ADITYA BIRLA

BIRLA CARBON

RAVEN 5000 ULTRA II

Solventborne High Color Coatings

SOLVENTBORNE HIGH COLOR COATINGS

Birla Carbon offers Raven 5000 Ultra II carbon black, the finest particle size carbon black in the world. This product features the highest surface area available in a carbon black which, in turn gives the deepest color. Jetness is the property most desired for high-end coatings applications in the automotive, industrial, and architectural industries. Birla Carbon will work with you to obtain the ultimate level of color in your formulation.

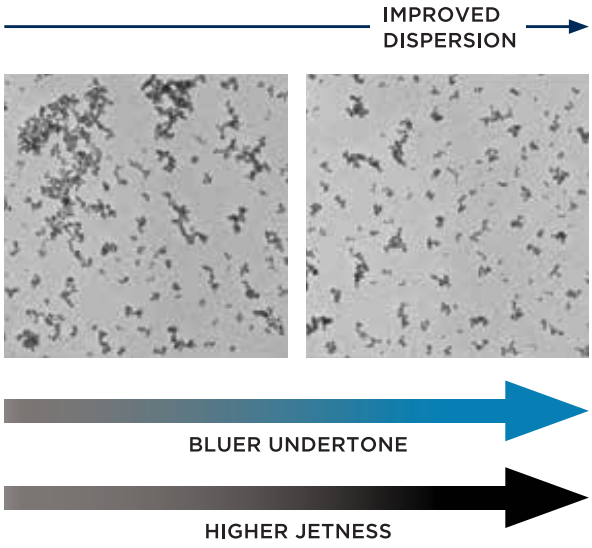
PERFORMANCE PROPERTIES

Raven 5000 Ultra II carbon black provides the industry leading level of jetness in high color coatings. The very fine particle size and very high surface area of this product allows the most opportunity for light absorption which brings out the exceptional level of jetness.

In order to optimize the level of jetness, the maximum amount of surface area needs to be exposed. This is achieved through good dispersion. The surface oxidation of Raven 5000 Ultra II carbon black leads to better wetting and dispersion than would be expected from a more neutral surface.

The use of external dispersants is usually necessary to attain the darkest color. Proper selection of dispersants is based on the resin system, the solvent, and the pigment surface chemistry. Optimization of the dispersant type, loading, and mixing conditions will lead to developing the ultimate level of color in your application.

Shown here are the effects of improved dispersion and color development. In this case, less than 15% additional dispersion time minimized micro-flocculation, enhanced jetness, and changed the undertone of the black from brown to blue. Optimizing the formulation through proper selection of the dispersant and its loading will show similar improvements.



Birla Carbon has dedicated teams and capabilities focused on specialty carbon black markets, including plastics, inks, and coatings. Our Raven and Conductex specialty carbon blacks meet the unique requirements in these markets and provide the desired properties of color, conductivity, viscosity, and UV protection for a wide range of applications. Our contemporary research infrastructure and state-of-the-art technology centers make us well equipped to collaborate with our customers and provide the best possible solution to any challenge in the specialty carbon black market. With a presence in each of the key markets of Asia, Europe, and the Americas, Birla Carbon stands ready to deliver consistent, high-quality products and services worldwide.`

TYPICAL PROPERTIES

PROPERTY	UNIT	R5000UII
NSA	m^2/g	583
STSA	m^2/g	350
OAN	$cm^3/100g$	95
Volatile Content	%	10.5

PROCESSING CONDITIONS

MILLBASE

- Shaker milling with 2.4mm stainless steel shot
- 9:1 media to pigment dispersion ratio
- Milling time 60 minutes

LETDOWN

- Mixed for 30 minutes to blend components
- Letdown added to millbase
- Shaken for additional 20 minutes

MILLBASE FORMULATIONS

The impact of different dispersants on color development was evaluated. All millbase formulations maintained identical loadings of active dispersant and carbon black.

ACTIVE LEVEL IN DISPERSANT	35% ACTIVE	50% ACTIVE	100% ACTIVE
Joncryl® 500	78.5	78.5	78.5
MIAK	10.4	12.5	14.9
Dispersant	6.9	4.8	2.4
R5000UII	4.2	4.2	4.2
Total	100.0	100.0	100.0

LETDOWN	
Joncryl® 500	60.0
Cymel® 303 LF	24.0
MIAK	10.0
i-BuOH	3.5
DC-57 (10% in i-BuOH)	1.1
Cycat® 4040	1.4
Total	100.0

PAINT	
Millbase	43.3
Letdown	56.7
Total	100.0

All millbases are treated the same way due to the same carbon black and dispersant loading.

POLYMERIC DISPERSANTS EVALUATED

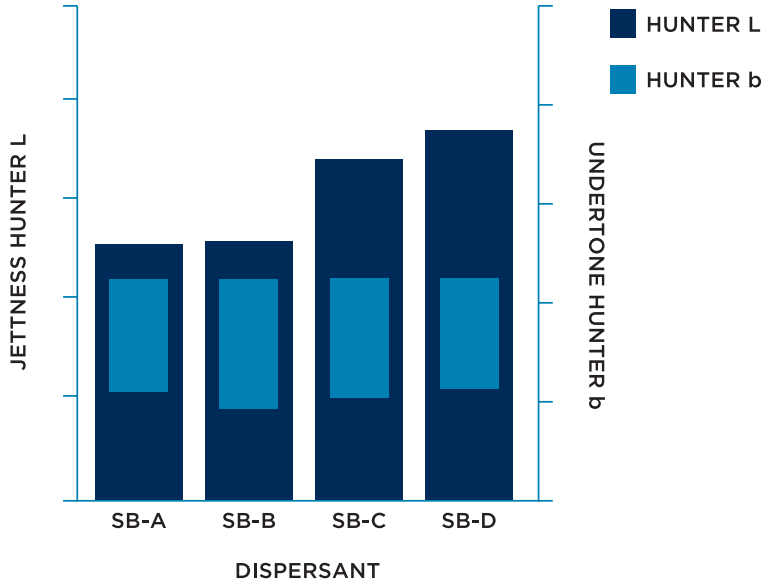
Dispersant	Anchor/Functional Group		Polymer Type	% Active
	Configuration	Charge		
SB-A	Block Copolymer	Non-ionic	Acrylic	50
SB-B	Block Copolymer	Non-ionic	Acrylic	50
SB-C	Block Copolymer	Cationic	Polyurethane	35
SB-D	Comb Copolymer	Non-ionic	Polyurethane	100

GLOSS AND HAZE

Dispersant	20° Gloss	20° Haze
SB-A	83.6 ± 0.51	33 ± 2.22
SB-B	83.3 ± 0.29	40 ± 3.42
SB-C	84.3 ± 0.31	31 ± 1.50
SB-D	85.5 ± 0.34	28 ± 0.96

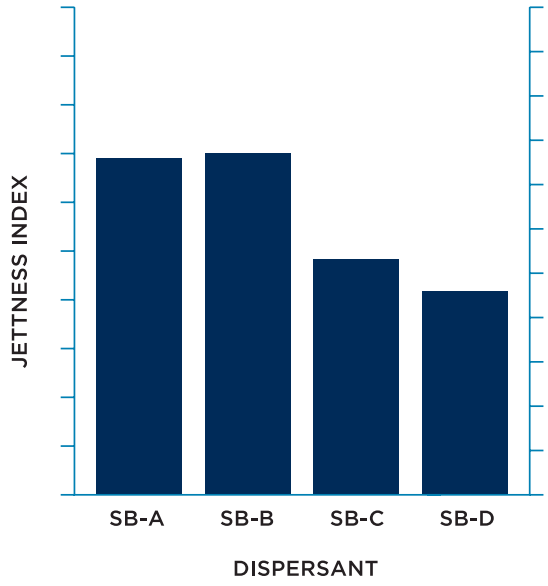
MASSTONE PERFORMANCE

In this formulation, an acrylic type of polymeric dispersant outperforms the polyurethane types in the development of jetness. This is to be expected since the main resin is an acrylic polyol.



JETNESS INDEX

The jetness index correlates with the visual impression and combines the masstone and undertone into a single value.



Collaborating with our customers means much more than finding a product solution. It means having the drive to explore solutions to a challenge from every angle, and leveraging our proven, global expertise to do it. It means creating practical innovations that deliver real results. And it means creating a seamless experience that is built on a relationship, not a process. The experience begins with a conversation. **Please contact us** to get started.

ABOUT BIRLA CARBON

Birla Carbon is a leading global supplier of carbon black. As one of the flagship businesses of the leading Indian multinational conglomerate, the **Aditya Birla Group**, Birla Carbon provides innovative sustainable carbon black solutions that enhance the performance of paints and coatings, inks and toners, plastics, adhesives, sealants, textile fibers, mechanical rubber goods, tires, Energy Systems, and Sustainable Carbonaceous Materials.

As an ardent practitioner of sustainable development, Birla Carbon's Sustainable Operational Excellence (SOE) strategy focuses on employee safety, environmental stewardship, efficient use of carbon sources, product circularity and sustainability, and a key focus on conducting operations in a socially and ethically responsible manner. Birla Carbon has been recognized by EcoVadis since 2016 as an advanced practitioner of sustainability. Our current rating is available on the **Birla Carbon Sustainability webpage**.

Birla Carbon's Purpose, 'Share the Strength', is about balanced and shared leadership, working at the product level to innovate cutting edge solutions through collaboration with its people, customers, and communities and backed by knowledge built over a century.

For more information, visit **birlacarbon.com**, or follow us **@BirlaCarbon** on **Twitter**, **LinkedIn**, **Facebook**, or **Instagram**.

SHARE THE STRENGTH

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