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Technical Bulletin

AMINE APPLICATIONS AND PROPERTIES DATA

ALKANOLAMINES

Monoethanolamine (MEA): A chemical intermediate in the manufacture of cosmetics, surface active agents, emulsifiers, and plasticizing agents; a gas-scrubbing agent for removal of H_2S and CO_2 from refinery and natural gas streams, and carbon dioxide from ammonia manufacturing; corrosion inhibitor, metal working fluids.

Diethanolamine (DEA): An intermediate in the manufacture of cosmetics; surface-active agents used in household detergents and textiles specialties; insecticides and herbicides; petroleum demulsifiers; as a gas scrubber in refinery and natural gas operations; waxes, polishes, and coatings emulsifiers; soluble oils; metal working fluids; and corrosion inhibitors.

Triethanolamine (TEA): An intermediate in the manufacture of surface-active agents used in textile demulsifers, toilet goods, cement additives, cutting oils, photographic-film developers; corrosion inhibitor; dispersant for dyes, casein, shellac, and rubber latex; sequestering agents; rubber chemical intermediate.

Dimethylethanolamine (DMEA): An intermediate in the manufacture of water treating chemicals. A component of water-reducible paints; an intermediate in the preparation of textile chemicals, ion exchange resins, pharmaceuticals, and emulsifying agents; an epoxy curing agent; and a urethane catalyst.

N-methyldiethanolamine (MDEA): A gastreating agent for absorption and removal of H_2S and CO_2; urethane catalyst; textile softener; pH control; an epoxy resin curing agent.

Monomethylethanolamine (MMEA): Used in photoresist stripper formulations and as an inter-mediate in the production of pharmaceuticals, and in general transportation coatings.

DIGLYCOLAMINE® Agent/DGA® brand 2-(2-aminoethoxy)ethanol: Removal of CO_2, COS and H_2S from hydrogen synthesis gas, refinery gas, and natural gas streams; selective solvent for recovery of aromatics from refinery streams. Other applications include preparation of foam stabilizers, wetting and emulsifying agents, condensation polymers, photoresist strippers, metal working and personal care products.

JEFFAMINE® POLYOXYALKYLENEAMINES

JEFFAMINE monoamines, diamines, and triamines: Versatile in their use and tailorable in their structure, these products are used in a variety of chemistries such as epoxy, curatives, polyamides and other polymer derivatives. As epoxy curing agents, they impart low color, reduce viscosity, and increase flexibility, providing cure systems tailored to meet specific requirements. They can be used in preparing polyamide, polyurea, and modified urethane resins; in adhesives, elastomers, and foam formulations; as corrosion inhibitors; in agricultural chemical applications; and as intermediates for textile and paper treating chemicals. Polymeric derivatives may be useful as dispersants in paints, fuels, and lubricants and as viscosity index improvers for lube oils.

MORPHOLINES

Morpholine (MOR): A corrosion inhibitor, especially in steam boiler systems; an emulsifier for cosmetics, rubless waxes, and polishes; a separating agent for volatile amines; an intermediate in the manufacture of optical brighteners; an intermediate for textile lubricants, softening agents, adjuvants, whitening agents, sizing emulsifiers, rubber vulcanization accelerators, antioxidants, surface-active agents, plasticizers, viscosity improvers, insecticides, fumigants, herbicides, dyes, and catalysts.

N-methylmorpholine (NMM): Stabilizer for chlorinated hydrocarbons; extraction solvent; preparation of self-polishing waxes, oil emulsions, corrosion inhibitors, water-reducible paints, pharmaceuticals and urethane catalysts.

N-ethylmorpholine (NEM): Stabilizer for chlorinated hydrocarbons; extraction solvent; preparation of self-polishing waxes, oil emulsions, corrosion inhibitors, pharmaceuticals, and urethane catalysts.

N-methylmorpholine oxide, aqueous solution (NMMO): Can be used to form cellulose solutions from which cellulose films or fibers may be obtained.

PIPERAZINES

N-aminoethylpiperazine (AEP): An epoxy resin curing agent used to formulate epoxy systems for coating, adhesives, sealants, reinforced composites, potting and encapsulation, and tooling compounds.

Dimethylpiperazine (DMP): Catalyst for polyether urethane foams; intermediate for cationic surface-active agents.

SUBSTITUTED PROPYLAMINES

Dimethylaminopropylamine (DMAPA): Intermediate for hair products, betaine manufacturing, gasoline additives, antistatic agents, agricultural emulsifiers, fabric softeners, asphalt antistripping agents, and dyes; epoxy curing agent.

Methoxypropylamine (MOPA): Specialty emulsifier intermediate for floor waxes, water treating chemicals, and other products

Aminopropylmorpholine (APM): Intermediate for printing dyes, additives for fuels and lube oils, and specialty surfactants.

JEFFCAT® TERTIARY AMINES

N, N-Dimethylcyclohexylamine (DMCHA): General purpose amine catalyst for urethane foams.

Pentamethyldiethylenetriamine (PMDETA): A tertiary amine catalyst for use in the urethane industry.

Tetramethylbis(aminoethyl)ether: A general purpose, high efficient blowing catalyst used in urethane flexible foams and rigid packaging foams.

N,N-dimethyl-2-(2-aminoethoxy)ethanol (DMDGA™ amino alcohol): A tertiary amino alcohol often used in the urethane industry and metal working.

Pentamethyldipropylenetriamine: A catalyst for both the water-isocyanate reaction and the polyolisocyanate reaction.

Tetramethyldipropylenetriamine: A catalyst for both the water-isocyanate reaction and the polyolisocyanate reaction.

ETHYLENEAMINES

Ethyleneamines: Versatile reactive intermediates used to produce a wide range of chemical products. Ethyleneamine applications include lube and fuel additives, epoxy curing agents, agricultural chemicals, fabric softeners, pharmaceuticals, personal-care products, textile additives, asphalt additives, bleach activators, chelating agents, corrosion inhibitors, drainage aids, elastomeric fibers, fungicides, hydrocarbon purification, mineral processing aids, polyamide resins, rubber processing additives, plastic lubricants, surfactants, and wet-strength resins. They also are used in the manufacture of polyols and urethane catalysts for polyurethane products.

OUR QUALITY POLICY

Huntsman Corporation is committed to providing products and services that consistently conform to our customers' requirements. To fulfill this commitment, the employees of Huntsman Corporation are dedicated to "being the best" through continuous improvement. In implementing its quality policy, Huntsman Corporation is committed to the use of statistical methods.

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CAS, EINECS, and MITI Numbers of Huntsman Amines

Amine	CAS	EINECS	ENCS (MITI)
Alkanolamines			
Monoethanolamine (MEA)	141-43-5	205-483-3	Sec. 2 #301
Diethanolamine (DEA)	111-42-2	203-868-0	Sec. 2 #302
Triethanolamine (TEA)	102-71-6	203-49-8	Sec. 2 #308
Dimethylethanolamine (DMEA)	108-01-0	203-542-8	Sec. 2 #297
N-methyldiethanolamine (MDEA)	105-59-9	203-312-7	Sec. 2 #300
Monomethylethanolamine (MMEA)	109-83-1	203-710-0	Sec. 2 #295
DIGLYCOLAMINE® Agent/DGA® brand 2-(2-aminoethoxy)ethanol	929-06-6	213-195-5	Sec. 2 #3202
Aminoethylethanolamine (AEEA)	111-41-1	203-867-5	Sec. 2 #304
Morpholines			
Morpholine (MOR)	110-91-8	203-815-1	Sec. 5 #859
N-methylmorpholine (NMM)	109-02-4	203-640-0	Sec. 5 #860
N-ethylmorpholine (NEM)	100-74-3	202-865-0	Sec. 5 #860
N-methylmorpholine oxide, aqueous solution (NMMO)	7529-22-8	231-391-8	—
Piperazines			
N-aminoethylpiperazine (AEP)	140-31-8	205-411-0	Sec. 5 #961
Dimethylpiperazine (DMP) JEFFCAT® dimethylpiperazine	106-58-1	203-412-0	—
Substituted Propylamines			
Dimethyaminopropylamine (DMAPA)	109-55-7	203-680-9	Sec. 2 #158
Methyoxypropylamine (MOPA)	5332-73-0	226-241-3	Sec. 2 #385
Aminopropylmorpholine (APM)	123-00-2	204-590-2	Sec. 5 #862
JEFFCAT® Tertiary Amines			
N,N-Dimethylcyclohexylamine (DMCHA)	98-94-2	202-715-5	Sec. 3 #2274
Pentamethyldiethlenetramine (PMDETA)	3030-47-5	221-201-1	Sec. 2 #147
Tetramethyl bis(aminoethyl)ether (ZF-20)	3033-62-3	221-220-5	Sec. 2 #390
DMDGA™ N,N-dimethyl-2(2-aminoethoxy)ethanol (ZR-70)	1704-62-7	216-940-1	Sec. 2 #454
Tetramethyldipropylenetriamine (Z-130)	3855-32-1	223-362-3	Sec. 2 #3284
Pentramethyldipropylenetriamine (ZR-40)	6711-48-4	229-761-9	—
Benzyldimethylamine (BDMA)	103-83-3	203-149-1	3-332

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CAS, EINECS, and MITI Numbers of Huntsman Amines

Amine	CAS	EINECS	ENCS (MITI)
Ethyleneamines			
Ethylenediamine (EDA)	107-15-3	203-486-6	Sec. 2 #150
Diethylenetriamine (DETA)	111-40-0	203-386-54	Sec. 2 #159
Triethylenetetramine (TETA)	112-24-3	203-950-6	Sec. 2 #163
Tetraethylenepentamine (TEPA)	112-57-2	203-986-2	Sec. 2 #162
JEFFAMINE® Polyoxyalkyleneamines			
XTJ-505 (M-600)	83713-01-3	Polymer	—
XTJ-506 (M-1000)	83713-01-3	Polymer	—
XTJ-507 (M-2005)	83713-01-3	Polymer	—
M-2070	83713-01-3	Polymer	—
D-230	9046-10-0	Polymer	Sec. 7 #324
D-400	9046-10-0	Polymer	Sec, 7 #324
D-2000	9046-10-0	Polymer	Sec. 7 #324
XTJ-510 (D-4000)	9046-10-0	Polymer	Sec. 7 #2567
XTJ-500 (ED-600)	65605-36-9	Polymer	—
XTJ-501 (ED-900)	65605-36-9	Polymer	—
XTJ-502 (ED-2003)	65605-36-9	Polymer	—
XTJ-504 (EDR-148)	929-59-9	213-203-6	Sec. 2 #312
HK-511	194673-87-5	—	—
T-403	39423-51-3	Polymer	Sec. 7 #328
XTJ-509 (T-3000)	64852-22-8	Polymer	Sec. 7 #2410
T-5000	64852-22-8	Polymer	Sec. 7 #2410
XTJ-435 chemical intermediate	—	—	—
XTJ-436	118270-87-4	Polymer	—

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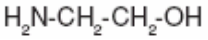
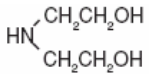
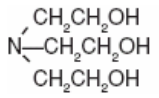
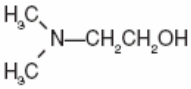
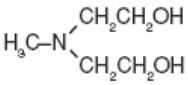
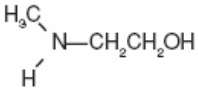
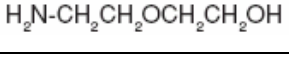
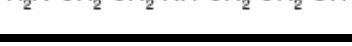
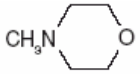
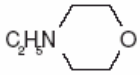
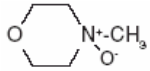
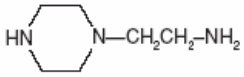
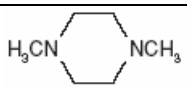
Structures and Properties of Huntsman Amines

Amine	Structure	Boiling Point °C	Mol. Wt.	Flash Point TCC °C	Vapor Pressure 20°C mm Hg	pKa
Alkanolamines						
Monoethanolamine (MEA)		170.5[a]	61.08	95[b]	<1	—
Diethanolamine (DEA)		269[a]	105.14	154[b]	<0.01	—
Triethanolamine (TEA)		360[a]	149.19	201[b]	<0.01	—
Dimethylethanolamine (DMEA)		134.6	89.14	105[c]	<0.1[d]	10.3
N-methyldiethanolamine (MDEA)		247.3	119.1	101[b]	<0.01	—
Monomethylethanolamine (MMEA)		—	75.1	71.1[b]	0.50	—
DIGLYCOLAMINE® Agent/DGA® brand 2-(2aminoethoxy)ethanol		221[a]	15.14	124[b]	<0.01	9.5
Aminoethylethanolamine (AEEA)		243	104.2	>149	<0.01	4.5[g]
Morpholines						
Morpholine (MOR)		128.3[a]	87.12	35	7.2	8.45 5.64[g]
N-methylmorpholine (NMM)		115.6	101.15	61[c]	18	7.5
N-ethylmorpholine (NEM)		138.3[a]	115.18	90[c]	5.2	7.8
M-methylmorpholine oxide, aqueous solution (NMMO)		118.5[h]	117.2	—	—	—
Piperazines						
N-aminoethylpiperazine (AEP)		222.0	128.8	>99	<0.01	4.4[g]
Dimethylpiperazine (DMP) JEFFCAT® dimethylpiperazine		131	114.2	72[c]	11[i]	8.2, 4.1

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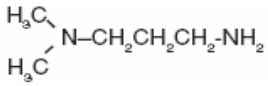
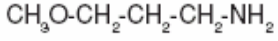
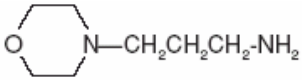
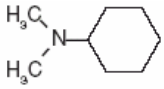
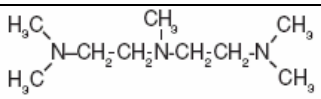
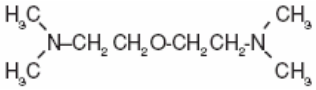
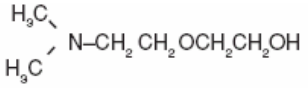
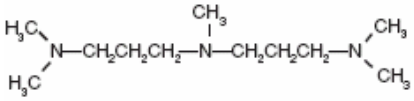
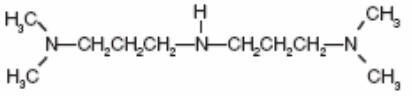
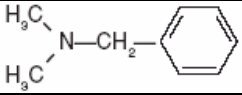
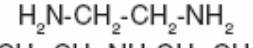
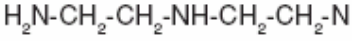
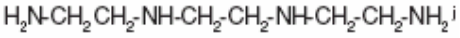
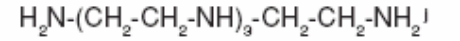
Structures and Properties of Huntsman Amines

Amine	Structure	Boiling Point °C	Mol. Wt.	Flash Point TCC °C	Vapor Pressure 20°C mm Hg	pKa
Substituted Propylamines						
Dimethylaminopropylamine (DMAPA)		134.9[a]	102.18	29	5.3	3.4[g] 5.3[g]
Methoxypropylamine (MOPA)		118.7[a]	89.1	30[e]	5.7	3.9[g]
Aminopropylmorpholine (APM)		224.1[a]	144.22	88[e]	0.05	10.0
JEFFCAT® Tertiary Amines						
N, N-Dimethylcyclohexylamine (DMCHA)		160	127.2	40[b]	2.1	10.0
Pentamethyldiethylenetriamine (PMDETA)		201	173.3	83.3[b]	<1	9.1 8.0 2.4
Tetramethylbis(aminoethyl)ether (ZF-20)		189	160.3	69	<1	10.1, 7.6
DMDGA™ N,N-dimethyl-2(2-aminoethoxy)ethanol (ZR-70)		201	133.2	93	0.06	9.1
Pentamethyldipropylenetriamine (ZR-40)		227	201.4	92[b]	<1	9.7 8.4 7.4
Tetramethyldipropylenetriamine (Z-130)		222	187.3	190[b]	<1	9.9 8.5 7.2
Benzyldimethylamine (BDMA)		180	135.2	54	1.3	—
Ethyleneamines						
Ethylenediamine (EDA)		116.9	60.1	43	9.34	4.1[g]
Diethylenetriamine (DETA)		206.7	103.1	102	0.084	4.1[g]
Triethylenetetramine (TETA)		276.5	151[f]	118	<0.01	4.2[g]
Tetraethylenepentamine (TEPA)		332	200[f]	>177	<0.01	4.2[g]

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Structures and Properties of Huntsman Amines

Amine	Structure	Boiling Point °C	Mol. Wt.	Flash Point TCC °C	Vapor Pressure 20°C mm Hg	pKa
JEFFAMINE® Polyoxyalkyleneamines						
XTJ-505 (M-600)	CH_3–$[OCH_2CH(R)]_x$-$[OCH_2CH(CH_3)]_y$-NH_2 R=H, CH_3	—	600[f]	265[b,c]	—	—
XTJ-506 (M-1000)		—	1000[f]	208[b,c]	—	—
XTJ-507 (M-2005)		—	2000[f]	208[b,c]	—	—
M-2070		—	2000[f]	243.3[b]	—	—
D-230	$NH_2CH(CH_3)CH_2$-$[OCH_2CH(CH_3)]_x$-NH_2	—	230[f]	121[b]	1/101, 10/133	9.46
D-400		—	400[f]	163[b]	1/165, 10/193	9.51
D-2000		—	2000[f]	186[b]	0.93/235	8.65
XTJ-510 (D-4000)	$NH_2CH(CH_3)CH_2[OCH(CH_3)CH_2]_x$-$[OCH_2CH_2]_y$-$[OCH_2CH(CH_3)]_z$-$NH_2$	—	4000[f]	213[b]	—	—
XTJ-500 (ED-600)		—	600[f]	160[b]	—	—
XTJ-501 (ED-900)		—	900[f]	134[b]	—	—
XTJ-502 (ED-2003)		—	2000[f]	260[b]	—	—
XTJ-504 (EDR-148)	$NH_2(CH_2CH_2O)_2$-$CH_2CH_2NH_2$	—	148	265[b,c]	—	—
HK-511	$NH_2CH(CH_3)CH_2$-$(OCH_2CH_2)_2$–$OCH_2CH(CH_3)NH_2$	253[n]	225[f]	138[b]	1[l],10[m]	—
T-403	$CH_2[OCH_2CH(CH_3)]_xNH_2$ $CH_3CH_2CCH_2[OCH_2CH(CH_3)]_yNH_2$ $CH_2[OCH_2CH(CH_3)]_zNH_2$	—	440[f]	196[b]	1/181, 5/207	9.23
XTJ-509 (T-3000)	CH_2-$[OCH_2CH(CH_3)]_x$-NH_2 CH_2-$[OCH_2CH(CH_3)]_y$-NH_2 CH_2-$[OCH_2CH(CH_3)]_z$-NH_2	—	3000[f]	235[b]	—	—
T-5000		—	5000[f]	210[b]	—	—
XTJ—435 chemical intermediate	$CH_3(CH_2)_{12}$–$OCH_2CH(CH_3)$–$OCH_2CH(CH_3)NH_2$	>350	325	355[e]	15.4[k]	—
XTJ-436	C_9H_{19}-C_6H_4-$O[CH_2CH(CH_3)]_{12.5}$-$OCH_2CH(CH_3)NH_2$	—	1004	380[e]	—	—

[a] At 760mm Hg
[b] PMCC
[c] °F
[d] At 100°F
[e] COC
[f] Approximate
[g] pk_b
[h] As 60% aqueous solution
[i] At 70°F
[j] primary component
[k] At 205°C
[l] At 95°C
[m] At 139°C
[n] IBP

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