



ADHESIVES

The primary function of an adhesive is to bond, hold or fasten materials together. An adhesive formulation is typically comprised of polymers, additives and process oils. Calumet™ offers naphthenic and paraffinic process oils, white oils, solvents and waxes for use in a wide range of applications.

APPLICATIONS

- Aerospace
- Automotive
- Apparel and clothing
- Cloth and textiles
- Electronics
- Heating, ventilation and air conditioning
- Industrial machinery
- Medical
- Packaging
- Laminating and coating
- Tapes, labels and graphics

BASE OILS

The higher polarity of naphthenic oils compared to paraffinic oils result in a lower aniline point allowing for greater solvency with polar elastomeric polymers and tackifier resins used in adhesives. The saturated hydrocarbon rings give the molecules a greater ability to solubilize other components in an adhesive formulation. Since oil viscosity can have significant impact on formulated adhesives, with proper process oil selection, formulators can optimize finished product performance. Calumet process oils below are available for adhesive applications:

PROPERTIES	METHOD	CALSOL™ 5550	CALSOL™ 550	CALSOL™ 850	CALPRO™ 500	CALSOL™ 5200	CALSOL™ 5300	CALSOL™ P910	CALSOL™ P960	RAVEN™ 140
Viscosity @ 40 °C (cSt)	D445	97.1	96.3	95.9	97.0	385.3	616.1	20.1	122.6	602.0
Viscosity @ 100 °C (cSt)	D445	9.0	9.0	8.0	10.0	20.5	28.0	4.1	12.6	29.0
Viscosity @ 100 °F (SUS)	D2161	514.4	508.7	512.5	508.9	2100.4	3364.6	105.7	642.5	3291.0
Viscosity @ 210 °F (SUS)	D2161	56.8	56.8	53.2	59.1	103.8	141.0	39.9	70.0	144.8
API Gravity @ 60 °F	D4052	25.2	25.2	21.4	26.4	22.7	22.3	33.5	29.0	20.5
Specific Gravity @ 60 °F	D1250	0.9029	0.9029	0.9254	0.8961	0.9176	0.9200	0.8575	0.8816	0.9309
Viscosity-Gravity Constant	D2501	0.840	0.841	0.871	N/A	N/A	N/A	0.809	0.809	0.854
Density (Pounds per Gallon)	D1250	7.529	7.518	7.716	7.462	7.641	7.661	7.150	7.341	7.752
Molecular Weight	D2502	420	425	370	455	520	575	365	535	590
Pour Point (°F)	D97	-36	-26	-22	-20	-5	11	5	13	5
Color, ASTM	D1500	L0.5	L0.5	1.0	L1.0	L2.0	L8.0	1	2.0	D8.0
UV Absorptivity @ 260 nm	D2008	0.5	0.4	3.2	1.0	2.7	3.0	0.1	0.6	-
Volatility @ 225 °F (Wt.%)	D972	0.3	0.5	3.3	0.5	0.4	0.1	2.1	0.1	0.1
Flash Point, COC (°F)	D92	438	412	377	233	495	527	402	503	445
Refractive Index @ 20 °C	D1218	1.4918	1.4914	1.5024	1.4897	1.5024	1.5071	1.4698	1.4834	-
Aniline Point (°F)	D611	209.5	211.5	180.0	220.3	219.5	225.8	220.7	248.2	209.0
Clay-Gel (Wt.%)	D2007									
Asphaltenes		0	-	-	-	-	-	0	0	-
Polar Compounds		0	-	-	-	-	-	0	0	-
Aromatics		18	-	-	-	-	-	9	11	-
Saturates		82	-	-	-	-	-	91	88	-
Carbon Type Analysis (%)	D2140									
Ca		4	3	8	4	9	13	0	2	-
Cn		44	46	52	39	36	27	36	31	-
Cp		52	51	40	57	55	60	64	63	-
FDA 21 CFR 178.3620 (c)	FDA	PASS	PASS	PASS	-	PASS	PASS	PASS	-	-

SOLVENTS

Solvent based adhesives are good for porous and non-porous surfaces. They provide excellent adhesion, dry quick, and are easily spreadable during application allowing for a more thorough coating in comparison to numerous water-based adhesives. Calumet also manufactures solvents for applications requiring FDA credentials.

	ALIPHATIC SOLVENTS							ISOPARAFFINIC SOLVENTS	
PROPERTIES	METHOD	HP IsoHexane	Hexane	180-210 <1%	195-208 <1%	200-230 <1%	210-245 <1%	CONOSOL® 260	CONOSOL® 340
API Gravity @ 60 °F	ASTM D4052	82.1	75.1	62.3	67.9	62.3	61.8	39.9	34.6
Density @ 60 °F (Pounds Per Gallon)	ASTM D1250	5.522	5.709	6.087	5.916	6.088	6.103	6.873	7.092
Flash Point TCC (T), COC (C), PMCC (P) (°F)	ASTM D56 ASTM D92 ASTM D93	-	-	16 (T)	18 (T)	32 (T)	32 (T)	285 (P)	341 (C)
Color, Saybolt	ASTM D156	30	30	30	30	30	30	30	30
Refractive Index @ 25 °C	ASTM D1218	-	-	-	-	-	1.4033	1.4536	1.4658
Aromatics (Vol. %)	ASTM D1319	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.3	0.3
Distillation, IBP (°F)	ASTM D86	133	151	180	196	207	209	519	599
Distillation, 50% (°F)	ASTM D86	138	155	183	200	214	218	550	611
Distillation, Dry Point (°F)	ASTM D86	143	163	195	208	237	245	596	642
Specific Gravity @ 60/60 °F	ASTM D1250	0.6623	0.6847	0.7301	0.7095	0.7302	0.7320	0.8237	0.8518
Aniline Point (°F)	ASTM D611	-	144.6	144.6	146.2	136.4	139.9	191.0	189.8
Kauri-Butanol Value	ASTM D1133	29.0	29.3	39.1	31.9	33.6	34.1	23.8	21.7
Pour Point (°F)	ASTM D97	-	-	<-85	<-85	<-70	<-70	-30	-30
Viscosity @ 40 °C (cSt)	ASTM D445	-	-	-	-	-	-	3.74	7.86
Meets CARB Requirements	Method 310	-	-	-	-	-	-	Yes	Yes
Vapor Pressure @ 20 °C (mm Hg)	ASTM D2879	-	-	-	-	-	-	0.01	<0.01
Flammable	-	√	√	√	√	√	√	-	-
Non-Hazardous	-	-	-	-	-	-	-	√	√

DRAKESOL™ SPECIALTY SOLVENTS

PROPERTIES	METHOD	DRAKESOL™ 205	DRAKESOL™ 220	DRAKESOL™ 260
API Gravity @ 60 °F	D4052	45.4	42.7	41.8
Specific Gravity, 60/60 °F	D4052	0.7999	0.8126	0.8164
Flash Point, PMCC (°F)	D93	202	240	263
Color, Saybolt	D156	30	30	30
Kauri-Butanol Value	D1133	26.7	25.0	23.2
Refractive Index @ 20 °C	D1218	1.4416	1.4460	1.4488
Distillation Range (°F)	D86			
IBP		432	485	511
50%		443	502	541
EP		474	538	594
FDA 21 CFR 172.884	FDA	PASS	PASS	PASS
FDA 21 CFR 178.3650	FDA	PASS	PASS	PASS
FDA 21 CFR 573.740	FDA	PASS	PASS	PASS
FDA 21 CFR 573.680	FDA	PASS	PASS	PASS
FDA 21 CFR 178.3620 (b)	FDA	PASS	PASS	PASS

WAXES

Waxes are typically used in adhesive applications as a blending ingredient to help control the viscosity, to increase bond strength and hardness, and to improve seal compatibility.

PARAFFIN

PROPERTIES	METHOD	FR-6513	SC-6820
Melt Point (°C)	D87	66	68
Melt Point (°F)	D87	151	156
Oil Content (%)	D721	<0.50	<1.50
Penetration @ 77 °F	D1321	13	15
Color, Saybolt	D156	29	28
FDA 21 CFR 172.886	FDA	YES	YES

WHITE OILS

White oils can act as a diluent or plasticizer in hot melt and pressure sensitive adhesive technology. Since the adhesives can come in contact with food or skin, the clear color, pharmacopeia and FDA credentials of the Drakeol® line are important.

PROPERTIES	METHOD	DRAKEOL® 21	DRAKEOL® 34	DRAKEOL® 35	DRAKEOL® 350	DRAKEOL® 600
API Gravity @ 60 °F	D4052	33.5	32.1	31.3	31.1	30.1
Specific Gravity @ 25/25 °C	D4052	0.8530/0.8760	0.8580/0.8720	0.8640/0.8810	0.8570/0.8730	0.8600/0.8780
Color, Saybolt	D156	30	30	30	30	30
Viscosity @ 40 °C (cSt)	D7042	38.4/41.5	72.0/79.5	65.8/71.0	66.7/71.2	99.0/120
Viscosity @ 100 °F (SUS)	D2161	200/215	370/410	340/365	350/370	515/625
Flash Point, COC °F	D92	439	484	467	462	508
Odor	USP/NF	PASS	PASS	PASS	PASS	PASS
Acidity	USP	PASS	PASS	PASS	PASS	PASS
Infrared Absorption	USP	PASS	PASS	PASS	PASS	PASS
Limit Of PAH	USP	PASS	PASS	PASS	PASS	PASS
Limit Of Sulfur Compounds	USP	PASS	PASS	PASS	PASS	PASS
Readily Carbonizable Substances	USP	PASS	PASS	PASS	PASS	PASS
Solid Paraffins	USP	PASS	PASS	PASS	PASS	PASS
FDA 21 CFR 172.878	FDA	PASS	PASS	PASS	PASS	PASS

TECHNICAL ASSISTANCE

For product or technical questions, contact your Sales Representative or Calumet Product Support at (800) 437-3188 or email technical@calumet.com.

Calumet's sampling and testing procedures in effect at the time of production will be used for certification testing. Results may be based on tank certification, manufacturing data, periodic testing and/or most recent product restock. Typical values only represent the values one would expect if the property were tested in our laboratories with our test methods on the specified date. Some product properties are not frequently measured, and accordingly typical values are not based on a statistically relevant number of tests. The information in this document relates only to the named product. The user is solely responsible for all determination regarding any use and any process.

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