

RHOPLEX™ RN-128 **100% Acrylic Emulsion** **with Bio-based Carbon Content**



Evolving Consumer Sentiment Towards Using Sustainable Products

Key decision-makers in the paint purchasing sector have reported a 9% increase in their likelihood to consider plant-based products compared to the previous year. A survey conducted among 500 DIY and professional painters based in the United States indicates that the primary factors influencing paint purchases are concerns for personal and family health, as well as environmental sustainability. As consumer awareness and willingness to adopt products with plant-based attributes grow, it is imperative to deliver products that fulfill consumer expectations regarding both the sustainability and performance metrics.

Responses indicate a growing interest in sustainability and willingness to try sustainable products



86%

of consumers say **personal & family health and care for the environment** are the driving factors in purchasing sustainable products



>60%

Personal health & indoor air quality drive consumers to purchase more sustainable **paint** if durability is not sacrificed

+9%

increase in consumers “trying out” plant-based products compared to 2021

46%

of big box store respondents say paint will be a focus for “environmentally friendly” product placement

Source: Dow commissioned survey in 2022

What is RHOPLEX™ RN-128 100% Acrylic Emulsion?

RHOPLEX™ RN-128 is a plant-based 100% acrylic emulsion for use in decorative interior architectural coatings. As a U.S. Department of Agriculture (USDA) Certified Biobased Product, RHOPLEX™ RN-128 incorporates 27% bio-based carbon content into the resin, ensuring consistent and traceable bio-carbon content in every batch of polymer produced. This method reduces dependence on petroleum-based feedstocks, thereby decreasing the carbon footprint of both polymer production and paint production utilizing this resin. RHOPLEX™ RN-128 is designed for use in interior flat to semi-gloss paints and offers an excellent performance profile characteristic of 100% acrylic resins.

Key Attributes

- Approximately 27% bio-based carbon content, verified through third-party C-14 testing using ASTM D-6866.
- Potential to enable USDA BioPreferred certification for Interior Paint and Coatings.
- Reduced fossil-fuel dependency through the utilization of bio-renewable feedstocks.
- Lower bulk VOC & emissions compared to petroleum-based resins.
- Potential for significant carbon emissions savings without negative impacts on other environmental factors, as indicated by internal LCA results.
- Performance profile comparable to petroleum-based acrylic resins.

Formulation Features

- Flat through semigloss sheen versatility
- Coalescent demand that offers VOC flexibility in formulation
- No intentionally added alkylphenol ethoxylates (APEO)
- No intentionally added per- and polyfluoroalkyl substances (PFAS)

Property*	RHOPLEX™ RN-128
Appearance	Opaque, white to off-white liquid
Solids, % wt.	~50
pH	8.0-8.5
Weight per U.S. Gallon (Wet, lbs/gal)	8.95
MFFT (°C)	~11
Coalescent level (%)	4-6

*These properties are typical but do not constitute specifications.

Reduced Bulk VOC and Emissions Compared to Petroleum-Based Acrylics

Emitted VOCs are measured on resins and formulated paints applied to a panel, which is then placed in a controlled relative humidity chamber for observation. As illustrated in Figure 1, RHOPLEX™ RN-128 Acrylic Emulsion exhibits significantly reduced VOC emissions compared to a standard petroleum-based binder at the initial 24-hour time point. After 1 week and 2 weeks, RHOPLEX™ RN-128 shows zero emitted VOCs, while the petroleum-based acrylic displays detectable amounts.

Bulk VOC, a regulated measurement in final paint formulations based on region and on paint segment, for RHOPLEX™ RN-128 Emulsion is approximately 35% lower than that of a comparable petroleum-based resin, as measured by ASTM D-6886 on a wet polymer sample.

Emitted VOCs are subject various certifications, with the primary specification in North America being California Specification 01350 v1.2.

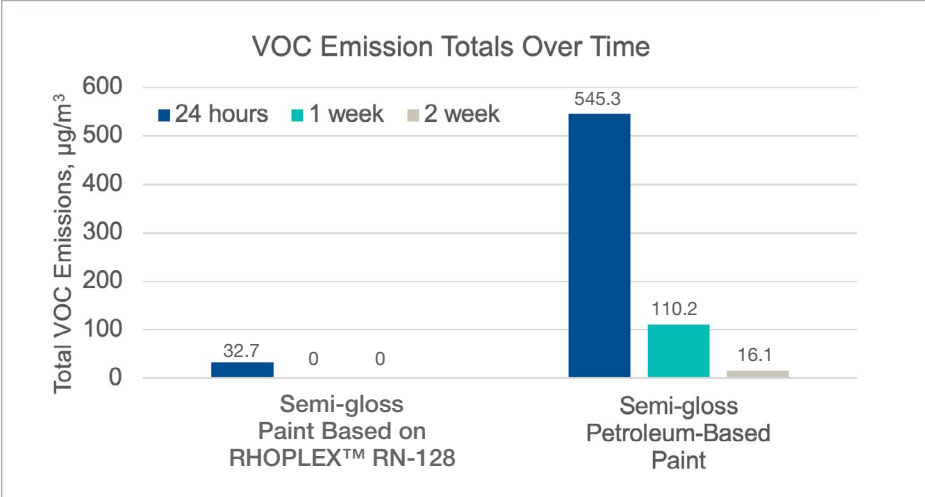


Figure 1. Emitted VOCs of semi-gloss paint containing RHOPLEX™ RN-128 Emulsion and a petroleum-based semi-gloss paint control

Sample	Total Bulk VOC, ppm wt/wt *
RHOPLEX™ RN-128	956
Petroleum-Based Acrylic Binder	1483

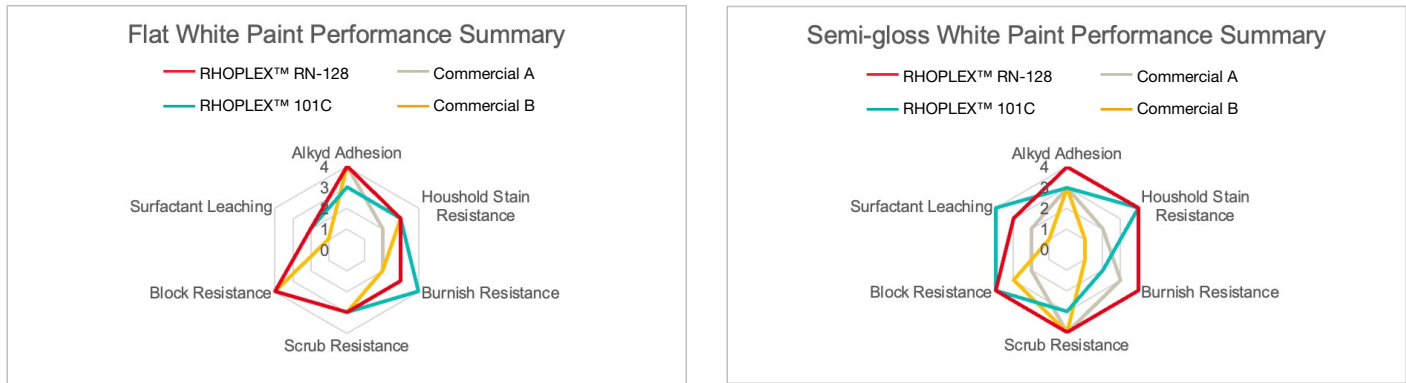
*Measured by ASTM D-6886. Typical values, not to be construed as specifications. Users should confirm results by their own tests.



Performance Summary in Flat and Semi-Gloss Paints

When compared to RHOPLEX™ 101C, a similar-quality, petroleum-based resin, RHOPLEX™ RN-128 Emulsion offers a comparable overall balance of performance properties, including adhesion to alkyd substrates, household stain resistance, burnish resistance, scrub resistance, block resistance, and surfactant leaching in a flat sheen paint. Similarly, when compared to two industry-leading commercial paints, paints formulated with RHOPLEX™ RN-128 exhibit performance properties consistent with industry benchmarks.

In a semi-gloss white formulation, RHOPLEX™ RN-128 offers an excellent balance of performance across all six properties of interest. While RHOPLEX™ 101C shows slightly improved surfactant leaching performance over RHOPLEX™ RN-128, RHOPLEX™ RN-128 matches or exceeds RHOPLEX™ 101C performance in all other evaluated areas. Paint formulated with RHOPLEX™ RN-128 paint also outperforms the commercial benchmarks for most properties.



Professional Painter Evaluation of RHOPLEX™ RN-128 Acrylic Emulsion

Five professional painters participated in a blind trial to evaluate a paint formulated with RHOPLEX™ RN-128 Acrylic Emulsion compared to the top preferred commercial paint used by this painting company. The painters assessed their impressions of the paint throughout the entire painting process.

The objective of the study was to determine if a bio-based paint, specifically one formulated with a 100% acrylic resin, meets the expectations of professional painters and is deemed “acceptable.”

Overall, the painters considered the paint containing RHOPLEX™ RN-128 to be excellent and expressed confidence using it for professional jobs. Notably, the paint formulated with RHOPLEX™ RN-128 outperformed the benchmark paint in several areas, including roller application coverage and smoothness, spatter, and overall hiding after two coats. Additionally, in a spray application trial, the RHOPLEX™ RN-128-based was strongly preferred over the control paint based on its appearance and the lack of need for backrolling.

Here are some impactful quotes from the painters!

Property*	Paint with RHOPLEX™ RN-128	Contractor-Recommended Commercial Paint
Initial impression (odor, appearance, stirring consistency)	Improved	Control
Brush application (coverage and stretchability)	Improved	Control
Roller application (unloading, coverage, stretchability, spatter)	✓ Improved coverage ✓ Lesser spatter ✓ Easier/Smother application	Control
Wet and dry overall appearance	✓ Improved hiding after 2 coats	Control

“Very nice paint!”

“Winner winner chicken dinner!”

“It looks amazing.”

“Sprays on like glass”

“Best one of the two”

“Phenomenal coverage!”

Starting Point White Base Formulations

This starting point flat white formulation comprises 37% volume solids and 48% PVC, while the semi-gloss formulation consists of 37% volume solids and 24% PVC. Specifications across all starting point formulations were developed to match the gloss/sheen range of the commercial paint benchmarks in the study. The starting point formulations utilize a thickener package of ACRY SOL™ RM-3030 and ACRY SOL™ RM-995 Rheology Modifiers to ensure excellent thickening efficiency, flow and leveling, and application properties. RHOPLEX™ RN-128 Acrylic Emulsion requires approximately 6% coalescent to pass low-temperature film formation, resulting in a calculated VOC content of less than 50 g/L for both formulations.

	Flat White	Semigloss White
Grind		
Water	100.00	90.02
TAMOL™ 165A Dispersant	18.00	12.50
Ammonia (28%)	1.00	1.00
TRITON™ HW-1000 Surfactant	2.00	2.00
DOWSIL™ 107F Defoamer	2.00	2.00
Ti-Pure R-706	175.00	200.00
Minex 4	150.00	0.00
Minex 10	0.00	10.00
Optiwhite	50.00	0.00
Attagel 50	5.00	5.00
Water	50.00	30.01
Letdown		
RHOPLEX™ RN-128 Emulsion	360.00	515.00
ROPAQUE™ Ultra EF Opaque Polymer	54.00	35.00
Propylene glycol	4.24	0.00
TERGITOL™ 15-S-12 Surfactant	0.00	2.00
Texanol	12.00	16.00
ACRY SOL™ RM-3030 Rheology Modifier	22.00	22.00
ACRY SOL™ RM-995 Rheology Modifier	12.00	9.52
Water	98.08	78.00
DOWSIL™ 107F Defoamer	1.00	2.08
Calculations		
Wt [g]	1116.32	1032.44
Vol [mL]	835.29	837.08
Vol [X], equiv.	1.00	1.00
Vol [gal], equiv.	100.09	100.30
PVC [%], add in.	47.50	23.59
Vol Solids [%], add in.	38.68	37.35
Coal [%]	6.03	6.00
Disp [%]	1.02	1.25
Density [lb/gal]	11.15	10.29
Calculated VOC [g/L] (US)	49.71	49.81

In summary, RHOPLEX™ RN-128 100% Acrylic Emulsion with approximately 27% bio-carbon content offers paint manufacturers a quality resin that can help reduce VOC emissions and the carbon footprint of the final paint formulation. RHOPLEX™ RN-128 offers performance comparable to similar petroleum-based resins, such as RHOPLEX™ 101C. In flat, eggshell, and semi-gloss paints, the performance across several key properties matched or exceeded that of paints formulated with RHOPLEX™ 101C and leading commercial benchmark paints.



Images: AdobeStock_183353505, dow_53989421204

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