Technical Data Sheet
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ULH-TEA
Ultra-low hydride triethylaluminum

CAS Number	97-93-8
EINECS/EC	202-619-3
Molecular Formula	$(C_2H_5)_3Al$

APPLICATION

Ultra-low hydride triethylaluminum (ULH-TEA) is used primarily as a catalyst component in Ziegler-Natta type systems for olefin and diene polymerizations. It is also used in ethylene oligomerization to produce olefins and, in chain growth of ethylene, to produce longer chain aluminum alkyls, which are then converted to primary alcohols or other products.

SPECIFICATION

Aluminum, wt. %, min	22.5
TEA, wt. %, min	92.0
TNBA, wt. %, max	8.0
TIBA, wt. %, max	0.5
Hydride (calculated as AlH_3), wt. %, max	0.1

STATISTICAL DATA

	Average ($\bar{x}$)	Variation (3σ)
Aluminum, wt. %	22.9	0.4
TEA, wt. %	93.8	1.2
TNBA, wt. %	5.7	0.9
TIBA, wt. %	< 0.1	(*)
Hydride (calculated as AlH_3), wt. %	0.02	0.03

DENSITY & VISCOSITY

Temperature		Density		Viscosity
°C	°F	g/mL	lbs/gal	cp
-40	-40	0.876	7.311	10.8
-30	-22	0.8693	7.255	8.31
-20	-4	0.8626	7.199	6.51
-10	14	0.8559	7.143	5.18
0	32	0.8492	7.087	4.18
10	50	0.8425	7.031	3.42
20	68	0.8358	6.975	2.83
25	77	0.8325	6.947	2.58
30	86	0.8291	6.919	2.36
40	104	0.8224	6.863	2
50	122	0.8156	6.807	1.7
60	140	0.8089	6.751	1.46
70	158	0.8023	6.696	1.27
80	176	0.7956	6.64	1.11
90	194	0.7889	6.584	0.972
100	212	0.7822	6.528	0.859
110	230	0.7755	6.472	0.764
120	248	0.7688	6.416	0.683
130	266	0.7621	6.36	0.613
140	284	0.7554	6.304	0.553
150	302	0.7487	6.248	0.501
160	320	0.742	6.192	0.456
260	500	0.6749	5.632	0.21

Equations:

Density: d(g/mL)=0.84922-0.0006703t, t= °C
Viscosity: $\log_{10}(cp) = -2.2645 + 923.38/(t + 320)$, t = °C
Experimental range: 20-90°C

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PHYSICAL PROPERTIES

Property	Value
Formula	$(C_2H_5)_3Al$
Formula weight	114.17
State and color at 25°C	clear, colorless liquid
Stability in contact with air	flames instantly
Stability in contact with water	reacts violently
Melting point, °C(°F)	-50.4 (-58)
Boiling point at 760 mm Hg, °C(°F)	185 (365)
Vapor pressure,[1] mm Hg at:	
0°C (32°F)	0.00134
10°C (50°F)	0.00466
20°C (68°F)	0.0147
30°C (86°F)	0.0425
40°C (104°F)	0.114
50°C (122°F)	0.283
60°C (140°F)	0.661
80°C (176°F)	3.1
100°C (212°F)	11.70
120°C (248°F)	38.40
140°C (284°F)	109.60
160°C (320°F)	227.0
180°C (356°F)	629.0
200°C (392°F)	1,295.0
Specific heat at 25°C, cal/g°C	0.494
77°F, btu/lb°F	0.494
Heat of vaporization at NBP, cal/g	127
btu/lb	229
Δ H° of formation at 25°C, cal/gfw	-45.9
Heat of combustion, net at 25°C, cal/g	10,691
77°F btu/lb	18,165
Heat of reaction with water at 25°C, cal/g	1,006
77°F, btu/lb	1,811
Coefficient of volume expansion at 25°C, per °C	0.000822
77°F, per °F	0.000457
Dielectric constant at 5 megacycles at 25°C (77°F)	2.58
Critical temperature, °C (°F)	447 (837)
Critical pressure, atm	33
Surface tension, 28°C (82.4°F), dyne/cm	26.1
Decomposition rate[2] in Bomb at:	
140°C (284°F), %/hr	0.0028
160°C (320°F), %/hr	0.023
180°C (356°F), %/hr	0.16
200°C (392°F), %/hr	0.90
220°C (428°F), %/min	0.075
240°C (464°F), %/min	0.33
260°C (500°F), % min	1.3

[1]Experimental range: 80 - 190°C

[2]Experimental range: 160 - 250°C

Equation: $\log_{10}(\%/hr) = 17.249 - 8185/t$; t = °C + 273

SAFETY & HANDLING

The pyrophoric nature of ULH-TEA presents potential hazards not common to most liquid chemicals used by industry in tank truck quantities. ULH-TEA, being pyrophoric, breaks into flame spontaneously and gives off dense smoke when exposed to air. It reacts violently with water. ULH-TEA is a clear, non-corrosive mobile liquid with a low vapor pressure. Hydrocarbon solutions of ULH-TEA, depending on the concentration and temperature, may not be pyrophoric. However, these solutions must still be blanketed with an inert gas such as dry nitrogen because ULH-TEA will react with air and moisture at the surface of the solution, giving off dense smoke, heat and flammable gas. For specific information on the safe handling and toxicity of this product, please refer to the Material Safety Data Sheet, which is available upon request.

TRANSPORT & PACKAING

	Nominal Value		Approximate Loadings	
Container Description	Gallons	Liters	Pounds	Kilograms
Tank Car (DOT-105A300W)	23,000-25,100	87,100-95,000	135,000-230,000	61,400- 104,000
Tank Trailer (DOT-MC330 or 331)	6,200-7,200	23,500-27,200	30,00-48,000	13,600- 21,800
Portable Tanks (DOT-51)/UN T21	430	1,635	2,250-3,800	1,021-1,725
	1,980	7,500	10,257-17,000	4,880-7,711
Isotank	5,635-5,970	21,330-22,600	30,000-34,000	13,600- 15,500
Cylinders: dual valve (DOT-4BA240)				
5 gallon size	5.7	22	25-53	11-24
26 gallon size	28.0	106	150-268	68-120
Laboratory cylinders (DOT-3AA2015)				
0.4 gallon size	0.40	1.47	1.2-2.2	0.58-0.97
1.0 gallon size	0.94	3.60	2.9-6.3	1.4-2.8

*Actual weight depends on highway load limits, product density and lifting considerations.

Shipments are made in accordance with DOT regulations — Section 173.134. All containers are shipped blanketed with dry nitrogen under slight positive pressure. Hydrocarbon solutions are also available blended to customer specifications.Tank rail cars and tank trucks are available in North America only.

Transportation Classification

Proper shipping name ..... Organometallic Substance, Liquid, Pyrophoric, Water Reactive (Triethylaluminum)

Hazard class ..... 4.2 (spontaneously combustible) + 4.3(dangerous when wet)

ID number UN3394

Placard(s ..... spontaneously combustible w/ number 4+dangerous when wet 4

Label(s ..... spontaneously combustible+dangerous when wet

MARPOL Classification ..... n/a

Harmonized tariff number 2931.00.4000-2

Schedule B number ..... 2931.00.6000-7)

OTHER INFORMATION

Further Related Documents — Safety Data Sheet

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