# 100% Active Dispersants for Aqueous and Non-Aqueous Coatings

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Lubrizol | Performance Coatings

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- Dispersant design toolbox
- Optimization for flowable, 100% active dispersants
- Novel UV/solvent borne dispersant for organic pigments
- Novel water borne dispersant for organic pigments
- Novel water borne dispersant for high-jetness carbon blacks

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# Why 100% Active?


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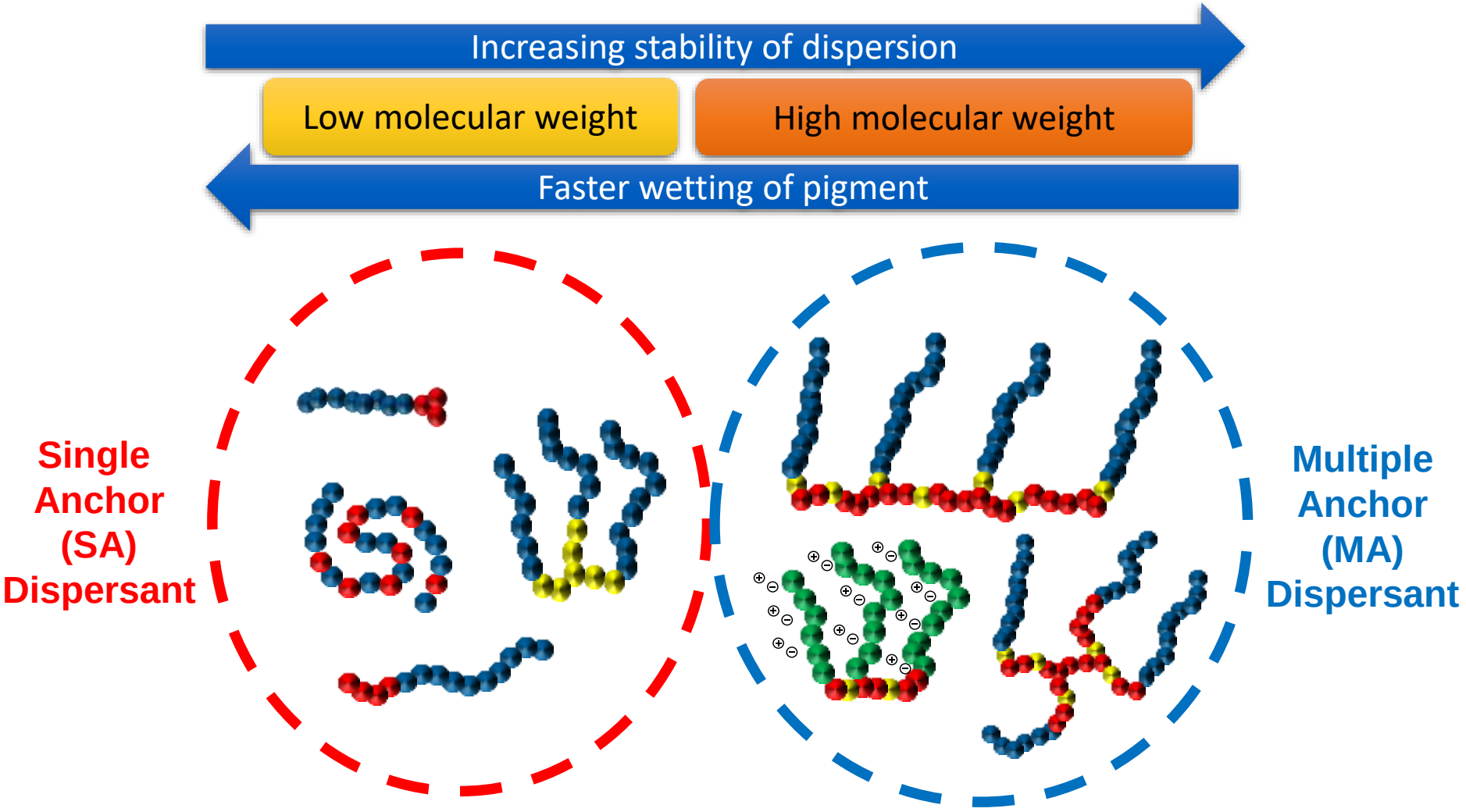
# Classes of Polymeric Dispersants

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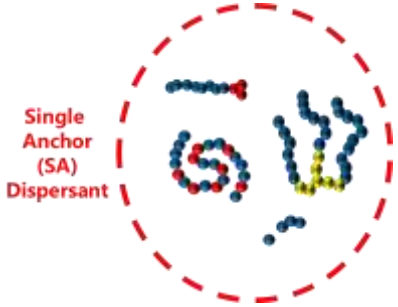
# Design Toolbox

## Single-chain, single-anchor



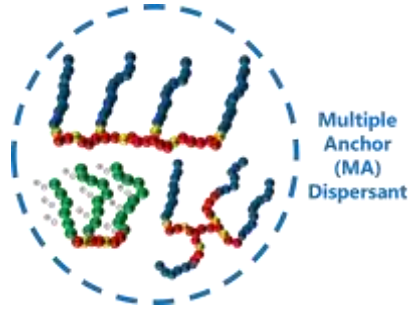

***Polymeric steric stabilizing chain***

- Polyethers - EO rich water soluble, PO rich for solvent
- Polyesters including lactones
- Acrylic

***Single point anchor***

- Polyaromatic
- Tertiary amine
- Quaternized amine
- Acidic including carboxylate, phosphate
- Block copolymers

## Multi-chain, multi-anchor




***Polymeric steric stabilizing chain***

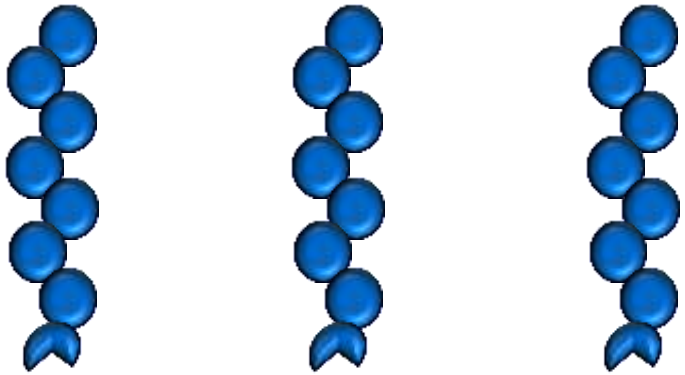
- Polyethers - EO/PO
- Polyesters
- Polylactones homo & copolymers
- Linear and branched alkyl initiators
- Soluble Acrylics
- Unsaturation for reactivity

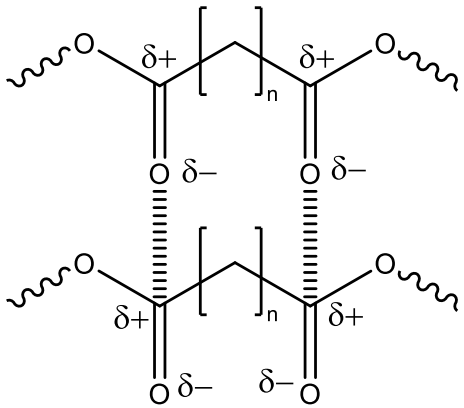
***Multiple point anchor***

- Polyamine
- Polyurethane backbones
    - acid or amine functional
- Quaternized amine
- Polyaromatic
- Mixed polyaromatic / amine
- Functionalized acrylics

# Interactive vs. 100% Active

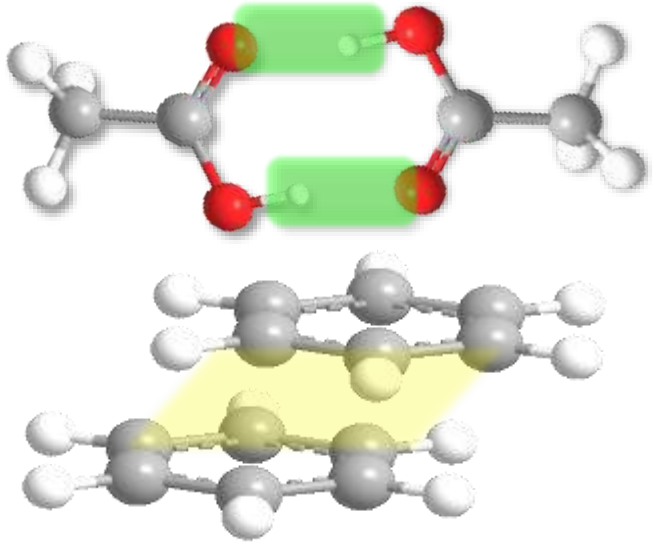
Stabilization chains interact with each other and increase crystallinity



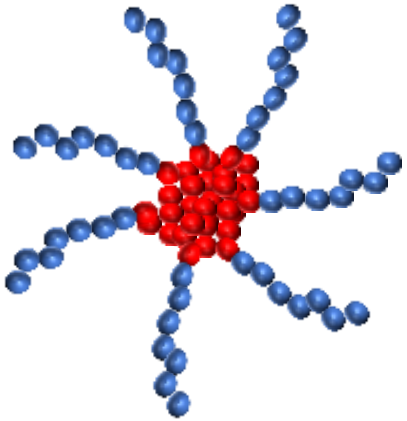



Pigment Anchoring Interactions include:

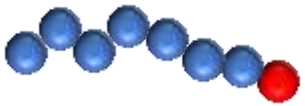
- Hydrogen bonding
- Dipole interactions
- π-π stacking



Large, interactive polymers are viscous



Small, inert polymers are fluid



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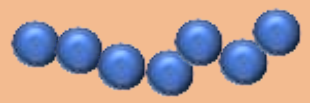
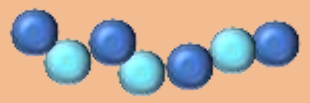
# Reaching 100% Through Architecture Optimization

## Raw Material Selection

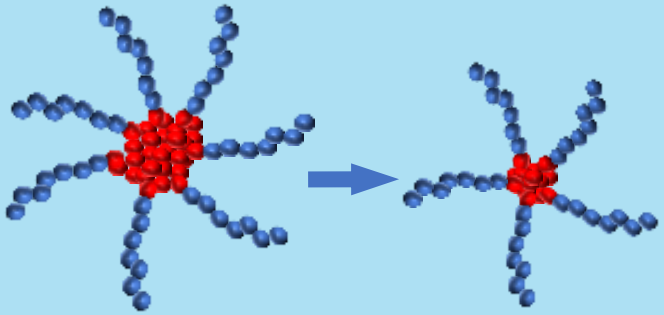
- Raw material properties impact final product
- Subtle changes can improve physical form
- Mitigate impact of changes on performance

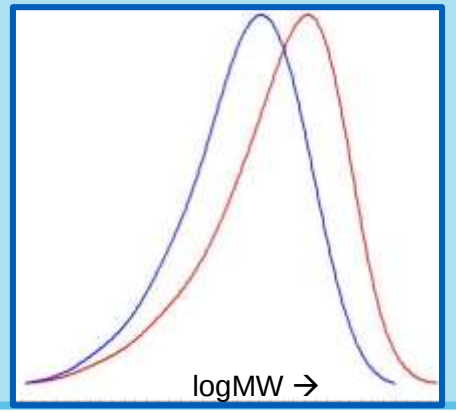




## Size Optimization

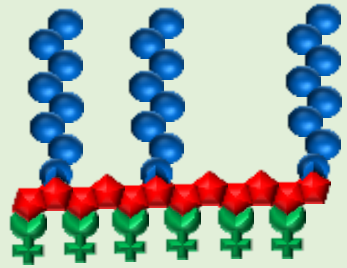
- Lower viscosity by reducing dispersant size
- Challenge is to retain performance



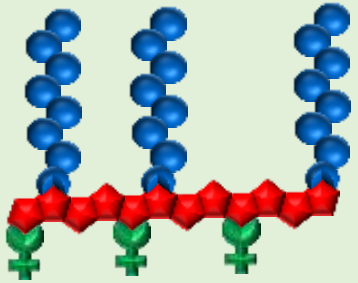



## Anchoring Technology

- Optimize anchoring interactions to balance dispersion stability with physical form



Unoptimized anchor group content provides colloidal stability but compromises physical form



Optimized anchor group content provides colloidal stability and physical form

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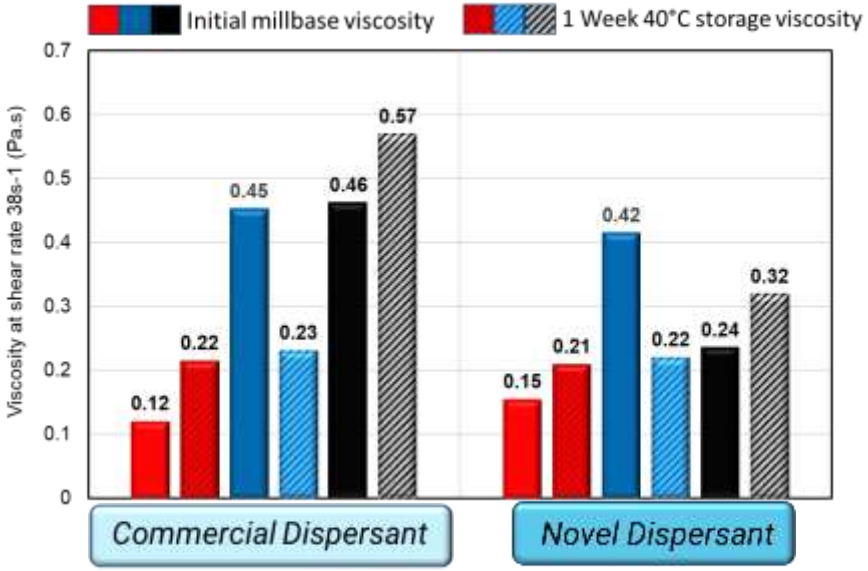
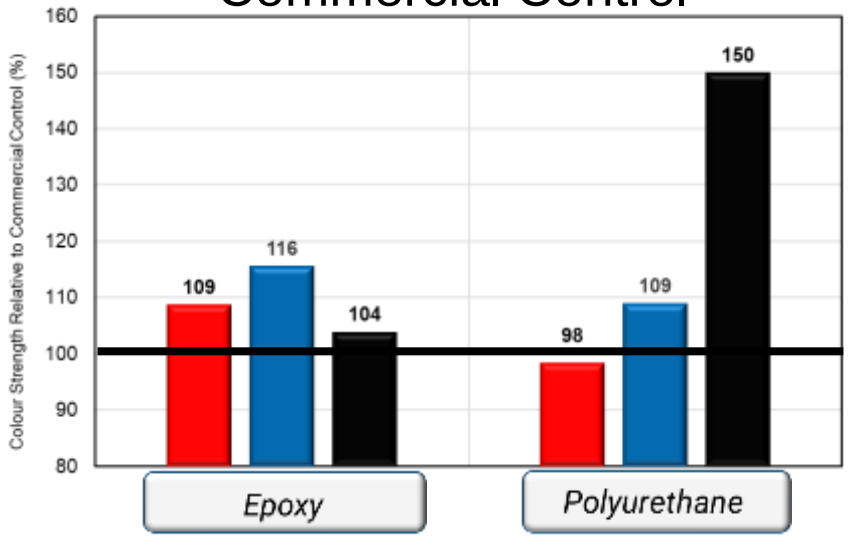
# Novel UV/Solvent Borne Dispersant for Organic Pigments

- Next-generation optimization of chain chemistry
- Significant improvement in dispersant flowability
- Equal or improved performance depending on pigment and system

## Viscosity and Storage Stability




## Color Strength Relative to Commercial Control

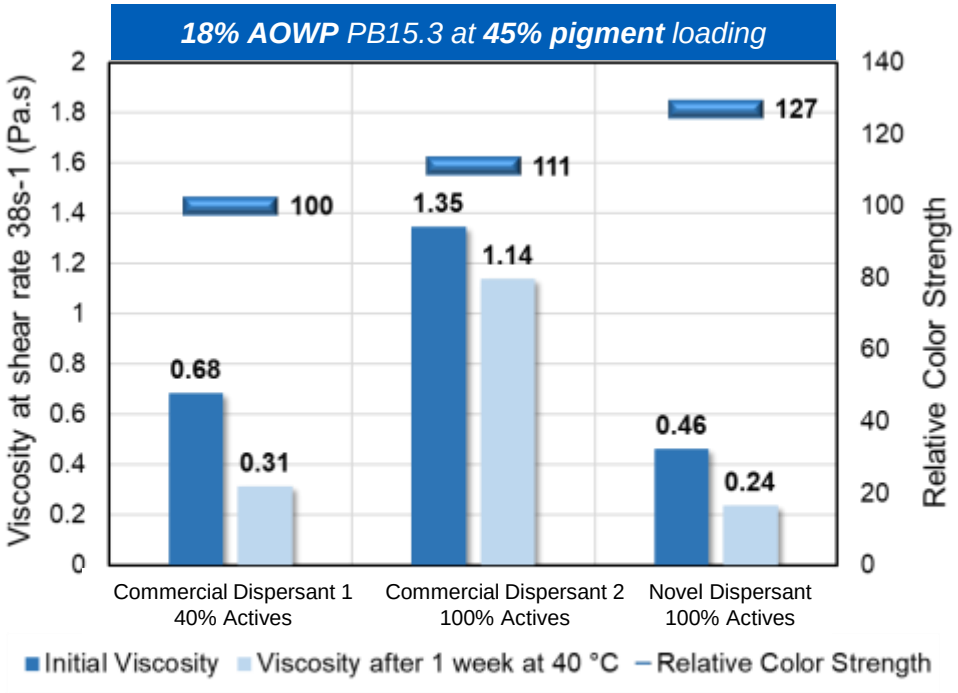


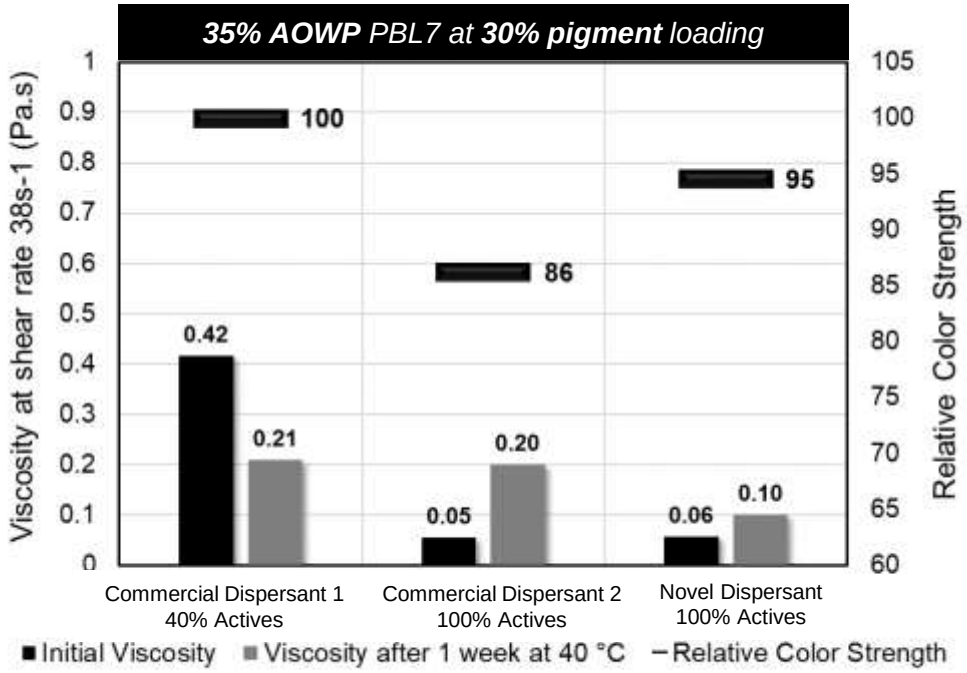

| PR254 | PB15.4 | PBL7 |
|---|---|---|
| 37.5% Pigment Load | 17.5% Pigment Load | 30% Pigment Load |
| 3.0% AOWP or D:P | 13.0% AOWP or D:P | 30% AOWP or D:P |

AOWP = Additive on Weight Pigment

# Novel Water Borne Dispersant for Organic Pigments

- Next-generation optimization of anchor and chain chemistry
- Slightly improved viscosity – pourable at room temperature
- Improved viscosity and color strength vs. 40% and 100% actives commercial benchmarks

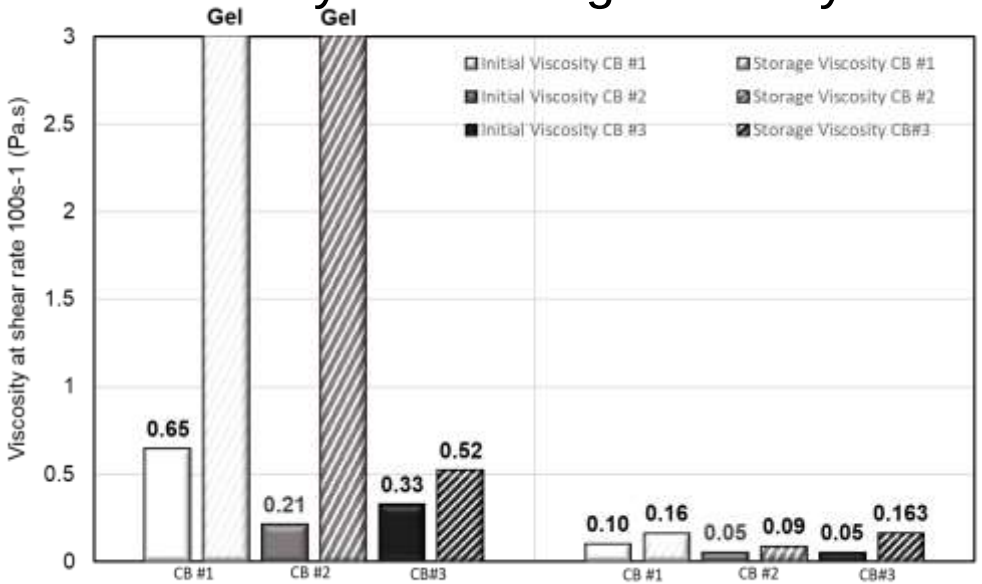



# Novel Water Borne Dispersant for Jet Carbon Blacks

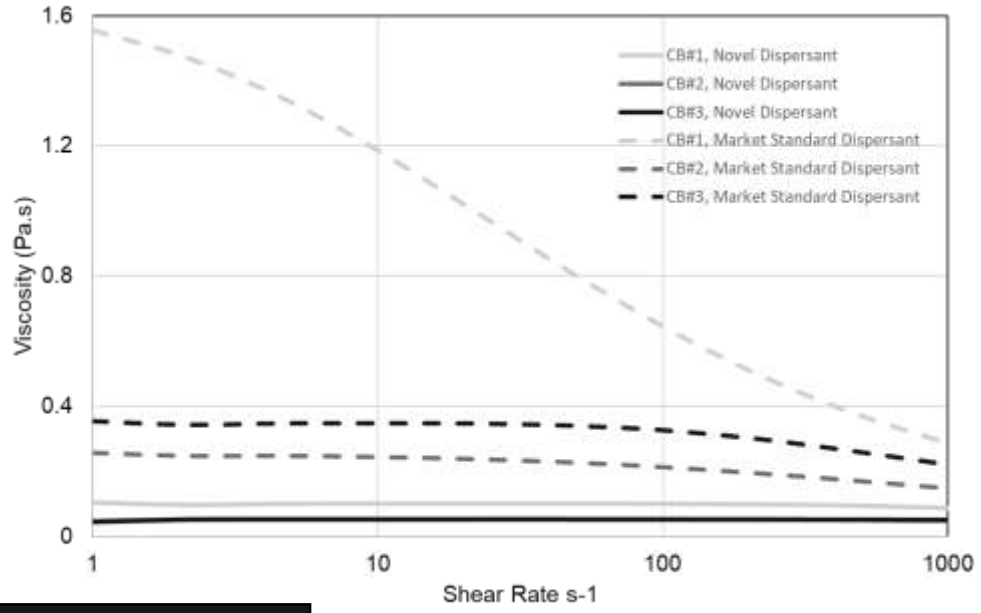
- Specially designed for high surface area, high color carbon black
- Fast wetting, high pigment loads, superior color
- Newtonian viscosity behavior at 20% pigment loading vs. shear thinning market standard
- **<u>Samples were dispersed with 0.5mm YTZ media (60nm Z-average particle size)</u>**

## Viscosity and Storage Stability




50% active Market Standard | 100% active Novel Dispersant

## Shear Sweeps



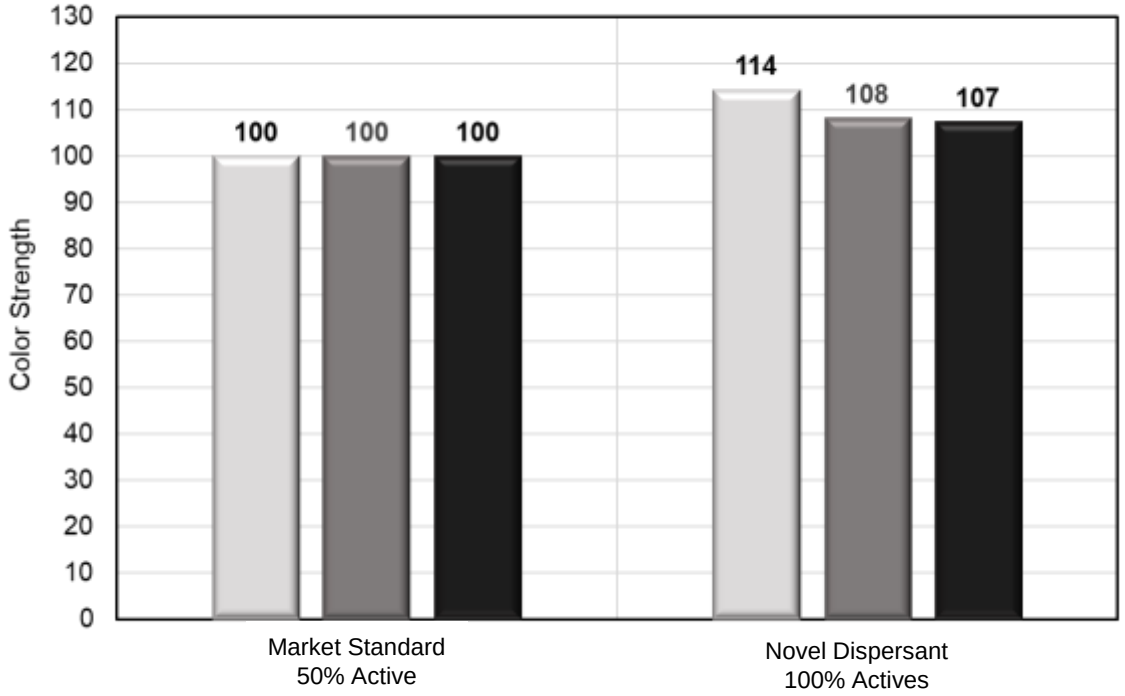

| PBL7 High SA #1<br>20% Pigment Load<br>100% AOWP or D:P | PBL7 High SA #2<br>20% Pigment Load<br>100% AOWP or D:P | PBL7 High SA #3<br>20% Pigment Load<br>100% AOWP or D:P |
|---|---|---|

AOWP = Additive on Weight Pigment

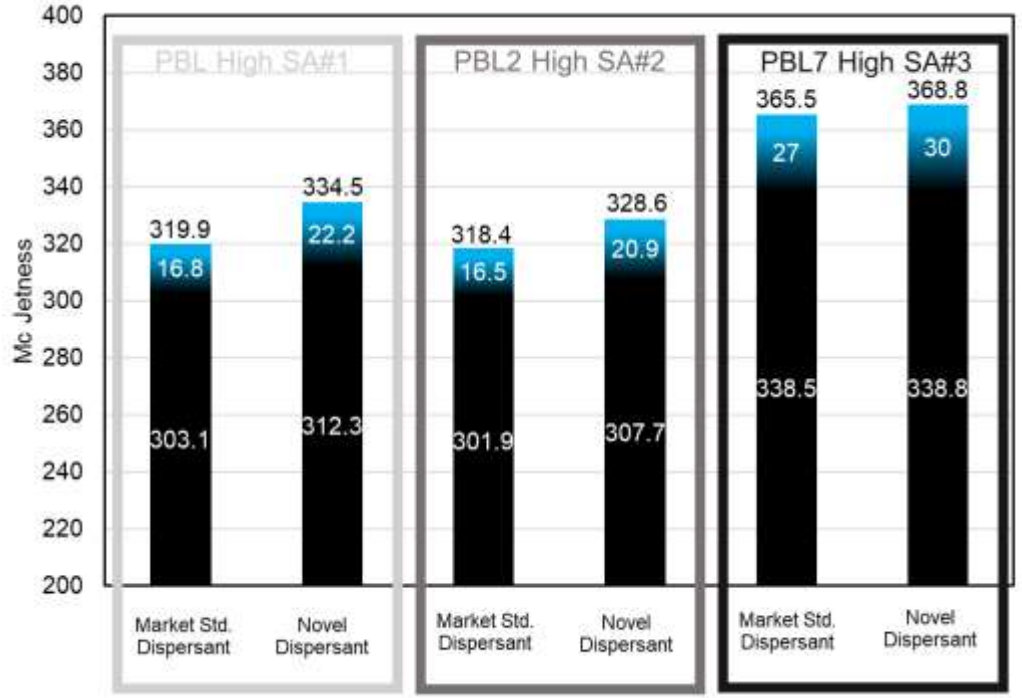
# Novel Water Borne Dispersant for Jet Carbon Blacks

- Significantly improved color strength
- Improved blackness, undertone, and overall jetness

## Color Strength




## Jetness in WB Acrylic Basecoat




| PBL7 High SA #1<br>20% Pigment Load<br>100% AOWP or D:P | PBL7 High SA #2<br>20% Pigment Load<br>100% AOWP or D:P | PBL7 High SA #3<br>20% Pigment Load<br>100% AOWP or D:P |
|---|---|---|

AOWP = Additive on Weight Pigment

# Acknowledgements

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# Thank you for your attention
# Please visit us at booth for more information

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