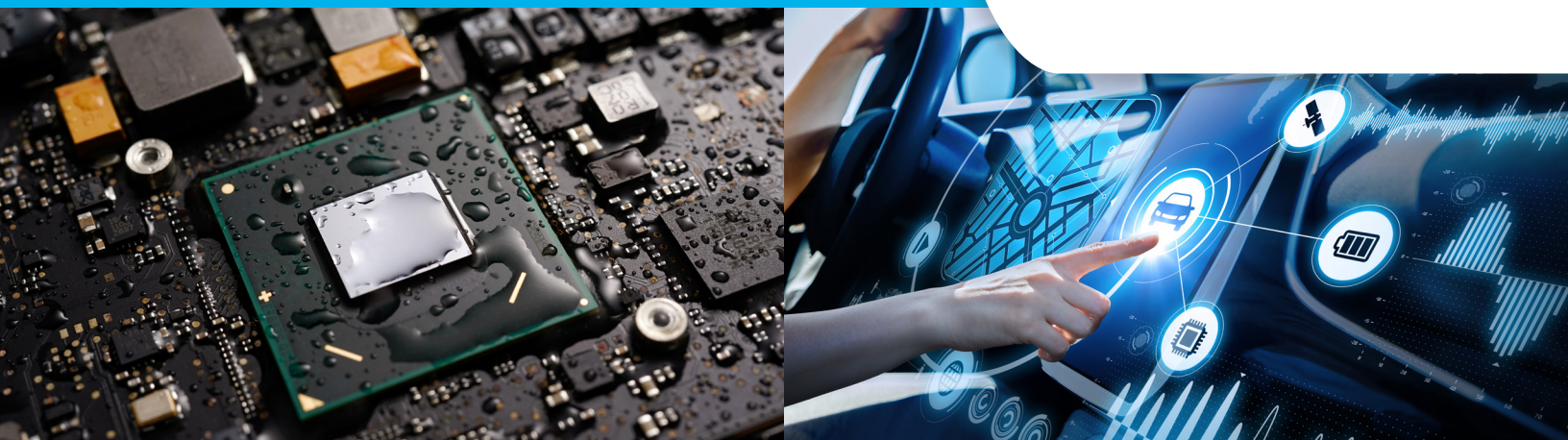




BENEFITS

- Low surface tension for low surface energy substrates
- Enhanced wettability for improved adhesion
- Exceptional water and chemical resistance

TARGET MARKETS/ APPLICATIONS

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

ADDITIONAL INFO

- SDS/TDS: Krasol® and Ricon®

Improve Substrate Wettability with Krasol® and Ricon® Polybutadiene Resins

Introduction

Cray Valley supplies a large variety of polybutadiene resins, comprising Krasol® hydroxyl terminated polybutadienes and Ricon® polybutadiene resins. A study was conducted to determine the effects of microstructure and functionality on surface tension.

A Dymometer Plus, based on the du Nouy ring method, was used to measure the surface tensions of Krasol and Ricon in comparison with other polybutadienes of varying 1,2-vinyl content, overall unsaturation, number of OH functional groups, and molecular weight. Results are shown in the table on page 2.

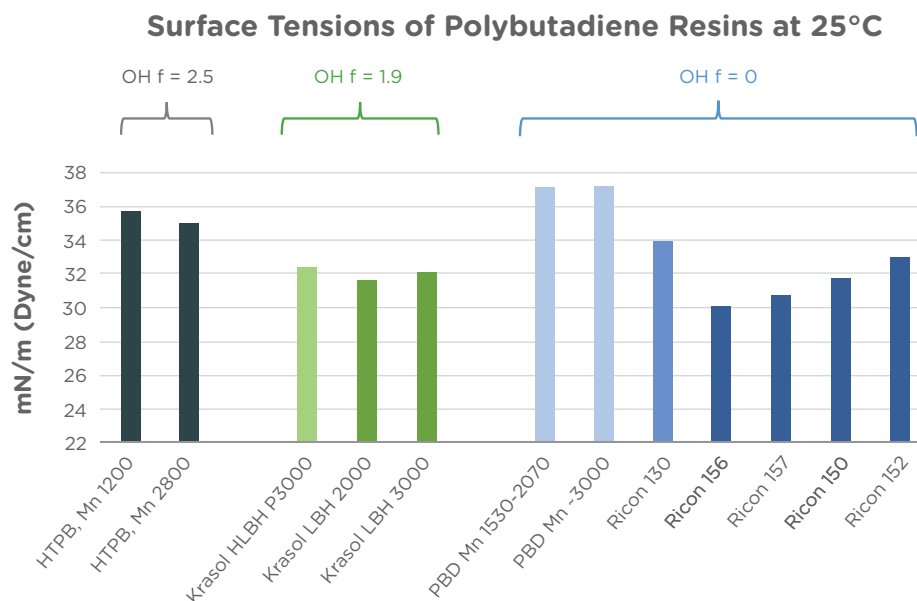
Product Type	Product	Mn, g/mol	Tg, °C	Number of OH groups/chain	1,2-Vinyl, %	Surface Tension, mN/m (dyne/cm) ¹
Hydroxyl Terminated Polybutadienes (HTPB)	Krasol HLBH P3000	3000	-46	1.9	0	32.4
	Krasol LBH 2000	2000	-35	1.9	65	31.6
	Krasol LBH 3000	3000	-40	1.9	65	32.1
	HTPB, Mn 1200 ²	1200	-70	2.5	20	35.7
	HTPB, Mn 2800 ²	2800	-75	2.5	20	35.0
Unfunctionalized Polybutadienes	Ricon 130	2500	-86	0	22	33.9
	Ricon 156	1800	-56	0	65	30.1
	Ricon 157	2400	-51	0	67	30.7
	Ricon 150	4200	-40	0	70	31.7
	Ricon 152	3900	-30	0	76	33.0
	PBD Mn ³	1530-2070		0	1	37.1
	PBD Mn ³	~3000		0	1	37.2

(1) All measurements conducted at 24.5°C ±1.6°C

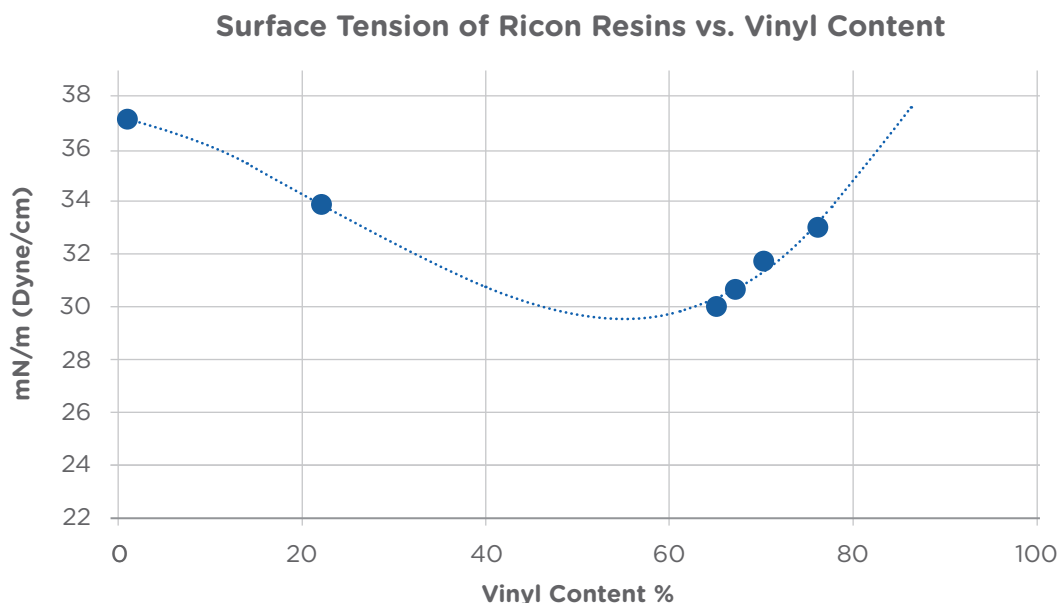
(2) Poly bd® R20LM and R45 HTLO, Resin Solutions Inc.

(3) Sigma Aldrich

Polybutadienes are hydrocarbon resins and highly non-polar so overall low surface tension is expected. It is also expected that Hydroxyl Terminated Polybutadiene (HTPB) resins would have higher surface tension than unfunctionalized polybutadiene resins like Ricon, due to the increased polarity from the OH functional groups. Krasols with functionality of 1.9 have lower surface tension compared to other commercial HTPB with higher functionality, and are comparable with unfunctionalized polybutadiene resins. With HTPB, there seems to be little correlation between surface tension and molecular weight, Tg, or vinyl content. There is very little difference in surface tension of Krasol LBH 3000 with high unsaturation compared to Krasol HLBH P3000, which is fully hydrogenated. The plot below shows the variation of surface tension with number of OH functional groups.



With unfunctionalized polybutadienes such as Ricon, there is also no correlation between surface tension and molecular weight. But surface tension seems to decrease with vinyl content up to about 60% vinyl, above which it increases.



The surface tension of adhesive, sealant and coating formulations can be affected by the microstructure and functionality of the polybutadiene resin being used. Krasol and Ricon polybutadiene resins have exceptionally low surface tension for improved wettability and adhesion of low energy substrates.

About Cray Valley

As part of the TotalEnergies family, Cray Valley is a global supplier of specialty chemical additives, hydrocarbon specialty chemicals, and liquid and powder tackifying resins used as ingredients in adhesives, rubbers, polymers, coatings and other materials. Cray Valley has pioneered the development of these advanced technologies, introducing hundreds of products that enhance the performance of products in energy, printing, packaging, construction, tire manufacture, electronics and other demanding applications.

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