed asphyxia at birth and required mechanical ventilation. Transient jaundice and liver enzyme elevation were attributed to asphyxia. The mother began breastfeeding on day 8 postpartum. At 3 to 7 weeks of age, cholestasis, jaundice and elevation of hepatic transaminases occurred. The late hepatic abnormalities were considered to be probably caused by carbamazepine in breastmilk.

Two infants were breastfed during maternal therapy with carbamazepine 600 and 1200 mg daily and [levetiracetam](#). The infants appeared to remain healthy throughout the 6- to 8-week study period.

In a long-term study on infants exposed to anticonvulsants during breastfeeding, no difference in average intelligence quotient at 3 years of age was found between infants who were breastfed (n = 26) a median of 6 months and those not breastfed (n = 32) when their mothers were taking carbamazepine. Breastfeeding during carbamazepine monotherapy does not appear to adversely affect infant growth or development, and breastfed infants had slightly higher IQs and enhanced verbal abilities than nonbreastfed infants at 6 years of age in one study. Combination therapy with sedating anticonvulsants or psychotropics may result in infant sedation or withdrawal reactions.

A prospective cohort study in Norway followed infants of mothers who took antiepileptic drugs during pregnancy and lactation and compared them to infants of mothers with untreated epilepsy and infants with fathers who took antiepileptics as control groups. Of the 223 mothers studied, 48 were taking carbamazepine monotherapy. Infants were assessed at 6, 18 and 36 months of age. Continuous breastfeeding in children of women using antiepileptic drugs was associated with no greater impaired development than those with no breastfeeding or breastfeeding for less than 6 months.

An exclusively breastfed infant, whose mother took carbamazepine 1200 mg daily during late pregnancy and postpartum, had poor weight gain, poor sucking, and vomiting beginning at birth with normal neurological and laboratory tests. Because gastroesophageal reflux was suspected, [ranitidine](#) and food thickeners were tried, but were unsuccessful. High milk and plasma carbamazepine levels were found. Partial formula feeding did not resolve the problem, but cessation of breastfeeding resolved the symptoms rapidly. The adverse effect was probably caused by carbamazepine.

● Effects on Lactation and Breastmilk

Relevant published information was not found as of the revision date. One woman on long-term carbamazepine therapy had slight galactorrhea 3.5 years after delivery, although her serum prolactin was normal. The prolactin level in a mother with established lactation may not affect her ability to breastfeed.

► [Drugs and Lactation Database \(LactMed\)](#)

◆ What is carbamazepine?

Carbamazepine is a medication used to control seizures. It is also used to treat other conditions, such as bipolar disorder, schizophrenia, or pain disorders. A common brand name for carbamazepine is Tegretol®, but there are others.

◆ I take carbamazepine. Can it make it harder for me to become pregnant?

Women with seizure disorders who use seizure medications for a long time might have irregular periods and difficulty becoming pregnant. Talk to your healthcare provider if you are having trouble getting pregnant.

◆ I just found out that I am pregnant. Should I stop taking carbamazepine?

Pregnant women should not stop this medication without talking to a healthcare provider. Having a seizure while pregnant may be harmful to the baby. Women with bipolar disorder who stop taking medication during their pregnancy may be at an increased risk for episodes of depression or mania that could be harmful to both the mother and the baby. If possible, women with seizure disorders or bipolar disorder who could become pregnant should discuss their options for treatment, including medications, with their healthcare providers before becoming pregnant.

◆ Does taking carbamazepine increase the chance for miscarriage?

Miscarriage can occur in any pregnancy. A few studies have seen slightly more miscarriages among those taking carbamazepine during pregnancy. Other studies have not seen this. Having a health condition that requires carbamazepine might be a reason for the small increase of miscarriage in the studies.

◆ Does taking carbamazepine increase the chance of birth defects?

In every pregnancy, a woman starts out with a 3-5% chance of having a baby with a birth defect. This is called her background risk. Studies looking at women who have taken carbamazepine during the first trimester of pregnancy have found an increased chance of neural tube defects (when the spinal cord or skull do not form properly). The most common neural tube defect is spina bifida. The chance for neural tube defects in the general population is less than 1% (less than 1 in 100). Taking carbamazepine might increase that chance to about 1%. [Folic acid](#) has been found to reduce the background risk for neural tube defects. If you take carbamazepine, your healthcare provider might recommend that you take extra [folic acid](#) before and during pregnancy. Other studies have reported a greater chance for other major birth defects, such as heart defects or cleft lip. Some studies have also suggested an increased chance for minor birth defects such as a small nose with a long space between the nose and upper lip, and small finger and toenails. Other studies have reported an increased chance of growth issues and small head size. The chance for birth defects might increase with higher doses of carbamazepine, especially in early pregnancy. Talk to your healthcare provider about the lowest effective dose for your condition, and about the risks and benefits of your treatment. Blood tests and ultrasounds can screen for neural tube defects and other birth defects.

◆ Could taking carbamazepine in the second or third trimester cause other pregnancy complications?

In rare cases, taking carbamazepine during pregnancy can cause bleeding problems in the newborn due to low vitamin K levels. Women taking carbamazepine in pregnancy should ask their healthcare providers about taking vitamin K supplements near the end of their pregnancies. They can also talk to their child's pediatrician before delivery about giving the newborn a vitamin K supplement at birth.

◆ Does taking carbamazepine in pregnancy cause long-term problems in behavior or learning for the baby?

Researchers are just beginning to look at the development of children who have been exposed to carbamazepine during pregnancy. Some studies have found a small increased chance for developmental delays. Other studies have found no differences in development or IQ. More studies are needed to know the long-term effects of carbamazepine.

◆ Can I breastfeed while taking carbamazepine?

Carbamazepine passes into breast milk. However, the amount the baby might swallow in the milk is not expected to affect the infant. Breastfeeding while taking carbamazepine by itself (no additional seizure medications) does not appear to affect infant growth or development. Some healthcare providers can measure levels of carbamazepine in the baby's system if there is concern. Be sure to talk to your healthcare provider about all your breastfeeding questions.

◆ If a man takes carbamazepine, could it affect his fertility (ability to get his partner pregnant) or increase the chance of birth defects?

One small animal study and a couple small human studies have suggested that carbamazepine might affect sperm development, but the studies did not look at whether or not this caused problems with starting a pregnancy. More studies are needed to know if men who take carbamazepine have a harder time getting their partners pregnant. In general, exposures that fathers have are unlikely to increase risks to a pregnancy. For more information, please see the MotherToBaby fact sheet Paternal Exposures and Pregnancy at <https://mothertobaby.org/fact-sheets/paternal-exposures-pregnancy/pdf/>.

► [Mother To Baby Fact Sheets](#)

12.1.7 Exposure Routes



Oral. In clinical studies, carbamazepine suspension, conventional tablets, and extended-release tablets delivered equivalent amounts of drug to the systemic circulation. However, it has been observed that the suspension is somewhat faster absorbed. Furthermore, the extended-release tablet is slightly slower than the conventional tablet. The bioavailability of the extended-release tablet is 89%, compared to the suspension. Plasma levels of carbamazepine are variable. The time to peak concentration for the different formulations are as follows: Suspension = 1.5 hours; Conventional tablets = 4-5 hours; Extended-release tablets = 3-12 hours.

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

12.1.8 Symptoms



Mild ingestions cause vomiting, drowsiness, ataxia, slurred speech, nystagmus, dystonic reactions, and hallucinations. Severe intoxications may produce coma, seizures, respiratory depression, and hypotension

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

12.1.9 Acute Effects



26 items

Search

Compound CID	Organism	Test Type	Route	Dose	Effect	Reference
2554	women	TDLo	oral	112 mg/kg/2W-I	GASTROINTESTINAL: NAUSEA OR VOMITING; BLOOD: THROMBOCYTOPENIA	American Journal of Psychiatry., 150(1750), 1993
2554	child	TDLo	oral	65 mg/kg	BEHAVIORAL: CONVULSIONS OR EFFECT ON SEIZURE THRESHOLD; BEHAVIORAL: COMA; LUNGS, THORAX, OR RESPIRATION: OTHER CHANGES	Journal of Pediatrics., 121(295), 1992 [PMID:1640302]
2554	women	TDLo	oral	144 mg/kg/2W-I	BLOOD: THROMBOCYTOPENIA; SKIN AND APPENDAGES (SKIN): DERMATITIS, ALLERGIC: AFTER SYSTEMIC EXPOSURE	Journal of Clinical Psychiatry., 53(378), 1992 [PMID:1429479]
2554	man	TDLo	oral	160 mg/kg/3W-I	SKIN AND APPENDAGES (SKIN): DERMATITIS, OTHER: AFTER SYSTEMIC EXPOSURE	Journal of Clinical Psychopharmacology., 5(185), 1985
2554	child	TDLo	oral	1050 mg/kg/6W-	BEHAVIORAL: MUSCLE CONTRACTION OR SPASTICITY	American Journal of Psychiatry., 143(1176), 1985

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► [ChemIDplus](#)

12.1.10 Treatment



The prognosis in cases of severe poisoning is critically dependent upon prompt elimination of the drug, which may be achieved by inducing vomiting, irrigating the stomach, and by taking appropriate steps to diminish absorption. If these measures cannot be implemented without risk on the spot, the patient should be transferred at once to a hospital, while ensuring that vital functions are safeguarded. There is no specific antidote. (L1712)

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

12.1.11 Interactions



Various combinations of carbamazepine, [felbamate](#), and [phenytoin](#) were evaluated in mice (ip) for anticonvulsant activity (maximal electroshock seizure test) and minimal neurotoxicity (rotarod test). The results

obtained from these studies were analyzed using response surface methodologies. The outcomes of these analyses in regard to anticonvulsant activity suggest that, under these experimental study conditions, at 0.5 hr post treatment there is a significant carbamazepine/[phenytoin](#) synergism even though none of the drugs has a significant dose-response by that time when given alone, and that at 1.0 hr post treatment, the combination dose-response is additive. Thus, there appears to be an important dose/time relationship. In regard to the neurotoxic response, the results suggest a significant carbamazepine/[phenytoin](#) synergism at 0.25 hr post treatment and an additive neurotoxic effect due to the combination of [felbamate](#)/carbamazepine/[phenytoin](#) at 0.5, 1.0 and 2.0 hr post exposure.

[PMID:8573214](#)

Gennings C et al; *Arzneimittelforschung* 45 (7): 739-48 (1995)

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

Risk of hepatotoxicity with single toxic doses or prolonged use of high doses of [acetaminophen](#) may be increased, and therapeutic effects of [acetaminophen](#) may be decreased, in patients taking hepatic enzyme-inducing agents such as carbamazepine.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 704

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

Concurrent use /of [aminophylline](#), [oxtriphylline](#), or [theophylline](#)/ with carbamazepine may stimulate hepatic metabolism of the xanthines (except [dyphylline](#)), resulting in increased [theophylline](#) clearance.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 704

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

Concurrent use /of [hydantoin](#) anticonvulsants, [succinimide](#) anticonvulsants, barbiturates, benzodiazepines metabolized via hepatic microsomal enzymes, especially [clonazepam](#), [primidone](#), or [valproic acid](#)/ with carbamazepine may result in increased metabolism, leading to decreased serum concentrations and reduced elimination half-lives of these medications because of induction of hepatic microsomal enzyme activity; monitoring of blood concentrations as a guide to dosage is recommended, especially when any of these medications or carbamazepine is added to or withdrawn from an existing regimen. [Valproic acid](#) may prolong the half-life and reduce the protein-binding of carbamazepine; the concentration of the active 10,11-epoxide metabolite may be increased. In addition, use of carbamazepine in combination with other anticonvulsants has been reported to be associated with an increased risk of congenital defects and with an alteration of thyroid function.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 705

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

For more Interactions (Complete) data for CARBAMAZEPINE (41 total), please visit the [HSDB record page](#).

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

12.1.12 Antidote and Emergency Treatment



Emergency and supportive measures. Maintain an open airway and assist ventilation if necessary. Administer supplemental [oxygen](#). Treat seizures, coma, hyperthermia, arrhythmias, hyponatremia, and dystonias if they

occur. Asymptomatic patients should be observed for a minimum of 6 hours after ingestion and for at least 12 hours if an extended-release preparation was ingested. ...

Olson, K.R. (Ed.); Poisoning & Drug Overdose. 5th ed. Lange Medical Books/McGraw-Hill. New York, N.Y. 2007., p. 149

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

Decontamination. Administer activated [charcoal](#) orally if conditions are appropriate. Gastric lavage is not necessary after small to moderate ingestions if activated [charcoal](#) can be given promptly. For massive ingestions of carbamazepine, consider additional doses of activated [charcoal](#) and possibly whole-bowl irrigation.

Olson, K.R. (Ed.); Poisoning & Drug Overdose. 5th ed. Lange Medical Books/McGraw-Hill. New York, N.Y. 2007., p. 150

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

Repeat-dose activated [charcoal](#) is effective for carbamazepine and may increase clearance by up to 50%. However, it may be difficult to perform safely in a patient with obtundation and ileus, and there is no demonstrated benefit in terms of morbidity or mortality.

Olson, K.R. (Ed.); Poisoning & Drug Overdose. 5th ed. Lange Medical Books/McGraw-Hill. New York, N.Y. 2007., p. 150

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

Plasma exchange has been used in children with carbamazepine poisoning.

Olson, K.R. (Ed.); Poisoning & Drug Overdose. 5th ed. Lange Medical Books/McGraw-Hill. New York, N.Y. 2007., p. 150

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

For more Antidote and Emergency Treatment (Complete) data for CARBAMAZEPINE (16 total), please visit the [HSDB record page](#).

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

12.1.13 Human Toxicity Excerpts



/HUMAN EXPOSURE STUDIES/ ... Infants exposed to antiepileptic drugs (n = 1398) in early pregnancy were identified from the Swedish Medical Birth Registry. The number of infants with congenital malformations and exposed to antiepileptic drug was compared with the expected number estimated from all infants born (n = 582656). 90% (1256) of the antiepileptic drug exposed children were exposed to antiepileptic drugs in monotherapy, 56% were exposed to carbamazepine and 21% to [valproic acid](#). The odds ratio (OR) for having a malformation in the antiepileptic drug exposed group was 1.86 [95% confidence interval (95% CI) 1.42-2.44]. Exposure to [valproic acid](#) in monotherapy compared with carbamazepine in monotherapy gave OR = 2.51 (95% CI 1.43-4.68) for a neonatal diagnosis of malformations. However, there is no information available on the number of therapeutic abortions, or the different types of epilepsy or drug dosage in the two treatment groups. There was a small increase in the risk of having a major malformation after exposure to antiepileptic drugs in monotherapy. Exposure to [valproic acid](#) seems to carry a higher risk than exposure to carbamazepine.

PMID:15046269

Wide K et al; Acta Paediatr 93 (2): 174-6 (2004)

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

/HUMAN EXPOSURE STUDIES/ ... In order to quantify ... the risks of exposure to carbamazepine during pregnancy, ... data from prospective studies ... prospective studies involving 1255 cases of exposure /were pooled/ ... Carbamazepine therapy increased the rate of congenital anomalies, mainly neural tube defects, cardiovascular and urinary tract anomalies, and cleft palate. ... Carbamazepine also appears to reduce gestational age at delivery. A combination of carbamazepine with other antiepileptic drugs is more teratogenic than carbamazepine monotherapy. Children born to untreated epileptic women do not appear to have an increased rate of major birth defects. In light of these results, we recommend performing a level 2 ultrasound and fetal echocardiography in women treated with carbamazepine during pregnancy.

[PMID:11934528](#)

Matalon S et al; Reprod Toxicol 16 (1): 9-17 (2002)

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

/HUMAN EXPOSURE STUDIES/ Thirty-six mother-child pairs exposed to carbamazepine monotherapy and 34 pairs exposed to [phenytoin](#) monotherapy, all prospectively studied, were compared with another-child pairs exposed to nonteratogens. The controls were matched for maternal age, time of consultation, obstetric history, and socioeconomic status. The primary end point of interest was the children's global IQ measured by either the Bayley or the McCarthy scale according to their ages. ... Children exposed to [phenytoin](#) in utero had a mean (+ or - SD) global IQ 10 points lower (95% confidence interval, 4.9 to 15.8 points) than their matched controls (113.4 + or - 13.1 and 103.1 + or - 25.1; P = .038). The Reynell language development scores followed a similar trend, with children exposed to [phenytoin](#) scoring significantly lower than their controls. [Phenytoin](#)-exposed children had a global IQ of 84 or less significantly more often than the control group (P < .01). Children exposed in utero to carbamazepine did not differ from their controls on any of the neurobehavioral tests. /This/ study suggests a clinically important negative effect of phenytoin on neurobehavioral development, independent of maternal or environmental factors, causing a substantial number of children to achieve a lower score than expected on cognitive tests. No similar effects could be shown after gestational use of carbamazepine.

[PMID:7509419](#)

Scolnik D et al; JAMA 271 (10): 767-70 (1994)

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

/SIGNS AND SYMPTOMS/ ... Severe adverse dermatologic effects of carbamazepine include pruritic and erythematous rashes, urticaria, photosensitivity reactions, alterations in skin pigmentation, toxic epidermal necrolysis (Lyell's syndrome), and exfoliative dermatitis. In addition, erythema multiforme (including Stevens-Johnson syndrome), erythema nodosum, and development of a lupus erythematosus-like syndrome or aggravation of systemic lupus erythematosus have been reported. Alopecia may also occur. Although a causal relationship has not been established, hirsutism has been reported rarely in patients receiving carbamazepine.

McEvoy, G.K. (ed.). American Hospital Formulary Service. AHFS Drug Information. American Society of Health-System Pharmacists, Bethesda, MD. 2007., p. 2221

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

For more Human Toxicity Excerpts (Complete) data for CARBAMAZEPINE (42 total), please visit the [HSDB record page](#).

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

12.1.14 Non-Human Toxicity Excerpts



/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ ALBINO MALE RATS WERE INJECTED WITH CARBAMAZEPINE FOR 3 MONTHS IMMEDIATELY AFTER WEANING. A DECREASE IN PROSTATE WEIGHT WAS FOUND IN THE TREATED RATS. THEY HAD A LOWERED EPIDIDYMAL SPERM CONTENT WHICH DID NOT AFFECT THEIR FERTILITY.

PMID:6813428

Full text: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC491572>

COHN DF ET AL; J NEUROL NEUROSURG PSYCHIATRY 45 (9): 844 (1982)

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

/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ ... The purpose of this study was to examine effects of carbamazepine and [carbamazepine-10,11-epoxide](#) on mouse and rat embryonic growth and development in a whole embryo culture system. Embryos were cultured in rat serum containing various concentrations of carbamazepine or [carbamazepine-10,11-epoxide](#) for 48 hr beginning on GD9 (rats) or GD8 (mice). Carbamazepine at 24 ug/mL and higher concentrations significantly increased the frequency of embryos with open anterior neural tubes among rat and mouse embryos. Effects of [carbamazepine-10,11-epoxide](#) were more variable with increases at 16, 32 and 48 (but not 24) ug/mL among rat embryos and only at 24 ug/mL among mouse embryos. Carbamazepine at 60 ug/mL significantly decreased morphological score, the number of somite pairs, DNA content, crown-rump and head lengths among rat embryos and the morphological score of mouse embryos; whereas, [carbamazepine-10,11-epoxide](#) had few such adverse effects. ...

Grafton TF et al; Teratology 51 (3): 185 (1995)

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

/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ ... Twenty-eight C3H/He mice were assigned randomly to treatment groups that were given food that contained either carbamazepine (25 mg in 10 g food) or a placebo for 1 week before mating and throughout gestation. Adult offspring from eight litters of each group were evaluated for standard tasks for motor, arousal/motivation, anxiety, and cognition. Statistical comparisons included analysis of variance and the Fisher exact test. Compared with the placebo group, there were no significant differences among the carbamazepine offspring in the duration of gestation, litter size, and birth weights. Fewer locomotor chamber movements were recorded in the carbamazepine group than in the placebo-exposed group at postnatal day 21 (469 vs 555 counts for 60 minutes, P<0.03) and as adults (510 vs 688 counts for 60 minutes, P<0.03) Coordination, balance, and exploratory behavior did not differ between exposure groups. A startle response from auditory arousal was decreased in carbamazepine-exposed adults (1.4% vs 21.9%, P<0.03). Performances on anxiety/motivation tasks and on learning/memory tasks revealed no significant differences between exposure groups. Although prenatal exposure induced subtle arousal effects and slower locomotor activity, carbamazepine did not have an impact on coordination, cognition, or responses to anxiety-provoking conditions. Correlation in humans is recommended.

PMID:14981399

Rayburn WF et al; Am J Obstet Gynecol 190 (2): 517-21 (2004)

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

/LABORATORY ANIMALS: Developmental or Reproductive Toxicity/ ... Adult C3H/He mice were given carbamazepine in rodent chow in either a 0.25% or a 1.0% mixture. Comparisons between doses included nonpregnant weight change, plasma drug steady-state concentrations, and response to a maximal electroshock seizure test. The strain was then fed either the preferred dose of carbamazepine or a placebo 1 week before starting to mate and throughout gestation to compare reproductive performance and offspring early

development. Mice who ate the 0.25% carbamazepine mixture displayed no evoked seizure activity and, in contrast to the 1.0% mixture, did not lose weight. This daily dose of 542+/- or - 35 mg/kg produced a trough steady-state plasma concentration that was consistent with a protective threshold in humans. Differences from placebo controls were not statistically significant for the number of cycles necessary to conceive or for the duration of gestation. The litter size, survival rates, birth weights, weight gain, and onset of eye openings and teeth eruptions of the pups were not statistically significant between the two groups. Long-term prenatal exposure to a subtoxic yet therapeutic dose of carbamazepine did not impair reproductive performance or early growth and development of exposed mice offspring.

[PMID:14749669](#)

Christensen HD et al; Am J Obstet Gynecol 190 (1): 259-63 (2004)

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

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

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

12.1.15 Ecotoxicity Excerpts



/AQUATIC SPECIES/ The effects of the antiepileptic drug carbamazepine were studied in three freshwater invertebrate species representing different taxonomic groups, life histories, and habitats in aquatic ecosystems. The oligochaete *Lumbriculus variegatus* was exposed by way of carbamazepine-spiked sediments at nominal concentrations between 0.625 and 10 mg/kg dry weight (dw) for 28 days. At the end of the test, reproduction and biomass were monitored as end points. The non-biting midge *Chironomus riparius* was exposed to carbamazepine in a series of tests at nominal carbamazepine concentrations in sediment ranging from 0.16 to 100 mg/kg dw at 20 degrees C and 23 degrees C. Emergence and gender ratio were monitored at the end of the test. The freshwater snail *Potamopyrgus antipodarum* as the third test species was used in a chronic reproduction test for 28 days at aqueous carbamazepine concentrations from 0.4 to 250 mg/L. Whereas for the oligochaete and the snail no effects were observed, *C. riparius* exhibited a significant and concentration-dependent decrease of emergence in all test series. No observed effect concentrations and 10% effect concentrations were in the range of 33 to 140 and 70 to 210 microg/kg dw, respectively, based on measured carbamazepine concentrations in sediments. These low values indicate that carbamazepine may pose a potential threat for the survival of *C. riparius* and probably also for other aquatic insect populations in the field.

[PMID:16177879](#)

Oetken M et al; Arch Environ Contam Toxicol 49 (3): 353-61 (2005)

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

/AQUATIC SPECIES/ In this study, the four most abundantly used pharmaceuticals in Korea, namely [acetaminophen](#), carbamazepine, [cimetidine](#), and [diltiazem](#), and six sulfonamide related antibiotics, ... were examined for their acute aquatic toxicity employing a marine bacterium (*Vibrio fischeri*), a freshwater invertebrate (*Daphnia magna*), and the Japanese medaka fish (*Oryzias latipes*). In general, *Daphnia* was the most susceptible among the test organisms. The most acutely toxic among the chemicals tested in this study was [diltiazem](#), with a median lethal concentration of 8.2 mg/L for *D. magna*. ...

[PMID:17223195](#)

Kim Y et al; Environ Int 33 (3): 370-5 (2007)

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

/AQUATIC SPECIES/ The effects of the antiepileptic, analgesic drug carbamazepine on the growth, morphology, and life-history characteristics of *Daphnia pulex* were examined at nominal concentrations of 0, 0.1, 1, 10, 100, and 200 ug L⁻¹. At 1 microg carbamazepine L⁻¹, *Daphnia* matured and reproduced slightly earlier than did controls, and at a given body length females produced more offspring than did controls or those receiving other treatments. In combination with a relatively high juvenile somatic growth rate and highest total number of progeny produced per female, carbamazepine at 1ug L⁻¹ seemed to exert a stimulatory effect. The rates of population growth of the 100 and 200 ug L⁻¹ treatment groups was 9% and 32% lower, respectively, than the rates of growth of the controls and the *Daphnia* receiving treatments of up to 10 microg carbamazepine L⁻¹. At the highest dose, retardation of juvenile somatic growth resulted in delayed maturity and consequently in a lower rate of population growth. Adult somatic growth, spine length, reproductive output, and size of newborns were similar among treatments. Male offspring were only produced in the third broods, with broods that were 8% and 28% male at 1 and 10 ug L⁻¹, respectively. Neck teeth were never observed in *Daphnia*. Chronic adverse effects of carbamazepine on nontarget *Daphnia* were detected at 200 ug carbamazepine L⁻¹, but stimulatory effects might occur at environmentally realistic concentrations. However, additional studies of chronic toxicity investigating various combinations of pharmaceuticals and various environmental stresses, such as food condition, temperature, and kairomones, are needed to fully explore potential long-term adverse effects and to assess the environmental risk of common pharmaceuticals.

[PMID:16528693](#)

Lurling M et al; *Environ Toxicol* 21 (2): 172-80 (2006)

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

/AQUATIC SPECIES/ ... Carbamazepine, an anticonvulsant commonly present in surface and groundwater, was studied, using six ecotoxicological model systems with eighteen endpoints evaluated at different exposure time periods. The battery included the immobilization of *Daphnia magna*, bioluminescence inhibition in the bacterium *Vibrio fischeri*, growth inhibition of the alga *Chlorella vulgaris*, and micronuclei induction and root growth inhibition in the plant *Allium cepa*. Cell morphology, [neutral red](#) uptake, total protein content, MTS metabolism, [lactate](#) dehydrogenase leakage and activity and [glucose-6-phosphate](#) dehydrogenase activity were studied in the salmonid fish cell line RTG-2. The total protein content, LDH activity, [neutral red](#) uptake and MTT metabolism in Vero monkey kidney cells were also investigated. The most sensitive system to carbamazepine was the Vero cell line, followed by *Chlorella vulgaris*, *Vibrio fischeri*, *Daphnia magna*, *Allium cepa*, and RTG-2 cells. EC50 values from 19 microM in Vero cells at 72 h to more than 1200 microM in other systems, were obtained. Comparing the concentrations in [water](#) and the toxicity quantified in our assay systems, carbamazepine is not expected to produce acute toxic effects in the aquatic biota under these circumstances, but chronic and synergistic effects with other chemicals cannot be excluded.

[PMID:14599440](#)

Jos A et al; *Toxicol In Vitro* 17 (5-6):525-32 (2003)

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

12.1.16 Populations at Special Risk



Carbamazepine is contraindicated in patients with a history of previous bone marrow depression, acute intermittent porphyria, and/or hypersensitivity to the drug or in patients who have demonstrated sensitivity to any of the tricyclic antidepressants (e.g., [amitriptyline](#), [desipramine](#), [imipramine](#), [nortriptyline](#), [protriptyline](#)).

McEvoy, G.K. (ed.). *American Hospital Formulary Service. AHFS Drug Information. American Society of Health-System Pharmacists, Bethesda, MD. 2007.*, p. 2222

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

Carbamazepine may exacerbate seizures in some children with mixed seizure disorders.

McEvoy, G.K. (ed.). *American Hospital Formulary Service. AHFS Drug Information. American Society of Health-System Pharmacists, Bethesda, MD. 2007.*, p. 2222

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

We herein report a case of new-onset epileptic seizures induced by carbamazepine in an individual with autism spectrum disorders. ... epileptic seizures may possibly be either precipitated or exacerbated by carbamazepine especially in individuals with autism spectrum disorders.

[PMID:15276670](#)

Monji A et al; *Eur Psychiatry* 19 (5): 322-3 (2004)

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

12.1.17 Protein Binding



Carbamazepine is 75%-80% bound to plasma proteins. One pharmacokinetic study indicates that it is 72% bound to plasma proteins.

► [DrugBank](#)

12.2 Ecological Information



12.2.1 Environmental Fate / Exposure Summary



Carbamazepine's production and use as an anticonvulsive may result in its release to the environment through various waste streams. If released to air, an estimated vapor pressure of 1.8X10⁻⁷ mm Hg at 25 °C indicates carbamazepine will exist in both the vapor and particulate phases in the atmosphere. Vapor-phase carbamazepine will be degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life for this reaction in air is estimated to be 4 hours. Particulate-phase carbamazepine will be removed from the atmosphere by wet or dry deposition. Carbamazepine does contain chromophores that absorb at wavelengths >290 nm and therefore may be susceptible to direct photolysis by sunlight. If released to soil, carbamazepine is expected to have moderate mobility based upon an estimated K_{oc} of 510. Volatilization from moist soil surfaces is not expected to be an important fate process based upon an estimated Henry's Law constant of 1.1X10⁻¹⁰ atm-cu m/mole. A 7% removal rate in sewage treatment plants indicates that biodegradation is not an important environmental fate process. If released into [water](#), carbamazepine is expected to adsorb to suspended solids and sediment based upon the estimated K_{oc}. Volatilization from [water](#) surfaces is not expected to be an important fate process based upon this compound's estimated Henry's Law constant. Carbamazepine was fairly persistent when tested in a field experiment using epilimnion lake [water](#), exhibiting a half-life of 63 days. An estimated BCF of 15 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 readily under environmental conditions. The compound is susceptible to direct photolysis in [water](#), with a half-life of approximately 1 day. Occupational exposure to carbamazepine may

occur through inhalation and dermal contact with this compound at workplaces where carbamazepine is produced or used. Monitoring and use data indicate that the general population may be exposed to carbamazepine via ingestion drinking [water](#), as well as those administered this drug, an anticonvulsive. (SRC)

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

12.2.2 Artificial Pollution Sources



Carbamazepine's production and use as an analgesic/antiepileptic drug(1) may result in its release to the environment through various waste streams(SRC).

(1) Ashford RD; *Ashford's Dictionary of Industrial Chemicals*. London, England: Wavelength Publ, Ltd. p. 175 (1994)

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

12.2.3 Environmental Fate



TERRESTRIAL FATE: Based on a classification scheme(1), an estimated Koc value of 520(SRC), determined from a log Kow of 2.45(2) and a regression-derived equation(3), indicates that carbamazepine is expected to have moderate mobility in soil(SRC). Volatilization of carbamazepine from moist soil surfaces is not expected to be an important fate process(SRC) given an estimated Henry's Law constant of 1.1X10⁻¹⁰ atm-cu m/mole(SRC), using a fragment constant estimation method(4). Carbamazepine is not expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 1.8X10⁻⁷ mm Hg(SRC), determined from a fragment constant method(5). A 7% removal rate in sewage treatment plants(8) suggests that biodegradation is not an important environmental fate process in soil(SRC).

(1) Swann RL et al; *Res Rev* 85: 17-28 (1983) (2) Dal Pozzo A et al; *Int J Pharm* 50: 97-101 (1989) (3) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods*. Washington, DC: Amer Chem Soc pp. 4-9 (1990) (4) Meylan WM, Howard PH; *Environ Toxicol Chem* 10: 1283-93 (1991) (5) Lyman WJ; p. 31 in *Environmental Exposure From Chemicals Vol I*, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985) (6) Pfluger P, Dietrich DR; pp 11-17 in *Pharmaceuticals in the environment*. Kuemmerer K, ed., Springer, NY (2001)

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

AQUATIC FATE: Based on a classification scheme(1), an estimated Koc value of 510(SRC), determined from a log Kow of 2.45(2) and a regression-derived equation(3), indicates that carbamazepine 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 1.1X10⁻¹¹ atm-cu m/mole(SRC), developed using a fragment constant estimation method(4). The compound is susceptible to direct photolysis in [water](#)(5). Applying carbamazepine to natural river [water](#) and subjecting this to solar radiation resulted in a half-life of 907 hours(9). According to a classification scheme(6), an estimated BCF of 15(SRC), from its log Kow(2) and a regression-derived equation(7), suggests the potential for bioconcentration in aquatic organisms is low(SRC). Carbamazepine was fairly persistent when tested in a field experiment using epilimnion lake [water](#), exhibiting an overall elimination rate constant of 0.11 1/day; this corresponds to a half-life of 63 days(8).

(1) Swann RL et al; *Res Rev* 85: 17-28 (1983) (2) Doll TE, Frimmel FH; *Chemosphere* 52: 1757-69 (2003) (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) Doll TE, Frimmel FH; *Chemosphere* 52: 1757-69 (2003) (6) Franke C et al; *Chemosphere* 29: 1501-14 (1994) (7) Meylan WM et al; *Environ Toxicol Chem* 18: 664-72 (1999) (8) Tixier C et al; *Environ Sci Technol* 37: 1061-8 (2003) (9) Andreozzi R et al; *Water Res* 36: 2869-77 (2002)

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

ATMOSPHERIC FATE: According to a model of gas/particle partitioning of semivolatile organic compounds in the atmosphere(1), carbamazepine, which has an estimated vapor pressure of 1.8×10^{-7} mm Hg at 25 °C(SRC), determined from a fragment constant method(2), will exist in both the vapor and particulate phases in the ambient atmosphere. Vapor-phase carbamazepine is degraded in the atmosphere by reaction with photochemically-produced hydroxyl radicals(SRC); the half-life for this reaction in air is estimated to be 4 hours(SRC), calculated from its rate constant of 8.1×10^{-11} cu cm/molecule-sec at 25 °C(SRC) that was derived using a structure estimation method(3). Carbamazepine absorbs light at wavelengths >290 nm(4) and therefore may be susceptible to direct photolysis by sunlight(SRC).

(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) Meylan WM, Howard PH; *Chemosphere* 26: 2293-99 (1993) (4) Andreozzi R et al; *Water Res* 36: 2869-77 (2002)

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

12.2.4 Environmental Biodegradation



AEROBIC: Removal of carbamazepine in German sewage treatment plants was found to be extremely low at 7% (1). Using a batch suspension of activated sludge maintained under aerobic conditions, an initial decrease in 5.0 ug/L carbamazepine was observed in the first 15 minutes, then reached a constant level of 3.1 ug/L; 37% loss was attributed to adsorption to sludge. No metabolites were identified and no further degradation was observed(2).

(1) Pflugner P, Dietrich DR; pp 11-17 in *Pharmaceuticals in the environment*. Kuemmerer K, ed., Springer, NY (2001) (2) Mohle E, Metzger JW; in *Amer Chem Soc Symp Ser 791(Pharmaceuticals and personal care products in the environment)*: 192-705 (2001)

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

AEROBIC: Carbamazepine was fairly persistent when tested in a field experiment using Lake Greifensee epilimnion [water](#), Switzerland, tested from August 16, 1999 through October 22, 1999(1); an overall elimination rate constant of 0.11 1/day was reported, corresponding to a half-life of 63 days(1).

[PMID:12680655](#)

(1) Tixier C et al; *Environ Sci Technol* 37: 1061-8 (2003)

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

ANAEROBIC: Carbamazepine was found to be present in [water](#) samples following bank infiltration treatment under anaerobic conditions in a waterworks area in Germany(1).

[PMID:12322761](#)

(1) Ternes TA et al; *Environ Sci Technol* 36: 3855-63 (2002)

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

12.2.5 Environmental Abiotic Degradation



The rate constant for the vapor-phase reaction of carbamazepine with photochemically-produced hydroxyl radicals has been estimated as 8.1×10^{-11} cu cm/molecule-sec at 25 °C(SRC) using a structure estimation method(1). This corresponds to an atmospheric half-life of about 4 hours at an atmospheric concentration of

5X10⁵ hydroxyl radicals per cu cm(1). The rate constant for the vapor-phase reaction of carbamazepine with **ozone** has been estimated as 2.5X10⁻¹⁶ cu cm/molecule-sec at 25 °C(SRC) that was derived using a structure estimation method(1). This corresponds to an atmospheric half-life of about 1 hour at an atmospheric concentration of 7X10¹¹ **ozone** molecules per cu cm(2). Carbamazepine is not expected to undergo hydrolysis in the environment due to the lack of functional groups that hydrolyze readily under environmental conditions(3). Carbamazepine absorbs light at wavelengths >290 nm(5) and therefore may be susceptible to direct photolysis by sunlight(SRC). The compound is susceptible to direct photolysis in **water**, with measured rates ranging from 0.0006 1/min(4) to 5.7X10⁻³ 1/hr, (half-life of 121 hours)(5). The presence of dissolved humic acid (5.0X10⁻³ g dm⁻³) resulted in an increase in the half-life to 233.7 hrs(5). Applying carbamazepine to natural river **water** and subjecting this to solar radiation resulted in a half-life of 907 hours(5).

(1) Meylan WM, Howard PH; *Chemosphere* 26: 2293-99 (1993) (2) Atkinson R, Carter WPL; *Chem Rev* 84: 437-70 (1984) (3) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods*. Washington, DC: Amer Chem Soc pp. 7-4, 7-5, 8-12 (1990) (4) Doll TE, Frimmel FH; *Chemosphere* 52: 1757-69 (2003) (5) Andreozzi R et al; *Water Res* 36: 2869-77 (2002)

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

12.2.6 Environmental Bioconcentration



An estimated BCF of 15 was calculated in fish for carbamazepine(SRC), using a log Kow of 2.45(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) Dal Pozzo A et al; *Int J Pharm* 50: 97-101 (1989) (2) Meylan WM et al; *Environ Toxicol Chem* 18: 664-72 (1999) (3) Franke C et al; *Chemosphere* 29: 1501-14 (1994)

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

12.2.7 Soil Adsorption / Mobility



The Koc of carbamazepine is estimated as 510(SRC), using a log Kow of 2.45(1) and a regression-derived equation(2). According to a classification scheme(3), this estimated Koc value suggests that carbamazepine is expected to have moderate mobility in soil. In a soil column study using Mahall-Leveen sandy soil from an area northwest of Phoenix, AZ, carbamazepine was detected in the column leachate at a concentration of 0.116 ug/L following addition of the compound at 0.170 ug/L 20 days prior(4).

(1) Dal Pozzo A et al; *Int J Pharm* 50: 97-101 (1989) (2) Lyman WJ et al; *Handbook of Chemical Property Estimation Methods*. Washington, DC: Amer Chem Soc pp. 4-9 (1990) (3) Swann RL et al; *Res Rev* 85: 17-28 (1983) (4) Cordy GE et al; *Ground Water Monit Remed* 24: 58-69 (2004)

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

12.2.8 Volatilization from Water / Soil



The Henry's Law constant for carbamazepine is estimated as 1.1X10⁻¹⁰ atm-cu m/mole(SRC) using a fragment constant estimation method(1). This Henry's Law constant indicates that carbamazepine is expected to be essentially nonvolatile. Carbamazepine is expected to volatilize from dry soil surfaces(SRC) based upon an estimated vapor pressure of 1.8X10⁻⁷ mm Hg(SRC), determined from a fragment constant method(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) Lyman WJ; p. 31 in *Environmental Exposure*

From *Chemicals Vol I*, Neely WB, Blau GE, eds, Boca Raton, FL: CRC Press (1985)

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

12.2.9 Environmental Water Concentrations



DRINKING WATER: Carbamazepine was detected in 1 of 12 drinking **water** samples collected from different facilities in Germany at a maximum concentration of 0.30 ug/L, detection limit of 0.01 ug/L(1).

(1) Ternes T; in *Amer Chem Soc, Div Environ Chem., Preprint Ext Abstr, 219th ASC Natl Mtg., 40: 98-00 (2000)*

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

SURFACE WATER: Carbamazepine is ubiquitous in the environment(1,2). A median concentration of 0.25 ug/L has been reported in German rivers(2). Concentrations as high as 1,075 ng/L have been detected in Berlin, Germany surface waters(4). Levels in waters samples from the Boulder Basin of Lake Mead, Nevada, sampled between 1997 and 1999 ranged from 14 to 35 ng/L(3). Carbamazepine concentrations in Iowa surface waters sampled in 2001 were (% frequency) 0.002 (4.3), 0.008 (4.3), and 0.263 (70.0) ug/L during high-flow, normal-flow, and low-flow conditions, respectively; reporting limit = 0.0107 ug/L(5).

(1) Daughton CG; in *Amer Chem Soc Symp Ser 791(Pharmaceuticals and personal care products in the environment): 2-38 (2001)*

(2) Pfluger P, Dietrich DR; pp 11-17 in *Pharmaceuticals in the environment. Kuemmerer K, ed., Springer, NY (2001)* (3) Snyder SA

et al; in *Amer Chem Soc Symp Ser 791(Pharmaceuticals and personal care products in the environment): 116-39 (2001)* (4)

Heberer T; *Toxicol Lett* 131: 5-17 (2002) (5) Kolpin DW et al; *Sci Total Environ* 348: 119-130 (2004)

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

SEAWATER: Carbamazepine was not detected in **water** from the Tromso, Norway Sound during sampling in April, 2002(1).

PMID:15212901

(1) Weigel S et al; *Chemosphere* 56: 583-92 (2004)

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

12.2.10 Effluent Concentrations



Carbamazepine has been reported in sewage treatment plant and environmental samples(1). A median concentration of 2.1 ug/L has been reported in German sewage treatment plant effluents(2) with concentrations in these effluents as high as 6.3 ug/L(3). The maximum carbamazepine concentrations in waste **water** treatment plant effluents in Switzerland sampled for a period of 3 months reached 0.95 ug/L(4). A concentration of 0.27 ug/L was reported in an Asgard Norway sewer sample collected on April 18, 2002(5).

(1) Daughton CG; in *Amer Chem Soc, ACS Symp Ser 2001, 791(Pharmaceuticals and personal care products in the environment):*

2-38(2001) (2) Pfluger P, Dietrich DR; pp 11-17 in *Pharmaceuticals in the environment. Kuemmerer K, ed., Springer, NY (2001)* (3)

Ternes T; in *Amer Chem Soc, Div Environ Chem., Preprint Ext Abstr, 219th ASC Natl Mtg., 40: 98-00 (2000)* (4) Tixier C et al;

Environ Sci Technol 37: 1061-8 (2003) (5) Weigel S et al; *Chemosphere* 56: 583-92 (2004)

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

12.2.11 Milk Concentrations



Carbamazepine is distributed into breast milk. Concentrations in breast milk and in the plasma of nursing infants have been reported to reach 60% of the maternal plasma concentration.

Thomson/Micromedex. Drug Information for the Health Care Professional. Volume 1, Greenwood Village, CO. 2007., p. 704

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

12.2.12 Probable Routes of Human Exposure



NIOSH (NOES Survey 1981-1983) has statistically estimated that 5,295 workers (3,361 of these are female) are potentially exposed to carbamazepine in the US(1). Occupational exposure to carbamazepine may occur through inhalation and dermal contact with this compound at workplaces where carbamazepine is produced or used. Monitoring and use data indicate that the general population may be exposed to carbamazepine via ingestion of drinking [water](#), as well as those administered this drug, an anticonvulsive(SRC).

(1) NIOSH; NOES. National Occupational Exposure Survey conducted from 1981-1983. Estimated numbers of employees potentially exposed to specific agents by 2-digit standard industrial classification (SIC). Available at <https://www.cdc.gov/noes/> as of Jun 8, 2007.

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

13 Associated Disorders and Diseases



315 items

Disease	Evidence Type	Evidence PMID
Paroxysmal Extreme Pain Disorder	therapeutic	17145499
		17679678
Anorectal Malformations	marker/mechanism	15123016
Affective Disorders, Psychotic	therapeutic	8109663
Abnormalities, Multiple	marker/mechanism	2492459
Anemia, Aplastic	marker/mechanism	12389151
		12897634
		16886988
		2042043
		2089834
		...

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► [Comparative Toxicogenomics Database \(CTD\)](#)

3 items 	
Indication	ICD-11 Code 
Epilepsy	8A60-8A68
Type-1 diabetes	5A10
Gastric adenocarcinoma	2B72

► [Therapeutic Target Database \(TTD\)](#)

14 Literature

14.1 Consolidated References

38,915 items 



SORT BY

Publication Date - Most Recent 

[A new insight into the potential drivers of antibiotic resistance gene enrichment in the collembolan gut association with antibiotic and non-antibiotic agents](#)

Publication Name: Journal of Hazardous Materials
Publication Date: 2023-06-05
PMID: [36889073](#) DOI: [10.1016/j.jhazmat.2023.131133](#)

[Enhanced Brain Delivery via Intranasal Administration of Carbamazepine Loaded Solid Lipid Nanoparticles: Optimization, Pharmacokinetic Analysis, In-vitro, and In-vivo Drug Release Study](#)

Publication Name: Current Drug Delivery
Publication Date: 2023-06
PMID: [35598246](#) DOI: [10.2174/1567201819666220519120837](#)

[Analyzing the potential environmental impact of NIOSH list of hazardous drugs \(group 2\)](#)

Publication Name: The Science of the total environment
Publication Date: 2023-05-15
PMID: [36822426](#) DOI: [10.1016/j.scitotenv.2023.162280](#)

[Electrochemical oxidation of carbamazepine in water using enhanced blue TiO₂ nanotube arrays anode on porous titanium substrate](#)

Publication Name: Chemosphere
Publication Date: 2023-05
PMID: [36812998](#) DOI: [10.1016/j.chemosphere.2023.138193](#)

[Carbamazepine, venlafaxine, tramadol, and their main metabolites: Toxicological effects on zebrafish embryos and larvae](#)

Publication Name: Journal of Hazardous Materials
Publication Date: 2023-04-15
PMID: [36860067](#) DOI: [10.1016/j.jhazmat.2023.130909](#)

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[► PubChem](#)

14.2 NLM Curated PubMed Citations



All NLM Curated PubMed Citations



administration and dosage	history	urine
adverse effects	immunology	
analogs and derivatives	isolation and purification	
analysis	metabolism	
antagonists and inhibitors	pharmacokinetics	
biosynthesis	pharmacology	
blood	poisoning	
cerebrospinal fluid	radiation effects	
chemical synthesis	standards	
chemistry	supply and distribution	
classification	therapeutic use	
economics	toxicity	

[► PubChem](#)

14.3 Springer Nature References



25,248 items



SORT BY Publication Date - Oldest



Carbamazepine

Publication Date: 2013

Publication Name: Antiepileptic Drug Interactions

Exercise Improved the Anti-Epileptic Effect of Carbamazepine through GABA Enhancement in Epileptic Rats

PMID: [34008120](#)

Publication Date: 2021

Publication Name: Neurochemical Research



Effect of probenecid on the pharmacokinetics of carbamazepine in healthy subjects

PMID: [15915352](#)

Publication Date: 2005

Publication Name: European Journal of Clinical Pharmacology

Brivaracetam/carbamazepine interaction

Publication Date: 2021

Publication Name: Reactions Weekly



Effect of denzimol on carbamazepine and carbamazepine-10,11-epoxide concentrations in serum, liver, spleen and different brain regions of the rat: an inhibitory metabolic interaction

Publication Date: 1988

Publication Name: Naunyn-Schmiedeberg's Archives of Pharmacology

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► Springer Nature

14.4 Thieme References



13 items



Search

SORT BY Publication Date - Most Recent

Freezing the Butterfly Motion of Carbamazepine Derivatives

DOI: 10.1055/s-0035-1560201

Publication Date: 2015

Publication Name: Synthesis

Double Palladium-Catalyzed Synthesis of Azepines

DOI: 10.1055/s-0032-1317667

Publication Date: 2013

Publication Name: Synlett

Synthesis of Biologically Active Seven-Membered-Ring Heterocycles

DOI: 10.1055/s-0033-1338549

Publication Date: 2013

Publication Name: Synthesis

Formation of Epoxides by Oxidation

Publication Date: 2012

Publication Name: Science of Synthesis

N-Acylation of 5H-Dibenz[b,f]azepines Followed by Amination

Publication Date: 2012

Publication Name: Science of Synthesis

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► Thieme Chemistry

14.5 Wiley References



2 items



Enantiospecific Analysis of 8-Prenylnaringenin in Biological Fluids by Liquid-Chromatography-Electrospray Ionization Mass Spectrometry: Application to Preclinical Pharmacokinetic Investigations

DOI: 10.1002/chir.22343

Publication Date: 2014
Publication Name: Chirality

Enantiomer-Specific In Vitro Biotransformation of Select Pharmaceuticals in Rainbow Trout (*Oncorhynchus mykiss*)

DOI: [10.1002/chir.22211](https://doi.org/10.1002/chir.22211)

Publication Date: 2013
Publication Name: Chirality

► [Wiley](#)

14.6 Depositor Provided PubMed Citations



7,019 items



Search

SORT BY **Publication Date - Most Recent** ▼

Study of the metabolic stability profiles of perampanel, rufinamide and stiripentol and prediction of drug interactions using HepaRG cells as an in vitro human model

PMID: [35597399](#)

Publication Date: 2022-08-01

Journal: Toxicology in vitro : an international journal published in association with BIBRA

The novel persistent sodium current inhibitor PRAX-562 has potent anticonvulsant activity with improved protective index relative to standard of care sodium channel blockers

PMID: [35037706](#)

Publication Date: 2022-03-01

Journal: Epilepsia

Inhibition of autophagy with expression of NADPH oxidase subunit p22phox in preneoplastic lesions in a high-fat diet and streptozotocin-related hepatocarcinogenesis rat model

PMID: [35786680](#)

Publication Date: 2022-01-01

Journal: The Journal of toxicological sciences

Extracellular Vesicles from Human Plasma Show a Distinctive Proteome and miRNome Profile in Patients with Severe Cutaneous Adverse Reactions

PMID: [34142820](#)

Publication Date: 2021-07-19

Journal: Chemical research in toxicology

A Gene Expression Biomarker Predicts Heat Shock Factor 1 Activation in a Gene Expression Compendium

PMID: [34170685](#)

Publication Date: 2021-07-19

Journal: Chemical research in toxicology

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[► PubChem](#)

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[► DrugBank](#)

14.8 Metabolite References



2 items		
PMID	Reference	
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18088268	Sisodiya SM, Goldstein DB: Drug resistance in epilepsy: more twists in the tale. Epilepsia. 2007 Dec;48(12):2369-70.	

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

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22. [FDA Approved Drug Products: Carbatrol \(carbamazepine\) extended-release capsules for oral use](#)

► [DrugBank](#)

[Foster et al. Anion-switchable supramolecular gels for controlling pharmaceutical crystal growth. *Nature Chemistry*, doi: 10.1038/nchem.859, published online 10 October 2010 <http://www.nature.com/nchem>](#)

► [Nature Chemistry](#)

14.10 Chemical Co-Occurrences in Literature

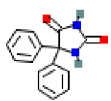
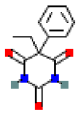


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Chemical

Selected evidence

 Phenytoin CID 1775	3,615 articles View All Use of Phenytoin, Phenobarbital Carbamazepine, Levetiracetam Lamotrigine and Valproate in Pregnancy and Breastfeeding: Risk of Major Malformations, Dose-dependency, Monotherapy vs Polytherapy, Pharmacokinetics and Clinical Implications PMID 33573557; DOI 10.2174/1570159x19666210211150856; Current neuropharmacology 2021; 19(11):1805-1824 (Review Article) Name matches: phenytoin carbamazepine A Phenytoin-Induced Ataxia Mimicking a Stroke PMID 35863977; DOI 10.1016/j.ajem.2022.07.018; The American journal of emergency medicine 2022 10; 60(?):226.e5-226.e6 Name matches: phenytoin carbamazepine Development of a useful single-reference HPLC method for therapeutic drug monitoring of phenytoin and carbamazepine in human plasma PMID 36637705; DOI 10.1007/s44211-023-00266-z; Analytical sciences : the international journal of the Japan Society for Analytical Chemistry 2023 Jan; ?(?): Name matches: phenytoin carbamazepine
 Valproic Acid CID 3121	3,537 articles View All [Effects of lithium, valproic acid, carbamazepine and antipsychotic agents on cognition in bipolar disorders-A systematic review] PMID 36922444; DOI 10.1007/s00115-023-01454-y; Der Nervenarzt 2023 Mar; ?(?): (Review Article) Name matches: valproic acid carbamazepine Comparison of myocardial perfusion between the users of two antiepileptic medications: valproate vs. carbamazepine PMID 37324229; DOI 10.22038/aojnmb.2023.67084.1465; Asia Oceania journal of nuclear medicine & biology 2023; 11(2):122-127 Name matches: valproate carbamazepine Cytotoxicity Activity of Graviola Fruit Extract with Carbamazepine and Valproic Acid Show Antagonistic and Indifferent Effects PMID 37378914; DOI 10.31557/apjcp.2023.24.6.1869; Asian Pacific journal of cancer prevention : APJCP 2023 Jun; 24(6):1869-1875 Name matches: valproic acid carbamazepine
 Phenobarbital CID 4763	2,280 articles View All Use of Phenytoin, Phenobarbital Carbamazepine, Levetiracetam Lamotrigine and Valproate in Pregnancy and Breastfeeding: Risk of Major Malformations, Dose-dependency, Monotherapy vs Polytherapy, Pharmacokinetics and Clinical Implications PMID 33573557; DOI 10.2174/1570159x19666210211150856; Current neuropharmacology 2021; 19(11):1805-1824 (Review Article) Name matches: phenobarbital carbamazepine Drug Reaction with Eosinophilia and Systemic Symptom (DRESS) induced by carbamazepine: a case report and literature review PMID 25360193; DOI 10.11604/pamj.2014.18.9.3799; The Pan African medical journal 2014; 18(?):9 (Review Article) Name matches: phenobarbital carbamazepine Carbamazepine versus phenobarbitone monotherapy for epilepsy: an individual participant data review PMID 26204241; DOI 10.1002/14651858.cd001904.pub2; The Cochrane database of systematic reviews 2015 Jul; ?(7):CD001904 (Review Article) Name matches: phenobarbitone carbamazepine

14.11 Chemical-Gene Co-Occurrences in Literature



Showing 3 of 100 View More	
Gene/Protein/Enzyme	Selected evidence
hla-b	290 articles View All Carbamazepine-modified HLA-A*24:02-bound peptidome: Implication of CORO1A in skin rash PMID 35526384; DOI 10.1016/j.intimp.2022.108804; International immunopharmacology 2022 Aug; 109(?):108804 Name matches: hla-b carbamazepine Associations of HLA genetic variants with carbamazepine-induced cutaneous adverse drug reactions: An updated meta-analysis PMID 35599240; DOI 10.1111/cts.13291; Clinical and translational science 2022 08; 15(8):1887-1905 Name matches: hla-b carbamazepine Development of label-free electrochemical impedance spectroscopy for the detection of HLA-B*15:02 and HLA-B*15:21 for the prevention of carbamazepine-induced Stevens-Johnson syndrome PMID 36191668; DOI 10.1016/j.ab.2022.114931; Analytical biochemistry 2022 12; 658(?):114931 Name matches: hla-b carbamazepine
	311 articles View All Effects of itraconazole and carbamazepine on the pharmacokinetics of nirmatrelvir/ritonavir in healthy adults PMID 37184075; DOI 10.1111/bcp.15788; British journal of clinical pharmacology 2023 May; ?(?): Name matches: cytochrome p450 carbamazepine Application of the Population Pharmacokinetics Model-Based Approach to the Prediction of Drug-Drug Interaction between Rivaroxaban and Carbamazepine in Humans PMID 37242468; DOI 10.3390/ph16050684; Pharmaceuticals (Basel, Switzerland) 2023 May; 16(5): Name matches: cytochrome p450 carbamazepine Application of physiologically-based pharmacokinetic model approach to predict pharmacokinetics and drug-drug interaction of rivaroxaban: A case study of rivaroxaban and carbamazepine PMID 36193622; DOI 10.1002/psp4.12844; CPT: pharmacometrics & systems pharmacology 2022 Nov; 11(11):1430-1442 Name matches: cytochrome p450 carbamazepine
	240 articles View All Carbamazepine for Chronic Muscle Pain: A Retrospective Assessment of Indications, Side Effects, and Treatment Response PMID 36672104; DOI 10.3390/brainsci13010123; Brain sciences 2023 Jan; 13(1): Name matches: sodium channel carbamazepine Neurologic toxicity of carbamazepine in treatment of trigeminal neuralgia PMID 35101289; DOI 10.1016/j.ajem.2022.01.044; The American journal of emergency medicine 2022 05; 55(?):231.e3-231.e5

Name matches: sodium channel *carbamazepine*

Carbamazepine promotes surface expression of mutant Kir6.2-A28V ATP-sensitive potassium channels by modulating Golgi retention and autophagy

PMID 35398096; DOI 10.1016/j.jbc.2022.101904; The Journal of biological chemistry 2022 05; 298(5):101904

Name matches: sodium channel *carbamazepine*

► [PubChem](#)

14.12 Chemical-Disease Co-Occurrences in Literature



Showing 3 of 25 View More		
Disease	Selected evidence	
Epilepsy	4,665 articles View All The ABCB1, ABCC2 and RALBP1 polymorphisms are associated with carbamazepine response in epileptic patient: a systematic review PMID 35325436; DOI 10.1007/s13760-022-01920-5; Acta neurologica Belgica 2022 Aug; 122(4):871-880 (Review Article) Name matches: <i>epilepsy</i>; <i>epileptic carbamazepine</i> Anti-seizure efficacy and retention rate of carbamazepine is highly variable in randomized controlled trials: A meta-analysis PMID 35980668; DOI 10.1002/epi4.12644; Epilepsia open 2022 12; 7(4):556-569 (Review Article) Name matches: <i>epilepsy carbamazepine</i> Possible Clinical and Pharmacogenetic Predictors of the Efficacy and Safety of Carbamazepine in Post-COVID-19 Depression PMID 36170698; Psychiatria Danubina 2022 Sep; 34(Suppl 8):31-37 (Review Article) Name matches: <i>epilepsy</i>; <i>epileptiform activity carbamazepine</i>	
	3,491 articles View All Anti-seizure efficacy and retention rate of carbamazepine is highly variable in randomized controlled trials: A meta-analysis PMID 35980668; DOI 10.1002/epi4.12644; Epilepsia open 2022 12; 7(4):556-569 (Review Article) Name matches: <i>seizure carbamazepine</i> Influence of EPHX1 c.337 T>C and UGT2B7*2 genetic polymorphisms on the requirement of carbamazepine maintenance dose in person with epilepsy (PWE) of Southern part of India: a cross-sectional genetic association study PMID 36853909; DOI 10.1515/dmpt-2022-0157; Drug metabolism and personalized therapy 2023 Mar; ? (?) Name matches: <i>seizures carbamazepine</i> A highlight on carbamazepine-induced adverse drug reactions in Saudi Arabia: a retrospective medical records-based study PMID 37199768; DOI 10.1007/s00210-023-02525-2; Naunyn-Schmiedeberg's archives of pharmacology 2023 May; ?(?) Name matches: <i>seizures carbamazepine</i>	
	1,063 articles View All	
Bipolar Disorder		

[\[Effects of lithium, valproic acid, carbamazepine and antipsychotic agents on cognition in bipolar disorders-A systematic review\]](#)

PMID 36922444; DOI 10.1007/s00115-023-01454-y; Der Nervenarzt 2023 Mar; ?(?): (Review Article)
Name matches: **bipolar disorder**; **bipolar disorders** *carbamazepine*

[Possible Clinical and Pharmacogenetic Predictors of the Efficacy and Safety of Carbamazepine in Post-COVID-19 Depression](#)

PMID 36170698; Psychiatria Danubina 2022 Sep; 34(Suppl 8):31-37 (Review Article)
Name matches: **bipolar affective disorder** *carbamazepine*

[Central Pontine Myelinolysis With Carbamazepine-Induced Syndrome of Inappropriate Antidiuretic Hormone and Its Management: A Case Report and Literature Review](#)

PMID 37033593; DOI 10.7759/cureus.35816; Cureus 2023 Mar; 15(3):e35816
Name matches: **bipolar affective disorder** *carbamazepine*

► PubChem

15 Patents



[US5284662](#)
[US5912013](#)
[US6977253](#)
[US7635773](#)
[US8410077](#)
[US9493582](#)
[US9629797](#)
[US9770407](#)
[US9750822](#)

► DrugBank

15.1 Depositor-Supplied Patent Identifiers



71,823 items		
Search	SORT BY	Priority Date - Most Recent
Detachable electrolysis-adsorption coupling reactor and wastewater treatment device		
Publication Number: CN-217947862-U		
Priority Date: 2022-08-25 Grant Date: 2022-12-02		
A PPCPs water pollution purification device		
Publication Number: CN-217947868-U		
Priority Date: 2022-08-25 Grant Date: 2022-12-02		
An extraction column for liquid chromatography		
Publication Number: CN-115078615-A		
Priority Date: 2022-08-22		
An extraction column for liquid chromatography		

Publication Number: [CN-115078615-B](#)

Priority Date: 2022-08-22 Grant Date: 2022-12-02

[A lithium salt concentration device](#)Publication Number: [CN-217939212-U](#)

Priority Date: 2022-08-22 Grant Date: 2022-12-02

<< First < Previous Page 1 of 14,365 Next > Last >>

[▶ 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=FFGPTBGBLSHEPO-UHFFFAOYSA-N>[▶ PATENTSCOPE \(WIPO\)](#)

15.3 FDA Orange Book Patents



1 of 4		View All
Patent	6977253	
Expiration	May 19, 2024	
Applicant	VALIDUS PHARMS	
Drug Application	N021710 (Prescription Drug: EQUETRO. Ingredients: CARBAMAZEPINE)	

[▶ FDA Orange Book](#)

2 of 4		View All
Patent	9629797	
Expiration	Nov 10, 2028	
Applicant	LUNDBECK PHARMS LLC	
Drug Application	N206030 (Prescription Drug: CARNEXIV. Ingredients: CARBAMAZEPINE)	

[▶ FDA Orange Book](#)

3 of 4		View All
Patent	9770407	

Expiration	Nov 10, 2028
Applicant	LUNDBECK PHARMS LLC
Drug Application	N206030 (Prescription Drug: CARNEXIV. Ingredients: CARBAMAZEPINE)

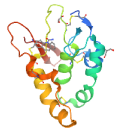
► [FDA Orange Book](#)

16 Interactions and Pathways



16.1 Protein Bound 3D Structures



1 item	
	Carbamazepine binds Frizzled8 PDB Code: 6TFB Resolution: 1.68 Å

► [RCSB Protein Data Bank \(RCSB PDB\)](#)

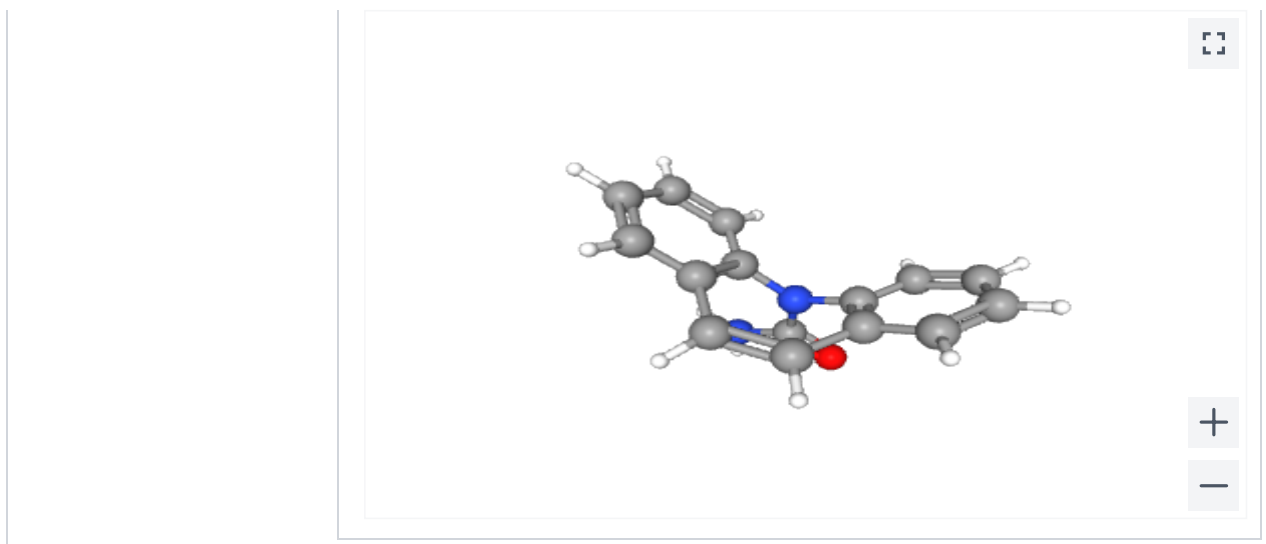
[View 1 protein in NCBI Structure](#)

► [PubChem](#)

16.1.1 Ligands from Protein Bound 3D Structures



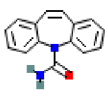
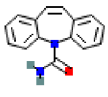
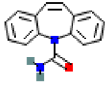
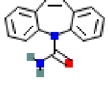
PDBe Ligand Code	N6W
PDBe Structure Code	6TFB
PDBe Conformer	 Interactive Chemical Structure Model ☒ Ball and Stick ☐ Sticks ☐ Wire-Frame ☐ Space-Filling ☒ Show Hydrogens ☐ Animate

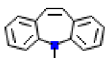


► [Protein Data Bank in Europe \(PDBe\)](#)

16.2 Chemical-Target Interactions



2,440 items 						
Search				SORT BY Data Source - A to Z 		
Structure	Gene	Taxonomy	Action 	Evidence IDs 	Data Source	
	CYP3A5	Homo sapiens (human)		PMID:12673034	Drug Gene Interaction database (DGIdb)	
	HLA-DRB1	Homo sapiens (human)		PMID:24399721 PMID:23830818	Drug Gene Interaction database (DGIdb)	
	CYP2B6	Homo sapiens (human)		PMID:17638512 PMID:21738081	Drug Gene Interaction database (DGIdb)	
	POU5F1	Homo sapiens (human)			Drug Gene Interaction database (DGIdb)	

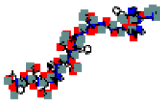
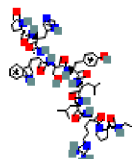
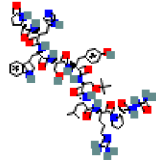
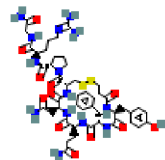
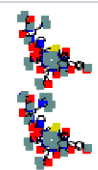
**SCN11A** **Homo sapiens (human)** Blocker Drug Gene Interaction database (DGIdb)

<< First < Previous Page 1 of 488 Next > Last >>

► ChEMBL; Comparative Toxicogenomics Database (CTD); Drug Gene Interaction database (DGIdb); DrugBank; IUPHAR/...

16.3 Drug-Drug Interactions

2,017 items

	Drug: Bivalirudin	Interaction: The risk or severity of bleeding can be increased when Bivalirudin is combined with Carbamazepine.
	Drug: Leuprolide	Interaction: Leuprolide may decrease the excretion rate of Carbamazepine which could result in a higher serum level.
	Drug: Goserelin	Interaction: Goserelin may decrease the excretion rate of Carbamazepine which could result in a higher serum level.
	Drug: Desmopressin	Interaction: The risk or severity of adverse effects can be increased when Carbamazepine is combined with Desmopressin.
	Drug: Vasopressin	Interaction: The risk or severity of water intoxication can be increased when Carbamazepine is combined with Vasopressin.

<< First < Previous Page 1 of 404 Next > Last >>

► DrugBank

16.4 Drug-Food Interactions

- Avoid alcohol. Ingesting alcohol may increase drowsiness and dizziness.
- Avoid grapefruit products.

- Exercise caution with St. John's Wort. This herb induces the CYP3A metabolism of carbamazepine and may reduce its serum concentration.
- Take with or without food.

► [DrugBank](#)

16.5 Pathways



1 item



Carbamazepine Metabolism Pathway

Source: [PathBank](#) External ID: [SMP0000634](#)

Taxonomy: [Homo sapiens \(human\)](#)

► [PubChem](#)

17 Biological Test Results



17.1 BioAssay Results

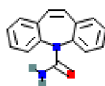


6,736 items



Search

SORT BY Activity Value - Increasing

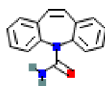


BK Channel Variant Modulator Selectivity Assay

Activity: [Inactive](#) Activity Value: -0.0824173 μ M

BioAssay AID: [1259406](#)

Substance SID: [363920227](#) Compound CID: [2554](#)

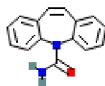


BK Channel Variant Modulator Selectivity Assay

Activity: [Inactive](#) Activity Value: -0.0474071 μ M

BioAssay AID: [1259406](#)

Substance SID: [363920227](#) Compound CID: [2554](#)

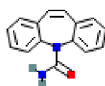


BK Channel Variant Modulator Selectivity Assay

Activity: [Inactive](#) Activity Value: -0.038879 μ M

BioAssay AID: [1259406](#)

Substance SID: [363920227](#) Compound CID: [2554](#)



BK Channel Variant Modulator Selectivity Assay

Activity: [Inactive](#) Activity Value: -0.0331227 μ M

BioAssay AID: [1259406](#)

Substance SID: [363920227](#) Compound CID: [2554](#)

BK Channel Variant Modulator Selectivity Assay

Activity: **Inactive** Activity Value: -0.011408 μ M

Page 1 of 1,348

► PubChem

18 Classification



18.1 MeSH Tree



1 item

View in Classification Browser

MeSH Tree > Diseases Category > Chemically-Induced Disorders > Drug-Related Side Effects and Adverse Reactions > Metabolic Side Effects of Drugs and Substances > Cytochrome P-450 Enzyme Inducers

Carbamazepine

A dibenzazepine that acts as a sodium channel blocker. It is used as an anticonvulsant for the treatment of grand mal and psychomotor or focal SEIZURES. It may also be used in the management of BIPOLAR DISORDER, and has analgesic properties.

► Medical Subject Headings (MeSH)

18.2 NCI Thesaurus Tree



1 item

View in Classification Browser

NCI Thesaurus Tree > Drug, Food, Chemical or Biomedical Material > Pharmacologic Substance > Agent Affecting Nervous System

Carbamazepine

A tricyclic compound chemically related to tricyclic antidepressants (TCA) with anticonvulsant and analgesic properties. Carbamazepine exerts its anticonvulsant activity by reducing polysynaptic responses and blocking post-tetanic potentiation. Its analgesic activity is not understood; however, carbamazepine is commonly used to treat pain associated with trigeminal neuralgia.

► NCI Thesaurus (NCIt)

18.3 ChEBI Ontology



1 item

View in Classification Browser

ChEBI Ontology > chemical entity > molecular entity > main group molecular entity > p-block molecular entity > carbon group molecular entity > organic molecular entity > heteroorganic entity > organic heterocyclic compound > organic heteropolycyclic compound > organic heterotricyclic compound

carbamazepine

A dibenzoazepine that is 5H-dibenzo[b,f]azepine carrying a carbamoyl substituent at the azepine nitrogen, used as an anticonvulsant.

► ChEBI

18.4 KEGG: Drug



1 item

View in Classification Browser

Therapeutic category of drugs in Japan > 1 Agents affecting nervous system and sensory organs > 11 Agents affecting central nervous system > 117 Psychotropics

[Carbamazepine \(JP18/USP/INN\)](#)

► [KEGG](#)

18.5 KEGG: USP



1 item

View in Classification Browser

USP drug classification > Central Nervous System Agents > Central Nervous System, Other

[Carbamazepine \(JP18/USP/INN\)](#)

► [KEGG](#)

18.6 KEGG: ATC



1 item

View in Classification Browser

Anatomical Therapeutic Chemical (ATC) classification > N NERVOUS SYSTEM > N03 ANTIEPILEPTICS > N03A ANTIEPILEPTICS > N03AF Carboxamide derivatives

[Carbamazepine \(JP18/USP/INN\)](#)

► [KEGG](#)

18.7 KEGG: Target-based Classification of Drugs



1 item

View in Classification Browser

Target-based classification of drugs > Ion channels > Voltage-gated ion channels > Sodium channels

[Carbamazepine \(JP18/USP/INN\)](#)

► [KEGG](#)

18.8 KEGG: JP15



1 item

View in Classification Browser

Drugs listed in the Japanese Pharmacopoeia

[Carbamazepine](#)

[▶ KEGG](#)

18.9 KEGG: Drug Groups



1 item

[View in Classification Browser](#)

Drug Groups > Neuropsychiatric agent > DG03199 Antiepileptic agent

[Carbamazepine](#)[▶ KEGG](#)

18.10 KEGG: Drug Classes



1 item

[View in Classification Browser](#)

Drug Classes > Neuropsychiatric agent

[Carbamazepine](#)[▶ KEGG](#)

18.11 WHO ATC Classification System



1 item

[View in Classification Browser](#)

ATC Code > N - Nervous system > N03 - Antiepileptics > N03A - Antiepileptics

[N03AF01 - Carbamazepine](#)[▶ WHO Anatomical Therapeutic Chemical \(ATC\) Classification](#)

18.12 FDA Pharm Classes



7 items

[View in Classification Browser](#)

FDA Pharmacological Classification > Physiological Effects [PE] > Organ System Specific Effects [PE] > Nervous System Activity Alteration [PE] > Electrical Activity Alteration [PE] > Disorganized Electrical Activity Alteration [PE]

Decreased Central Nervous System Disorganized Electrical Activity [PE]

FDA Pharmacological Classification > Established Pharmacologic Classes [EPC]

Mood Stabilizer [EPC]

FDA Pharmacological Classification > Mechanism of Action [MoA] > Receptor Interactions [MoA] > Transcription Factor Activity [MoA] > Cytochrome P450 Inducers [MoA]

Cytochrome P450 3A4 Inducers [MoA]

FDA Pharmacological Classification > Mechanism of Action [MoA] > Receptor Interactions [MoA] > Transcription Factor Activity [MoA]

Cytochrome P450 2C9 Inducers [MoA]

FDA Pharmacological Classification > Mechanism of Action [MoA] > Receptor Interactions [MoA] > Transcription Factor Activity [MoA]
Cytochrome P450 2C19 Inducers [MoA]

<< First < Previous Page 1 of 2 Next > Last >>

► FDA Pharm Classes

18.13 ChemIDplus



63 items	View in Classification Browser
ChemIDplus Chemical Information Classification Analgesics	
ChemIDplus Chemical Information Classification Analgesics, Non-Narcotic	
ChemIDplus Chemical Information Classification Anticonvulsants	
ChemIDplus Chemical Information Classification Antimanic Agents	
ChemIDplus Chemical Information Classification CA65 California Proposition 65 - California Proposition 65 requires the state governor to publish a list of chemicals known to the state to cause cancer or reproductive toxicity	
<< First < Previous Page 1 of 13 Next > Last >>	

► ChemIDplus

18.14 IUPHAR / BPS Guide to PHARMACOLOGY Target Classification



1 item	View in Classification Browser
Guide to Pharmacology Target Classification > Receptors Class Frizzled GPCRs Receptors of the Class Frizzled (FZD, nomenclature as agreed by the NC-IUPHAR subcommittee on the Class Frizzled GPCRs), are GPCRs originally identified in <i>Drosophila</i> , which are highly conserved across species. While SMO shows structural resemblance to the 10 FZDs, it is functionally separated as it is involved in the Hedgehog signaling pathway. SMO exerts its effects by activating heterotrimeric G proteins or stabilization of GLI by sequestering catalytic PKA subunits. While SMO itself is bound by sterols and oxysterols, FZDs are activated by WNTs, which are cysteine-rich lipoglycoproteins with fundamental functions in ontogeny and tissue homeostasis. FZD signalling was initially divided into two pathways, being either dependent on the accumulation of the transcription regulator β -catenin or being β -catenin-independent (often referred to as canonical vs. non-canonical WNT/FZD signalling, respectively). WNT stimulation of FZDs can, in cooperation with the low density lipoprotein receptors <i>LRP5</i> (O75197) and <i>LRP6</i> (O75581), lead to the inhibition of a constitutively active destruction complex, which results in the accumulation of β -catenin and subsequently its translocation to the nucleus. β -catenin, in turn, modifies gene transcription by interacting with TCF/LEF transcription factors. WNT/ β -catenin-dependent signalling can also be activated by FZD subtype-specific WNT surrogates. β -catenin-independent FZD signalling is far more complex with regard to the diversity of the activated pathways. WNT/FZD signalling can lead to the activation of heterotrimeric G proteins, the elevation of intracellular calcium, activation of cGMP-specific PDE6 and elevation of cAMP as well as RAC-1, JNK, Rho and Rho kinase signalling. Novel resonance energy transfer-based tools have allowed the study of the GPCR-like nature of FZDs in greater detail. Upon ligand stimulation, FZDs undergo conformational changes and signal <i>via</i> heterotrimeric G proteins. Furthermore, the phosphoprotein Dishevelled constitutes a key player in WNT/FZD signalling towards planar-cell-polarity-like pathways. Importantly, FZDs exist in at least two	

distinct conformational states that regulate pathway selection. As with other GPCRs, members of the Frizzled family are functionally dependent on the arrestin scaffolding protein for internalization, as well as for β -catenin-dependent and -independent signalling. The pattern of cell signalling is complicated by the presence of additional ligands, which can enhance or inhibit FZD signalling (secreted Frizzled-related proteins (sFRP), Wnt-inhibitory factor (WIF), sclerostin or Dickkopf (DKK)), as well as modulatory (co)-receptors with Ryk, ROR1, ROR2 and Kremen, which may also function as independent signalling proteins.

► [IUPHAR/BPS Guide to PHARMACOLOGY](#)

18.15 ChEMBL Target Tree



70 items	View in Classification Browser
Enzyme Biological molecules that possess catalytic activity. They may occur naturally or be synthetically created. Enzymes are usually proteins, however CATALYTIC RNA and CATALYTIC DNA molecules have also been identified. [MESH:D004798]	
Secreted protein	
Surface antigen Antigens on surfaces of cells, including infectious or foreign cells or viruses. They are usually protein-containing groups on cell membranes or walls and may be isolated. [MESH:D000954]	
ChEMBL Protein Target Tree	
Oxidoreductase The class of all enzymes catalyzing oxidoreduction reactions. The substrate that is oxidized is regarded as a hydrogen donor. The systematic name is based on donor:acceptor oxidoreductase. The recommended name will be dehydrogenase, wherever this is possible; as an alternative, reductase can be used. Oxidase is only used in cases where O ₂ is the acceptor. (Enzyme Nomenclature, 1992, p9) [MESH:D010088]	
Membrane receptor Cell surface proteins that bind signalling molecules external to the cell with high affinity and convert this extracellular event into one or more intracellular signals that alter the behavior of the target cell (From Alberts, Molecular Biology of the Cell, 2nd ed, pp693-5). Cell surface receptors, unlike enzymes, do not chemically alter their ligands. [MESH:D011956]	
<< First < Previous Page 1 of 14 Next > Last >>	

► [ChEMBL](#)

18.16 UN GHS Classification



27 items	View in Classification Browser
GHS Classification Tree > Hazard Statement Codes H302: Harmful if swallowed [Warning Acute toxicity, oral]	
GHS Classification Tree > Hazard Statement Codes H317: May cause an allergic skin reaction [Warning Sensitization, Skin]	
GHS Classification Tree > Hazard Statement Codes	

H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled [Danger Sensitization, respiratory]

GHS Classification Tree > Hazard Statement Codes

H361: Suspected of damaging fertility or the unborn child [Warning Reproductive toxicity]

GHS Classification Tree > Hazard Classes

Acute toxicity, oral

<< First < Previous Page 1 of 6 Next > Last >>

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

18.17 EPA CPDat Classification



3 items

[View in Classification Browser](#)

EPA CPDat Classification > Functional Use

anticonvulsant

EPA CPDat Classification > Functional Use

antiepileptic, psychotropic

EPA CPDat Classification > Functional Use

antiepileptic

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

18.18 NORMAN Suspect List Exchange Classification



37 items

[View in Classification Browser](#)

NORMAN Suspect List Exchange Classification

Parents (Predecessors)

These are parent compounds (predecessors) documented in the Parent-Transformation Product Pairs from Eawag (S66).

NORMAN Suspect List Exchange Classification > S66 | EAWAGTPS | Parent-Transformation Product Pairs from Eawag > Pharmaceuticals > Nervous System

Carboxamide derivatives

NORMAN Suspect List Exchange Classification

Parents (Predecessors)

These are parent compounds (predecessors) documented in the Parent-Transformation Product Pairs from HSDB (S68).

NORMAN Suspect List Exchange Classification

Pharmaceuticals

NORMAN Suspect List Exchange Classification

[M+H]⁺

<< First < Previous Page 1 of 8 Next > Last >>

► [NORMAN Suspect List Exchange](#)

18.19 CCSBase Classification



1 item

[View in Classification Browser](#)

[M+H]⁺

► [CCSbase](#)

18.20 EPA DSSTox Classification



89 items

[View in Classification Browser](#)

CompTox Chemicals Dashboard Chemical Lists

[\[AOPSTRESSORS\] List of Adverse Outcome Pathway Stressors](#)

Short_Description: List of Adverse Outcome Pathway Stressors from the AOP Database

Long_Description: The EPA Adverse Outcome Pathway Database (AOP_DB) contains a full list of AOP stressors obtained and updated from the AOP-Wiki, which is available and updated as part of the OECD supported AOP Knowledge Base (AOP_KB). The AOP-STRESSOR file maps the DSSTox substance records to the most current list of AOP stressors (last updated 2/12/2020). The AOP-STRESSOR file is a current snapshot of all AOP-Wiki-documented stressors. A detailed description of EPA's chemical management system and the DSSTox curation associated with chemical registration and mapping of the AOP-STRESSOR file is provided in the published document available for download at: The 2021 update of the EPA's adverse outcome pathway database

CompTox Chemicals Dashboard Chemical Lists

[\[BLOODEXPOSOME\] LIST: BLOODEXPOSOME Chemicals identified as part of the blood exposome](#)

Short_Description: Chemicals identified as part of the blood exposome

Long_Description: Barupal et al report on Generating the Blood Exposome Database Using a Comprehensive Text Mining and Database Fusion Approach. The database can be used for prioritizing chemicals for systematic reviews, developing target assays in exposome research, identifying compounds in untargeted mass spectrometry, and biological interpretation in metabolomics data. (Last remapped February 17th 2023)

CompTox Chemicals Dashboard Chemical Lists

[\[CANADADSL\] Canadian Domestic Substances List 2019](#)

Short_Description: The domestic substances list (DSL) is the sole standard against which a substance is judged to be "new" to Canada.

Long_Description: On May 4, 1994, Environment and Climate Change Canada published the domestic substances list (DSL) in Part II of the Canada Gazette. The DSL is an inventory of approximately 23 000 substances manufactured in, imported into or used in Canada on a commercial scale. It is based on substances present in Canada, under certain conditions, between January 1, 1984 and December 31, 1986. The DSL is the sole standard against which a substance is judged to be "new" to Canada. With few exemptions, all substances not on this list are considered new and must be reported prior to importation or manufacture in order that they can be assessed to determine if they are toxic or could become toxic to the environment or human health.

CompTox Chemicals Dashboard Chemical Lists

[\[CECSCREEN\] METABOLITES: HBM4EU CECscreen: Screening List for Chemicals of Emerging Concern](#)

Short_Description: HBM4EU CECscreen is a suspect screening list for Chemicals of Emerging Concern (CECs) plus metadata and predicted Phase 1 metabolites

Long_Description: HBM4EU CECscreen is a suspect screening list for Chemicals of Emerging Concern (CECs) plus metadata and predicted Phase 1 metabolites; this list contains the CECs only. CECscreen is part of the HBM4EU project (coord. UBA) > WP16 "emerging chemicals" (lead INRA, JP Antignac/L Debrauwer) > Task 16.1 (lead IRAS, J Vlanderen / R Vermeulen) > Main contributor (J Meijer) > Involved Partners (M Lamoree, T Hamers, S Hutinet, A, Covaci, C Huber, M Krauss, DI Walker, EL Schymanski) and hosted on the NORMAN Suspect List Exchange. Further details in Meijer et al (2021) DOI: 10.1016/j.envint.2021.106511. Dataset DOI: 10.5281/zenodo.3956586.

CompTox Chemicals Dashboard Chemical Lists

[\[CERAPP\] ARTICLE: Collaborative Estrogen Receptor Activity Prediction Project \(CERAPP\)](#)

Short_Description: CERAPP uses predictive computational models trained on HTS data to evaluate thousands of chemicals for ER-related activity.

Long_Description: CERAPP (Collaborative Estrogen Receptor Activity Prediction Project) is a large-scale modeling project demonstrate the efficacy of using predictive computational models trained on high-throughput screening data to evaluate thousands of chemicals for ER-related activity and prioritize them for further testing. CERAPP combined multiple models developed in collaboration with 17 groups in the United States and Europe to predict ER activity of a common set of 32,464 chemical structures. Quantitative structure-activity relationship models and docking approaches were employed, mostly using a common training set of 1,677 chemical structures provided by the U.S. EPA, to build a total of 40 categorical and 8 continuous models for binding, agonist, and antagonist ER activity. All predictions were evaluated on a set of 7,522 chemicals curated from the literature. To overcome the limitations of single models, a consensus was built by weighting models on scores based on their evaluated accuracies. The work is described in this peer-reviewed publication: <https://ehp.niehs.nih.gov/doi/10.1289/ehp.1510267>

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► EPA DSSTox

18.21 FDA Drug Type and Pharmacologic Classification



3 items

View in Classification Browser

FDA Drug Type and Pharmacologic Classification > Pharmacologic Class

Cytochrome P450 1A2 Inducers [MoA]

FDA Drug Type and Pharmacologic Classification > Pharmacologic Class

Cytochrome P450 2C19 Inducers [MoA]

FDA Drug Type and Pharmacologic Classification > Pharmacologic Class

Mood Stabilizer [EPC]

► National Drug Code (NDC) Directory

18.22 EPA Substance Registry Services Tree



5 items

View in Classification Browser

EPA SRS List Classification

Environmental Protection Agency Data Systems

EPA :: The Environmental Protection Agency (EPA) is an agency of the United States government. Its mission is to protect human health and to safeguard the natural environment. To fulfill that mission EPA maintains data systems about regulated substances and identifies categories of chemical substances that are subject to environmental regulations.

EPA SRS List Classification

Ecotoxicology Database

ECOTOX :: Comprehensive database providing adverse effects of single chemical stressors to ecologically relevant aquatic and terrestrial species.

EPA SRS List Classification

Storage and Retrieval for Water Quality Data

STORET :: STORET/WQX defines the methods and the data systems by which EPA compiles monitoring data (typically water quality data, but not exclusively water quality data) that are collected by a number of entities. Those entities could be states, tribes, volunteer monitoring groups, or EPA.

The purpose of the compilation of this data is to provide a seamless collection of monitoring data that is not restricted by jurisdictional boundaries. These data also provide the foundation for a number of water quality decisions, whether they be the setting of water quality standards, 305(b) assessment conclusions, 303(d) listings, the setting of Total Maximum Daily Loads (TMDLs), or permit renewals. This system also provides a means of supporting EPA generated reports (i.e. the Wadeable Streams Report, or the Katrina Emergency Response). As of May 2006, the STORET Warehouse has reports of 42 million monitoring results representing visits to 250,000 stations. For further information, visit the STORET web site at <http://www.epa.gov/storet>.

EPA SRS List Classification

Chemical Abstracts Index Name

CA Index :: The Chemical Abstracts Services (CAS) Registry File is a chemical structure and dictionary database containing unique records for chemical substances that have been published. All substance records are assigned a unique CAS Registry Number and a Chemical Abstracts (CA) index name. The records may also contain additional information, such as other names, molecular formulas, and structure diagrams related to the specific substance. The CA Index name is used as the name source in CRS when an 8th or 9th CI name is not available.

EPA SRS List Classification

Food and Drug Administration Substance Registry

FDA :: The primary goal of the FDA/USP Substance Registration System (SRS) is to unambiguously define all substances present in regulated products. Once a substance has been defined, the SRS assigns a strong identifier that is permanently associated with the substance. SRS is intended to be a general use resource and data presented here has been collected from public information sources. Inclusion of a substance in this database does not indicate that it is currently under review by the FDA or a substance in any FDA regulated product

► [EPA Substance Registry Services](#)

19 Information Sources



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SID855967

<https://pubchem.ncbi.nlm.nih.gov/bioassay/1996#section=Data-Table>

2. Hazardous Substances Data Bank (HSDB)

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<https://pubchem.ncbi.nlm.nih.gov/source/hsdb/3019>

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Carbamazepine [USAN:USP:INN:BAN:JAN]

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=chemidplus&sourceid=0000298464>

ChemIDplus Chemical Information Classification

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

6. DrugBank

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<https://comptox.epa.gov/dashboard/DTXSID4022731>

CompTox Chemicals Dashboard Chemical Lists

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

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<https://echa.europa.eu/substance-information/-/substanceinfo/100.005.512>

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<https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/27286>

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<https://gsrs.ncats.nih.gov/ginas/app/beta/substances/33CM23913M>

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CCSbase Classification

<https://ccsbase.net/>

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NORMAN Suspect List Exchange Classification

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

13. ChEBI

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<http://www.ebi.ac.uk/chebi/searchId.do?chebiId=CHEBI:3387>

ChEBI Ontology

<http://www.ebi.ac.uk/chebi/userManualForward.do#ChEBI%20Ontology>

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<https://dailymed.nlm.nih.gov/dailymed/browse-drug-classes.cfm>

FDA Pharmacological Classification

<https://www.fda.gov/ForIndustry/DataStandards/StructuredProductLabeling/ucm162549.htm>

15. LiverTox

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https://ncithesaurus.nci.nih.gov/ncitbrowser/ConceptReport.jsp?dictionary=NCI_Thesaurus&ns=ncit&code=C341

NCI Thesaurus Tree

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<http://www.ebi.ac.uk/Information/termsofuse.html>

https://www.ebi.ac.uk/chembl/compound_report_card/CHEMBL108/

ChEMBL Protein Target Tree

<https://www.ebi.ac.uk/chembl/g/#browse/targets>

19. Comparative Toxicogenomics Database (CTD)

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<http://www.dgldb.org/downloads>

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<https://www.dgldb.org/drugs/CARBAMAZEPINE>

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<https://www.guidetopharmacology.org/GRAC/LigandDisplayForward?ligandId=5339>

Guide to Pharmacology Target Classification

<https://www.guidetopharmacology.org/targets.jsp>

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<https://idrblab.net/ttd/data/drug/details/D04MSM>

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<https://www.crystallography.net/cod/2300327.html>

<https://www.crystallography.net/cod/2311081.html>

<https://www.crystallography.net/cod/2311083.html>

<https://www.crystallography.net/cod/4509215.html>

<https://www.crystallography.net/cod/4509220.html>

<https://www.crystallography.net/cod/4509221.html>

<https://www.crystallography.net/cod/4509222.html>

<https://www.crystallography.net/cod/4510731.html>

<https://www.crystallography.net/cod/4510732.html>

<https://www.crystallography.net/cod/4510733.html>

<https://www.crystallography.net/cod/7106548.html>

<https://www.crystallography.net/cod/7227180.html>

25. The Cambridge Structural Database

<https://www.ccdc.cam.ac.uk/structures/Search?Ccdcid=185919>

<https://www.ccdc.cam.ac.uk/structures/Search?Ccdcid=249934>

<https://www.ccdc.cam.ac.uk/structures/Search?Ccdcid=609185>

<https://www.ccdc.cam.ac.uk/structures/Search?Ccdcid=635853>

<https://www.ccdc.cam.ac.uk/structures/Search?Ccdcid=791775>

<https://www.ccdc.cam.ac.uk/structures/Search?Ccdcid=814268>

<https://www.ccdc.cam.ac.uk/structures/Search?Ccdcid=960316>

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26. DailyMed

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<https://www.fda.gov/science-research/liver-toxicity-knowledge-base-ltkb/drug-induced-liver-injury-rank-dilirank-dataset>

28. Nature Chemistry

<https://pubchem.ncbi.nlm.nih.gov/substance/99343617>

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EPA CPDat Classification

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

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<https://www.fda.gov/drugs/drug-approvals-and-databases/national-drug-code-directory>

37. MassBank Europe

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<https://github.com/MassBank/MassBank-web/blob/main/MassBank-Project/LICENSE.txt>

FFGPTBGBLSHEPO-UHFFFAOYSA-N

<https://massbank.eu/MassBank/Result.jsp?inchikey=FFGPTBGBLSHEPO-UHFFFAOYSA-N>

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[query=exists\(compound.metaData.name:%27InChIKey%27%20and%20compound.metaData.value:%27FFGPTBGBLSHEPO-UHFFFAOYSA-N%27\)](https://mona.fiehnlab.ucdavis.edu/spectra/browse?query=exists(compound.metaData.name:%27InChIKey%27%20and%20compound.metaData.value:%27FFGPTBGBLSHEPO-UHFFFAOYSA-N%27))

39. SpectraBase

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<https://spectrabase.com/spectrum/12aC1lu8DXK>

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<https://spectrabase.com/spectrum/Hm9SRztRxaB>

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<https://spectrabase.com/spectrum/KpxcONsO0mx>

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<https://spectrabase.com/spectrum/nvsudQ4SuY>

Carbamazepine

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

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<https://spectrabase.com/spectrum/FbF3qV5CBf4>

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<https://spectrabase.com/spectrum/DUpOUYt8os>

Carbamazepine

<https://spectrabase.com/spectrum/FsfunOsZ6UX>

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<https://spectrabase.com/spectrum/9dvbiAkhs0c>

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40. NIST Mass Spectrometry Data Center

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<https://pubchem.ncbi.nlm.nih.gov/compound/Carbamazepine#section=Information-Sources>

<https://www.nist.gov/srd/public-law>

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<http://www.nist.gov/srd/nist1a.cfm>

41. **Japan Chemical Substance Dictionary (Nikkaji)**

http://jglobal.jst.go.jp/en/redirect?Nikkaji_No=J8.590A

42. **Kruve Lab, Ionization & Mass Spectrometry, Stockholm University**

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43. **Metabolomics Workbench**

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<https://www.metabolomicsworkbench.org/data/StructureData.php?RegNo=42899>

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ATC Code

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47. **Protein Data Bank in Europe (PDBe)**

<http://www.ebi.ac.uk/pdbe-srv/pdbechem/chemicalCompound/show/N6W>

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<https://www.rcsb.org/>

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<https://pubchem.ncbi.nlm.nih.gov/substance/?source=15745&sourceid=18051453-686651982>

50. **SpringerMaterials**

Dibenzo[b,f]azepine-5-carboxylic acid amide

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

Carbamazepine

<https://www.wikidata.org/wiki/Q410412>

54. **Wikipedia**

carbamazepine

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

55. **Wiley**

<https://pubchem.ncbi.nlm.nih.gov/substance/?source=wiley&sourceid=118076>

56. **Medical Subject Headings (MeSH)****LICENSE**

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

Carbamazepine

<https://www.ncbi.nlm.nih.gov/mesh/68002220>

MeSH Tree

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

Cytochrome P-450 CYP3A Inducers

<https://www.ncbi.nlm.nih.gov/mesh/68065701>

Anticonvulsants

<https://www.ncbi.nlm.nih.gov/mesh/68000927>

Antimanic Agents

<https://www.ncbi.nlm.nih.gov/mesh/68018692>

Analgesics, Non-Narcotic

<https://www.ncbi.nlm.nih.gov/mesh/68018712>

Sodium Channel Blockers

<https://www.ncbi.nlm.nih.gov/mesh/68026941>

57. PubChem

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

58. KEGG

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<https://www.kegg.jp/kegg/legal.html>

Therapeutic category of drugs in Japan

http://www.genome.jp/kegg-bin/get_htext?br08301.keg

USP drug classification

http://www.genome.jp/kegg-bin/get_htext?br08302.keg

Anatomical Therapeutic Chemical (ATC) classification

http://www.genome.jp/kegg-bin/get_htext?br08303.keg

Target-based classification of drugs

http://www.genome.jp/kegg-bin/get_htext?br08310.keg

Drugs listed in the Japanese Pharmacopoeia

http://www.genome.jp/kegg-bin/get_htext?br08311.keg

Drug Groups

http://www.genome.jp/kegg-bin/get_htext?br08330.keg

Drug Classes

http://www.genome.jp/kegg-bin/get_htext?br08332.keg

59. 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

60. EPA Substance Registry Services

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<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

61. PATENTSCOPE (WIPO)

SID 403450545

<https://pubchem.ncbi.nlm.nih.gov/substance/403450545>

62. NCBI

<https://www.ncbi.nlm.nih.gov/projects/linkout>