TECHNICAL UPDATE

CRAY VALLEY
Hydrocarbon Specialty Chemicals

Polybutadiene Surface Tension Values Help Adhesive Formulators Improve Substrate Wettability

Target Markets

- Cast elastomers
- Adhesives and sealants
- Thermoplastic polyurethanes
- Coatings

Description

Cray Valley supplies a large variety of polybutadiene derivatives. A study was conducted to determine the effect of structure and functionality on surface tension. Cray Valley's range of polybutadiene resins is described on page 2.

A Dynometer Plus, based on the du Nouy ring method, was used to measure surface tensions of Cray Valley's polybutadiene derivatives. For the hydroxyl-terminated polybutadienes (HTPBs), the significant factor affecting surface tension appears to be vinyl content. This conclusion is based on a comparison of Krasol LBH resins (65% vinyl) versus Poly bd resins (15% vinyl) at various molecular weights. The lower the vinyl content, the higher the surface tension. Neither molecular weight in the range tested nor hydrogenation appeared to have a significant impact. The epoxidized resins (Poly bd 600E and 605E) demonstrated higher surface tensions than the precursor (Poly bd R20LM) due to increased polarity. At very low molecular weight (Krasol LB 2000 vs. Krasol LBH 2000), the hydroxyl group appears to increase surface tension. Results are presented on Page 3.

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Product	Description	Literature
Poly bd® R-45HTLO[1]	Hydroxyl-terminated polybutadiene resin. Mn=2700	TDS/MSDS
Poly bd R-20LM	Low molecular weight hydroxyl-terminated polybutadiene resin. Mn=1230	TDS/MSDS
Poly bd 600E	Epoxidized hydroxyl terminated polybutadiene resin. Mn=1350	TDS/MSDS
Poly bd 605E	Epoxidized hydroxyl terminated polybutadiene resin. Mn=1450	TDS/MSDS
Krasol® LBH 2000[1]	Hydroxyl-terminated polybutadiene. Mn=2000	TDS/MSDS
Krasol LBH 3000	Hydroxyl-terminated polybutadiene. Mn=3000	TDS/MSDS
Krasol LBH 5000	Hydroxyl-terminated polybutadiene. Mn=5000	TDS/MSDS
Krasol HLBH-P 3000	Hydroxyl-terminated polybutadiene. Mn=3100	TDS/MSDS
Ricon® 130[1]	Low vinyl polybutadiene resin. Mn=2500	TDS/MSDS
Ricon 150	High vinyl polybutadiene resin. Mn=3900	TDS/MSDS
Ricon 152	High vinyl polybutadiene resin. Mn=2900	TDS/MSDS
Ricon 156	High vinyl polybutadiene resin. Mn=1400	TDS/MSDS
Ricon 157	High vinyl polybutadiene resin. Mn=1800	TDS/MSDS
Polybutadiene (1% vinyl)[2]	Liquid polybutadiene. Mn-1530-2070	n/a
Polybutadiene (1% vinyl)[2]	Liquid polybutadiene. Mn ca. 3000	n/a

(1) Poly bd, Ricon, and Krasol resins are trademarks of Cray Valley
(2) Aldrich Chemical Co.

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Product	Measurement Temperature, °C	Surface Tension, mN/m or dyne/cm	Vinyl, %
Poly bd® R-45HTLO[1]	26.1	35.02	20
Poly bd R-20LM	25.9	35.74	20
Poly bd 600E	25.7	35.99	20
Poly bd 605E	25.3	37.15	20
Krasol® LBH 2000[1]	23.7	31.60	60-65
Krasol LBH 3000	24.1	32.13	60-65
Krasol LBH 5000	25.4	31.69	60-65
Krasol HLBH-P 3000	22.9	32.42	n/a
Ricon® 130[1]	24.4	33.93	28
Ricon 150	25.2	31.73	70
Ricon 152	25.4	32.99	80
Ricon 156	24.8	30.05	70
Ricon 157	25.5	30.69	70
Polybutadiene (Mn=1530-2070)[2]	25.4	37.11	1
Polybutadiene (Mn ca. 3000)[2]	25.9	37.20	1

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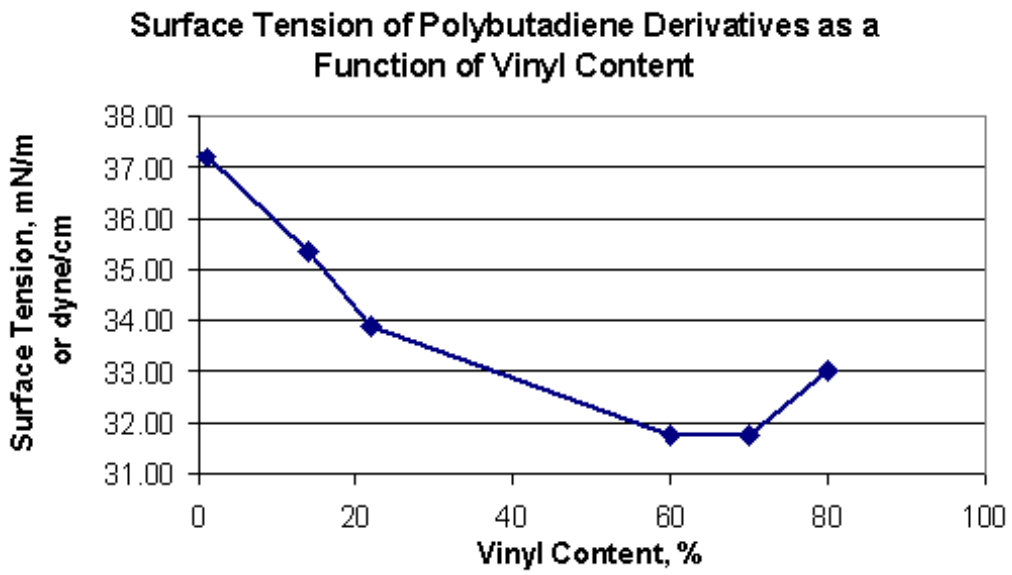
The graph below relates surface tension and vinyl content for Cray Valley's polybutadienes and their derivatives.



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