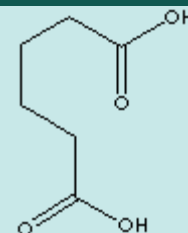


# ADIPIC ACID

## PRODUCT IDENTIFICATION

CAS NO.	124-04-9
EINECS NO.	204-673-3
FORMULA	HOOC(CH <sub>2</sub> ) <sub>4</sub> COOH
MOL WT.	146.142
H.S. CODE	2917.12
TOXICITY	Oral rat LD50: >11 gm/kg
SYNONYMS	1,4-Butanedicarboxylic acid; 1,6-Hexanedioic Acid; Adipinic Acid; Acifloctin; Acinetten; Hexanedioic acid;



## DERIVATION CLASSIFICATION

## PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE	white crystals
MELTING POINT	152 - 154 C
BOILING POINT	337 C
SPECIFIC GRAVITY	1.36
SOLUBILITY IN WATER	Slightly soluble
pH	3.45 (1%)
VAPOR DENSITY	5
AUTOIGNITION	420 C
REFRACTIVE INDEX	
NFPA RATINGS	Health: 1; Flammability: 1; Reactivity: 0
FLASH POINT	210 C
STABILITY	Stable under ordinary conditions

## GENERAL DESCRIPTION & APPLICATIONS

Adipic Acid (also called hexanedioic acid) is a white, crystalline compound of C<sub>6</sub> straight-chain dicarboxylic acid; slightly soluble in water and soluble in alcohol and acetone. Almost all of the commercial adipic acid is produced from cyclohexane through two sequent oxidation processes. The first oxidation is the reacting of cyclohexane with oxygen in the presents of cobalt or manganese catalysts at a temperature of 150 - 160 C, which produce cyclohexanol and cyclohexanone. Then, the intermediates are further reacted with nitric acid and air with a catalyst (copper or vanadium) or without nitric acid. Cyclohexane can be prepared by the hydrogenation of benzene. There are other ways such as the reactions using phenol, butadiene, and various fats as the starting material. Adipic acid consumption is linked almost 90% to nylon production by the polycondensation with hexamethylenediamine. Nylon, having a protein-like structure, is further processed into fibers for applications in carpeting, automobile tire cord and clothing. Adipic acid is used in manufacturing plasticizers and lubricants components. It is used in making polyester polyols for polyurethane systems. Food grade adipic acid is used as gelling aid, acidulant, leavening and buffering agent. Adipic acid has two carboxylic acid, -COOH, groups, which can yield two kinds of salts. Its derivatives, acyl halides, anhydrides, esters, amides and nitriles, are used in making target products such as flavoring agents, internal plasticizers, pesticides, dyes, textile treatment agents, fungicides, and pharmaceuticals through further reactions of substitution, catalytic reduction, metal hydride reduction, diborane reduction, keto formation with organometallic reagents, electrophile bonding at oxygen, and condensation.

### Members of adipic acid ester or salt

Product

CAS RN

Adipoylbis(iminoethylene)bis(triethylammonium iodide)	62055-20-3
(Dibutylstannylene)bis(thioethylene) dimethyl diadipate	70969-72-1
3,3'-(Adipoyldiimino)bis(5-((2-oxo-1-pyrrolidinyl)methyl)-2,4,6-triiodobenzoic acid	51134-92-0
(2,2-Bis(hydroxymethyl)butyl) hydrogen adipate	20563-11-5
(2-Hydroxyethyl) hydrogen adipate	94109-19-0
(Adipoylbis(iminoethylene))bis((o-chlorobenzyl)diethylammonium dichloride	108021-63-2
(Dimethylstannylene)bis(thioethylene) dimethyl diadipate	70969-67-4
1-(o-(1,3-Dioxolan-2-yl)phenoxy)-3-isopropylamino-2-propanol adipate	66287-62-5
1,1'-Adipoylbisaziridine	6950-06-7
1,4-Bis(3-aminopropyl)piperazine adipate	5423-61-0
1-Decyl 6-octyl 2,2,4-trimethyladipate	68425-97-8
1-tert-Butylamino-3-(o-(1,3-dioxolan-2-yl)phenoxy)-2-propanol adipate	66287-64-7
2-(2,3-Bis(2-hydroxypropoxy)propoxy)isopropyl 2-(2-(2-hydroxypropoxy)-3-(2-((1-oxoallyl)oxy)propoxy)propoxy) isopropyl adipate	94160-29-9
2-(3-(2-(Acryloyloxy)propoxy)-(2-(2-hydroxypropoxy))propoxy)-1-methylethyl 2-(2,3-bis(2-(acryloyloxy)propoxy)propoxy)-1-methylethyl adipate	94160-34-6
2,2-Bis(((1-oxooctyl)oxy)methyl)butyl 2-(((6-(2,2-bis(((1-oxodecyl)oxy)methyl)butoxy)-1,6-dioxohexyl)oxy)methyl)-2-(((1-oxooctyl)oxy)methyl)butyladipate	94278-18-9
2-Amino-4,5-methanoadipate	127515-30-4
2-Amino adipic acid	542-32-5
2-Ethyl-2-(hydroxymethyl)propane-1,3-diyl adipate	94110-05-1
2-Ethylhexyl 3-methoxypropyl adipate	85670-21-9
2-Ethylhexyl hydrogen adipate	4337-65-9
2-Ethylhexyl isodecyl adipate	68052-04-0
2-Ethylhexyl phenylmethyl adipate	58394-64-2
2-Nitro-4-sulfophenyl adipate	143392-33-0
3-(2-Aminoethyl)indol-5-ol acetate adipate	19628-29-6
3-(2-Aminoethyl)indol-5-ol propionate adipate	19628-28-5
3-(5-Aminopentyl)indole adipate	31699-72-6
3-(7-Aminoheptyl)indole adipate	31699-74-8
3,3'-(1,2-Ethanediylobis(oxy))bis(1-propanamine) adipate	21697-94-9
3,3'-(Adipoyldiimino)bis(5-(acetamidomethyl)-2,4,6-triiodobenzoic acid	25901-37-5
3,3'-(Adipoyldiimino)bis(5-(butyramidomethyl)-2,4,6-triiodobenzoic acid	25903-33-7
3,3'-(Adipoyldiimino)bis(5-(propionamidomethyl)-2,4,6-triiodobenzoic acid	25901-46-6
3-Oxadipic acid	689-31-6
6,13-Dioxa-5,14-distannaooctadecane, 5,5,14,14-tetrabutyl-7,12-dioxo-	7437-35-6
6-Decyl 1-octyl 2,2,4-trimethyladipate	67873-93-2
6-Methylheptyl 8-methylnonyl adipate	110-28-1
Acetazolamide adipate ethyl ester	111261-83-7
Acetyl di-starch adipate	63798-35-6
Adipate dianion	764-65-8
Adipate-adipic acid	134886-82-1
Adipic acid	124-04-9
Adipoylbis(iminoethylene)bis(trimethylammonium iodide)	62055-16-7
Adipoylbisphosphonic acid	139339-84-7
Adipoyldioxymethylbis(trimethylammonium iodide)	64048-56-2
Adipoyltributylplumbane	73940-91-7

Albuterol adipate diethanolate	177985-44-3
Allysine	1962-83-0
Aminotridecane adipate	35059-07-5
Benzyl butyl adipate	4121-13-5
Benzyl octyl adipate	3089-55-2
Bis((2-heptadecyl-4,5-dihydro-4-((1-oxooctadecyl)oxy)methyl)oxazol-4-yl)methyl) adipate	94159-97-4
Bis((carboxymethyl)trimethylammonium) adipate	89713-95-1
Bis(1-butylpentyl) adipate	77916-77-9
Bis(1-isopropyl-2,2-dimethyl-3-(2-methyl-1-oxopropoxy)propyl) adipate	100208-33-1
Bis(1-methylheptyl) adipate	108-63-4
Bis(1-methylpentadecyl) adipate	58262-41-2
Bis(2-((4-(2,2-dicyanovinyl)-3-methylphenyl)ethylamino)ethyl) adipate	25857-05-0
Bis(2-(2-(2-hydroxypropoxy)-3-(2-((1-oxoallyl)oxy)propoxy)propoxy)isopropyl) adipate	94160-30-2
Bis(2-(2-butoxyethoxy)ethyl) adipate	141-17-3
Bis(2-(2-isopropyl-3-oxazolidinyl)ethyl) adipate	27325-78-6
Bis(2-(diethylamino)ethyl) adipate	16545-00-9
Bis(2-(dimethylamino)ethyl) adipate	65169-69-9
Bis(2-(ethyl(3-methylphenyl)amino)ethyl) adipate	26479-97-0
Bis(2,3-epoxypropyl) adipate	2754-17-8
Bis(2-butoxyethyl) adipate	141-18-4
Bis(2-ethoxyethyl) adipate	109-44-4
Bis(2-fluoro-2,2-dinitroethyl) adipate	35027-66-8
Bis(2-hydroxy-3-((1-oxooctadec-9-enyl)oxy)propyl) adipate	94313-92-5
Bis(2-hydroxy-3-(4-(1-(4-(2-hydroxy-3-((1-oxoallyl)oxy)propoxy)phenyl)isopropyl)phenoxy)propyl) adipate	67696-49-5
Bis(2-hydroxyethyl) 2,2,4(or 2,4,4)-trimethyladipate	84713-15-5
Bis(2-hydroxyethyl) adipate	1700-12-5
Bis(2-mercaptoethyl) adipate	10194-00-0
Bis(2-methoxyethyl) adipate	106-00-3
Bis(2-octyldodecyl) adipate	85117-94-8
Bis(3,4-epoxy-6-methylcyclohexylmethyl)adipate	1985-84-8
Bis(3,5,5-trimethylhexyl) adipate	20270-50-2
Bis(3,5-dibromosalicyl)adipate	75848-76-9
Bis(3-cyclohexen-1-ylmethyl) adipate	63905-29-3
Bis(3-cyclohexylpropyl) adipate	84731-68-0
Bis(3-methoxypropyl) adipate	85661-31-0
Bis(4-(ethenyloxy)butyl) adipate	135876-36-7
Bis(4-hydroxybutyl) adipate	20985-13-1
Bis(4-methylcyclohexyl) adipate	41544-42-7
Bis(4-nitrophenyl) adipate	32564-25-3
Bis(6-methyl-3-cyclohexenemethyl) adipate	68555-34-0
Bis(6-methylheptyl) adipate	105-96-4
Bis(7-oxabicyclo(4.1.0)hept-3-ylmethyl) adipate	3130-19-6
Bis(bicyclo(2.2.1)hept-5-en-2-ylmethyl) adipate	7359-19-5
Bis(decyl) 2,2,4(or 2,4,4)-trimethyladipate	26635-53-0
Bis(methylcyclohexyl) adipate	27479-35-2
Bis(nonylphenyl) adipate	25550-79-2

Bis(oxiranylmethyl) 2,2,4(or 2,4,4)-trimethyladipate	53445-36-6
Bis(oxiranylmethyl) 2,4,4-trimethyladipate	25677-83-2
Bis(tetrahydrofurfuryl) adipate	105-02-2
Bis(trimethylsilyl) adipate	18105-31-2
But-3-enyl hydrogen adipate	64084-45-3
Butyl decyl adipate	71850-02-7
Calcium 2,5-dimethyl-3,4-dithioxoadipate	93776-78-4
Calcium adipate	7486-40-0
Calcium adipate	22322-28-7
Calcium octadecyl adipate	94109-12-3
Ddiethylhexanedioyl dichloride	68171-35-7
Decyl hexyl adipate	22707-35-3
Decyl dodecyl trimethyladipate	93951-44-1
Decyl octyl trimethyladipate	26856-72-4
Di(2-(2-ethylbutoxy)ethyl) adipate	7790-07-0
Di(2-(hexyloxy)ethyl) adipate	110-32-7
Di(2-ethylbutyl) adipate	10022-60-3
Di-(9Z)-9-octadecenyl adipate	40677-77-8
Di-2-propenyl adipate	2998-04-1
Di-2-propynyl adipate	6900-06-7
Diammonium adipate	3385-41-9
Dianhydro-D-glucitol hydrogen adipate	93893-99-3
Dibenzyl adipate	2451-84-5
Dibutylcarbityl adipate	65520-46-9
Di-alkyl(C8-26) adipate	68989-28-6
Di-alkyl(C9-11) adipate	72379-06-7
Dicapryl adipate	105-97-5
Dicetyl adipate	26720-21-8
Dicyclohexyl adipate	849-99-0
Didecyl 2,2,4-trimethyladipate	68426-01-7
Didecyl adipate	85995-88-6
Didocosyl adipate	65540-77-4
Didodecyl adipate	3072-02-4
Diethyl 3-oxoadipate	7149-59-9
Diethyl adipate	141-28-6
Diethyl octafluoroadipate	376-50-1
Diheptadecyl adipate	26719-27-7
Diheptyl adipate	14697-48-4
Dihexadecenyl adipate	94277-08-4
Dihexyl adipate	110-33-8
Diisobutyl adipate	141-04-8
Diisocetyl adipate	57533-90-1
Diisodecyl adipate	27178-16-1
Diisohexadecyl adipate	59686-69-0
Diisononyl adipate	33703-08-1
Diisooctyl adipate	1330-86-5
Diisopentyl adipate	6624-70-0
Diisopropyl adipate	6938-94-9
Diisotridecyl adipate	26401-35-4

Dilithium adipate	18621-94-8
Dimethyl 2,2,4-trimethyladipate	29713-25-5
Dimethyl 2,2'-dibromoadipate	868-72-4
Dimethyl 2-amino-3-oxoadipate hydrochloride	6317-41-5
Dimethyl 2-methyl-5-methyleneadipate	4513-62-6
Dimethyl 3-oxoadipate	5457-44-3
Dimethyl-2-methyl adipate	19780-94-0
Dimethyladipate	627-93-0
Di-n-butyl adipate	105-99-7
Di-n-nonyl adipate	151-32-6
Dioctadecyl adipate	1119-74-0
Dioctyl 2,2,4-trimethyladipate	26635-50-7
Dioctyl 2,2,4-trimethyladipate	68975-81-5
Dioctyl 2,2,4-trimethyladipate	68425-96-7
Dioctyl adipate	103-23-1
Dioctyl hexanedioate	123-79-5
Dipentadecyl adipate	26720-20-7
Dipentyl adipate	14027-78-2
Dipotassium adipate	19147-16-1
Dipropyl adipate	106-19-4
Di-sec-butyl adipate	38447-22-2
Disodium adipate	7486-38-6
Di-tert-butyl 2,2,4-trimethyldiperoxyadipate	21850-39-5
Di-tert-butyl 2,4,4-trimethyldiperoxyadipate	21850-40-8
Ditetradecyl adipate	26720-19-4
Ditetradecyl adipate	69227-17-4
Ditridecyl adipate	16958-92-2
Divinyl adipate	4074-90-2
DL-2-Aminoadipic acid	7620-28-2
DL-alpha-Aminoadipic acid	626-71-1
Dodecyl hydrogen adipate	78194-84-0
Ethyladipoylazolamide	138080-11-2
Glyceryl adipate	26699-71-8
Hexamethylenediamine adipate	3323-53-3
Hexanedioyl dichloride	111-50-2
Iocarmate meglumine	54605-45-7
Iocarmic acid	10397-75-8
Iodipamide meglumine	3521-84-4
Iodipamide sodium	2618-26-0
Iodipamide	606-17-7
Isodecyl isoctyl adipate	31474-57-4
Isodecyl hydrogen adipate	53595-56-5
Isopropyl hydrogen adipate	52221-06-4
L-2-Aminoadipic acid	1118-90-7
Magnesium adipate	7486-39-7
Methyl adipate lithium salt	64601-11-2
Methyl vinyl adipate	2969-87-1
Mono(2-(2-(2-hydroxyethoxy)ethoxy)ethyl) adipate	64114-59-6
Mono(2-ethyl-5-hydroxyhexyl) adipate	134998-71-3

Mono(2-ethyl-5-oxohexyl) adipate	134998-72-4
Monoethyl adipate	626-86-8
Monomethyl adipate	627-91-8
n-Decyl n-octyl adipate	110-29-2
Nonylphenyl hydrogen adipate	93982-14-0
N-Tallow alkyltrimethylenediamine mono adipate	71486-98-1
N-Trifluoroacetyladiamycin-14-O-hemi adipate	80787-29-7
Octafluoroadipoyl difluoride	37881-62-2
Octyl hydrogen adipate	17961-12-5
Piperazine adipate	142-88-1
Poly(4,4'-Methylenebis(cyclohexyl isocyanate), ethylene propylene glycol adipate)	67905-79-7
Poly(adipic acid, 1,2-ethanediol, 1,2-propanediol, 1,2,3-propanetriol)	81972-42-1
Poly(adipic acid, 1,3-butanediol diacetate)	67989-20-2
Poly(adipic acid, 1,3-diisocyanatomethylbenzene, 1,2-ethanediol)	9019-92-5
Poly(adipic acid, 1,3-diisocyanatomethylbenzene, 1,2-ethanediol, 1,2-propanediol)	9063-78-9
Poly(adipic acid, 1,3-diisocyanatomethylbenzene, 2,2-dimethyl-1,3-propanediol, 1,6-hexanediol, 3-hydroxy-2-(hydroxymethyl)-2-methylpropanoic acid)	67952-86-7
Poly(adipic acid, 1,3-diisocyanatomethylbenzene, 2,2'-oxybis(ethanol))	9017-08-7
Poly(adipic acid, 1,3-diisocyanatomethylbenzene, methyloxirane, oxirane)	69331-29-9
Poly(adipic acid, ethylene glycol, diphenylmethanediisocyanate)	9042-80-2
Poly(butylene adipate)	52012-76-7
Poly(ethylene propylene glycol adipate, 4,4'-methylenebis(cyclohexyl isocyanate) )	27084-91-9
Poly(oxypropylene) glycerol adipate	68439-20-3
Poly(propylene adipate)	25101-03-5
Polybutilate	24936-97-8
Polypropyleneglycol adipate	42615-42-9
Potassium sodium adipate	19584-53-3
Serotonin adipinate	13425-34-8
Serotonin adipinate	16031-83-7
Siomycin A hemi adipate-II sodium heptahydrate	79300-38-2
Sodium hydrogen adipate	18996-34-4
Spiramycin adipate	68880-55-7
Strontium adipate	85169-08-0
Tetradecyl hydrogen adipate	93777-47-0
Tetrahydrofurfuryl hydrogen adipate	93966-45-1
Vinyl hydrogen adipate	5238-38-0
Zinc adipate	3446-35-3

#### SALES SPECIFICATION

APPEARANCE	white crystalline powder
CONTENT	99.5% min
COLOR. APHA	5 max
IRON	0.2 ppm max
ASH	7 ppm max
NITRATE	5 ppm max
WATER	0.2% max

#### TRANSPORTATION

PACKING  
HAZARD CLASS  
UN NO.

25kgs in bag

OTHER INFORMATION

Hazard Symbols: XI, Risk Phrases: 36, Safety Phrases:

GENERAL DESCRIPTION OF DICARBOXYLIC ACID

Dicarboxylic acid is a compound containing two carboxylic acid, -COOH, groups. Straight chain examples are shown in table. The general formula is  $\text{HOOC}(\text{CH}_2)_n\text{COOH}$ , where oxalic acid's n is 0, n=1 for malonic acid, n=2 for succinic acid, n=3 for glutaric acid, and etc. In substitutive nomenclature, their names are formed by adding '-dioic' as a suffix to the name of the parent compound. They can yield two kinds of salts, as they contain two carboxyl groups in its molecules. The range of carbon chain lengths is from 2, but the longer than C 24 is very rare. The term long chain refers to C 12 up to C 24 commonly. Carboxylic acids have industrial application directly or indirectly through acid halides, esters, salts, and anhydride forms, polymerization, and etc. Dicarboxylic acids can yield two kinds of salts or esters, as they contain two carboxyl groups in one molecule. It is useful in a variety of industrial applications include;

- Plasticizer for polymers
- Biodegradable solvents and lubricants
- Engineering plastics
- Epoxy curing agent
- Adhesive and powder coating
- Corrosion inhibitor
- Perfumery and pharmaceutical
- Electrolyte

There are almost infinite esters obtained from carboxylic acids. Esters are formed by removal of water from an acid and an alcohol. Carboxylic acid esters are used as in a variety of direct and indirect applications. Lower chain esters are used as flavouring base materials, plasticizers, solvent carriers and coupling agents. Higher chain compounds are used as components in metalworking fluids, surfactants, lubricants, detergents, oiling agents, emulsifiers, wetting agents textile treatments and emollients, They are also used as intermediates for the manufacture of a variety of target compounds. The almost infinite esters provide a wide range of viscosity, specific gravity, vapor pressure, boiling point, and other physical and chemical properties for the proper application selections.

C length (Straight)	Product	CAS #	Melting Point	Boiling Point
C 2	Oxalic Acid (Ethanedioic Acid)	144-62-7	189 - 191 C	Sublimes
C 3	Malonic Acid (Propanedioic Acid)	141-82-2	131 - 135 C	Decomposes
C 4	Succinic Acid (Butanedioic Acid)	110-15-6	185 - 190 C	235 C
C 5	Glutaric Acid (Pentanedioic Acid)	110-94-1	95 - 99 C	302 C
C 6	Adipic Acid (Hexanedioic Acid)	124-04-9	151 - 153 C	265 C at 100 mmHg
C 7	Pimelic Acid (Heptanedioic Acid)	111-16-0	105 - 106 C	212 C at 10 mmHg
C 8	Suberic Acid (Octanedioic Acid)	505-48-6	143 - 144 C	230 C at 15 mmHg



C 9	Azelaic Acid (Nonanedioic Acid)	123-99-9	100 - 103 C	237 C at 15 mmHg
C 10	Sebacic Acid (Decanedioic Acid)	111-20-6	131 - 134 C	294 at 100 mmHg
C 11	Undecanedioic acid	1852-04-6	109 - 110 C	
C 12	Dodecanedioic acid	693-23-2	128 - 129 C	245 C at 10 mmHg
C 13	Brassylic acid (Tridecanedioic acid)	505-52-2	112 - 114 C	
C 14	Tetradecanedioic acid	821-38-5	126 - 128 C	
C 15	Pentadecanedioic acid	1460-18-0		
C 16	Thapsic acid (Hexadecanedioic acid)	505-54-4	124 - 126 C	
C 18	Octadecanedioic acid	871-70-5		