ALBEMARLE® CORPORATION

TNOA

Description

Tri-*n*-octylaluminum (TNOA) is used primarily as a catalyst component in Ziegler-Natta type systems for olefin and diene polymerizations. Other applications include use in alkylation reactions and as a catalyst component in linear oligomerization and cyclization of unsaturated hydrocarbons.

Specifications

Aluminum, wt. %, min	7.0
TNOA, wt. %, min	94.5
Branched $(C_{16}H_{33})_3Al$, wt. %, max	2.0
Hydride (calculated as AlH_3), wt. %, max	0.6
Octene, wt. %, max	3.0

Statistical Data

	Average ($\bar{x}$)	Variation (3σ)
Aluminum, wt. %	7.32	0.12
TNOA, wt. %	95.9	1.0
Branched $(C_{16}H_{33})_3Al$, wt. %	0.4	0.1
Hydride (calculated as AlH_3), wt. %	0.16	0.08
Octene, wt. %	0.5	0.6

Physical Properties

Formula	$(n\text{-}C_8H_{17})_3Al$
Formula weight	366.65
State and color at 25°C	clear, colorless liquid
Stability in contact with air	fumes vigorously, may ignite spontaneously
Stability in contact with water	reacts violently
Freezing point, °C	< -40
Boiling point at 760 mm Hg (extrapolated)[1], °C	361.3
Specific heat at 20°C	0.527 cal/g°C
68°F	0.527 btu/lb°F
Heat of vaporization at NBP	39.0 cal/g
	70.1 btu/lb
ΔH° of formation at 25°C (77°F)	-152.6 kcal/gfw
Heat of combustion, net at 25°C	10306 cal/g
77°F	18559 btu/lb
Heat of reaction with water at 25°C	346 cal/g
77°F	623 btu/lb
Coefficient of volume expansion at 25°C	0.000807/°C

[1]*Decomposes below boiling point*

Density and Viscosity

Temperature		Density		Viscosity
°C	°F	g/mL	lbs/gal	cp
0	32	0.8501	7.094	112
10	50	0.8435	7.038	71.0
20	68	0.8369	6.983	46.1
25	77	0.8336	6.956	37.6
30	86	0.8303	6.928	30.8
40	104	0.8237	6.873	21.1
50	122	0.8171	6.818	14.8
60	140	0.8105	6.763	10.6
70	158	0.8039	6.708	7.71
80	176	0.7973	6.653	5.72
90	194	0.7907	6.598	4.31
100	212	0.7841	6.543	3.29
120	248	0.7709	6.433	2.00
140	284	0.7577	6.322	1.28
160	320	0.7445	6.212	0.847
180	356	0.7313	6.102	0.582
200	392	0.7181	5.992	0.413

Equations:
Density: d(g/mL) = 0.8501 - 0.00066t; t = °C
Viscosity: $\log_{10}$ (cp) = -3.8649 + 1691.15/(t + 285.87); t = °C
Experimental range: 25 - 100°C

Shipping Information

Container Designation	Nominal Volume Gallons	Nominal Volume Liters	Approximate Loadings Pounds	Approximate Loadings Kilograms
Tank car				
(DOT-105A300W)	11,100	42,000	69,530	31,560
Tank trailer				
(DOT-MC330 or 331)	6,200-7,200	23,500-27,200	38,835-45,100[a]	17,630-20,475[a]
Portable tanks	250	945	1,500	680
(DOT-51)	430	1,635	2,600	1,179
	1,980	7,500	12,000	5,443
Isotank	5,635-5,970	21,330-22,600	31,640-40,900	14,350-32,170
Cylinders: dual valve				
(DOT-4BA240)				
3 gallon size	2.9	11	16	7
5 gallon size	5.7	22	33	15
26 gallon size	28.0	106	175	80
Laboratory cylinders				
(DOT-3AA1800)				
0.2 gallon size	0.18	0.68	0.8	0.36
1.0 gallon size	0.94	3.60	4.5	2.10

[a] *Actual weight depends on highway load limits.*

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.

Shipping Classifications

Proper shipping name:	Aluminum Alkyl (Tri-*n*-octylaluminum)
Hazard class:	4.2 (spontaneously combustible)
ID number:	UN3051
Placard(s):	spontaneously combustible w/ number 4
Label(s):	spontaneously combustible
MARPOL classification:	not applicable
Harmonized tariff number:	2931.00.4000-2
Schedule B number:	2931.00.6000-7

Safety and Handling Information

The pyrophoric nature of TNOA presents potential hazards not common to most liquid chemicals used by industry in tank truck quantities. TNOA, being pyrophoric, breaks into flame spontaneously and gives off dense smoke when exposed to air. It reacts violently with water. TNOA is a clear, noncorrosive mobile liquid with a low vapor pressure. Hydrocarbon solutions of TNOA, 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 TNOA 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.

Chemical Registration Numbers

CAS: 1070-00-4
EINECS: 2139644

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