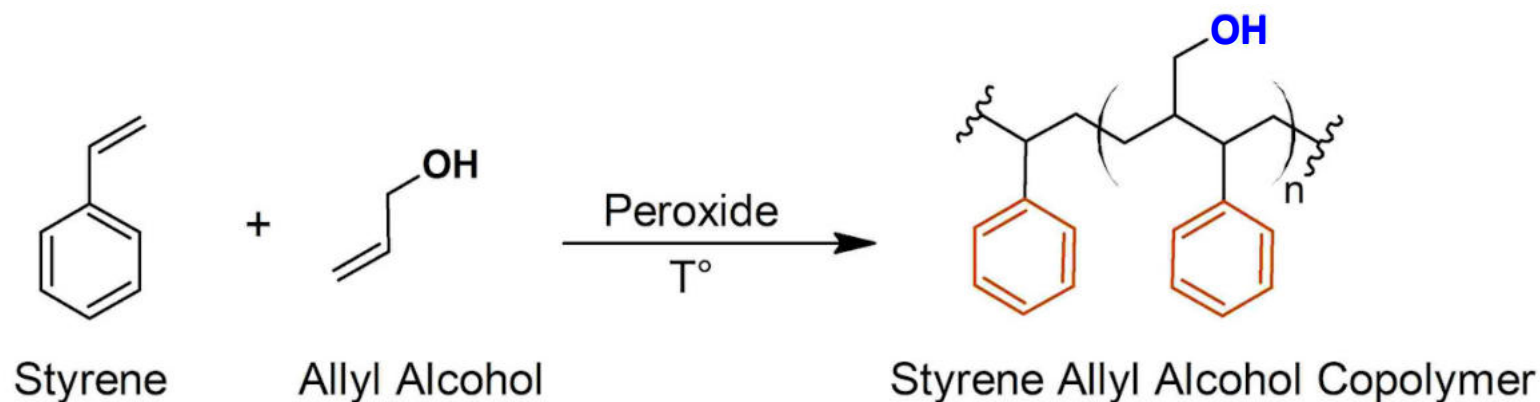


Styrene Allyl Alcohol Copolymer

**A Strategic Solution for
High-Performance Coatings, Inks and Adhesives**

Styrene Allyl Alcohol Copolymer - Synthesis & Structural Benefits



Standard Composition

Styrene, mole %	70
Allyl Alcohol, mole %	30

SAA combines **Hydrophilic Primary Hydroxyl** groups with **Hydrophobic Aromatic** groups.

- Reactive site for coating **cross-linking reactions** and **polyol resin derivatives synthesis** (esterification, urethanisation, alkoxylation, phosphatation, ...)
- Residual hydroxyl groups provide **adhesion** (metals, ...)
- Aromatic ring provides to the coating
 - **Hydrophobicity**
 - **Gloss**
- **Hardness**
- **Adhesion** (polystyrene, ...)

Styrene Allyl Alcohol Copolymer – Major Application Areas

LuerChem

Coatings/Paints



- Polyurethane Coatings
- Aminoplast Coatings
- Air-Drying Alkyd Resins
- UV/EB Curable Monomers
- Specialty Resins

Inks



- Writing Inks
- Printing Inks
- Overcoats

Adhesives



- Polyurethane Adhesives

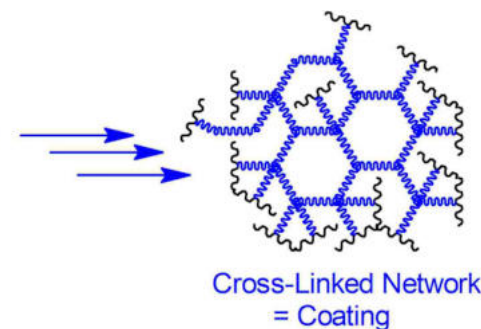
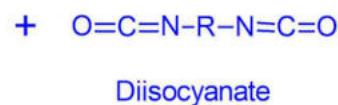
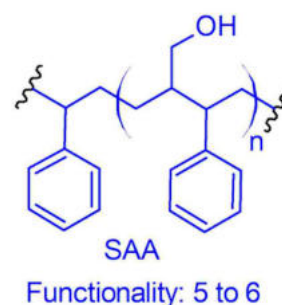
Styrene Allyl Alcohol Copolymer – Major Application Areas

LuerChem

Coatings/Paints

- Polyurethane Coatings

- Aminoplast Coatings
- Air-Drying Alkyd Resins
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- Specialty Resins



Inks

- Writing Inks
- Printing Inks
- Overcoats

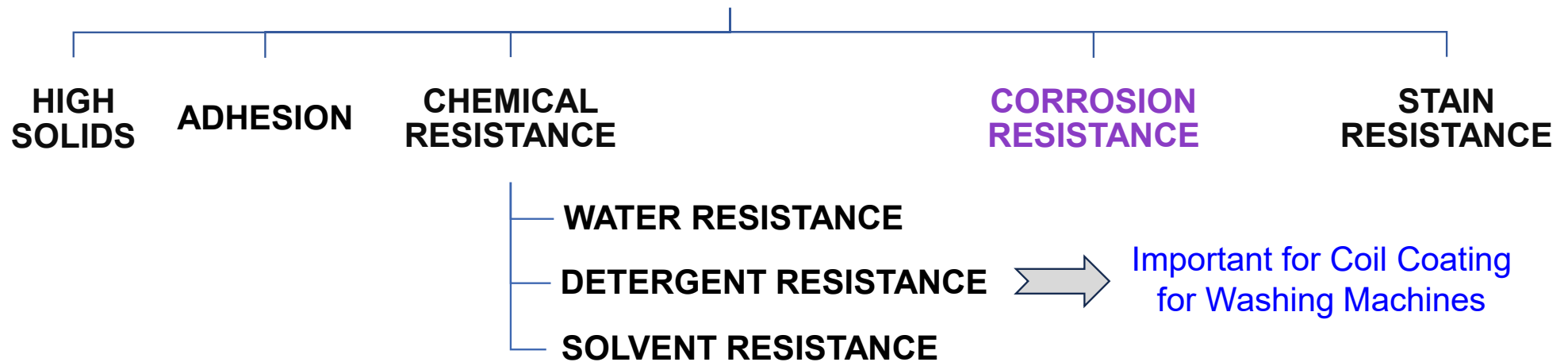
Adhesives

- Polyurethane Adhesives

Key Benefits of using SAA in Polyurethane Coatings

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Benefits of SAA in Polyurethane Coatings

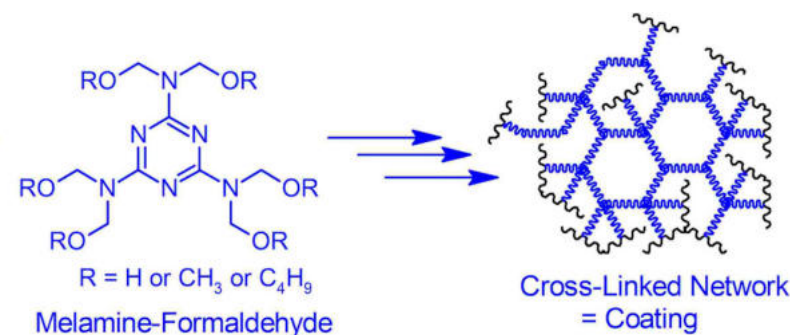
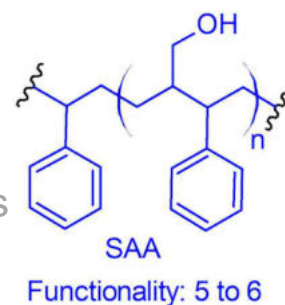


Styrene Allyl Alcohol Copolymer – Major Application Areas

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Coatings/Paints

- Polyurethane Coatings
- **Aminoplast Coatings**
- Air-Drying Alkyd Resins
- UV/EB Curable Monomers
- Specialty Resins



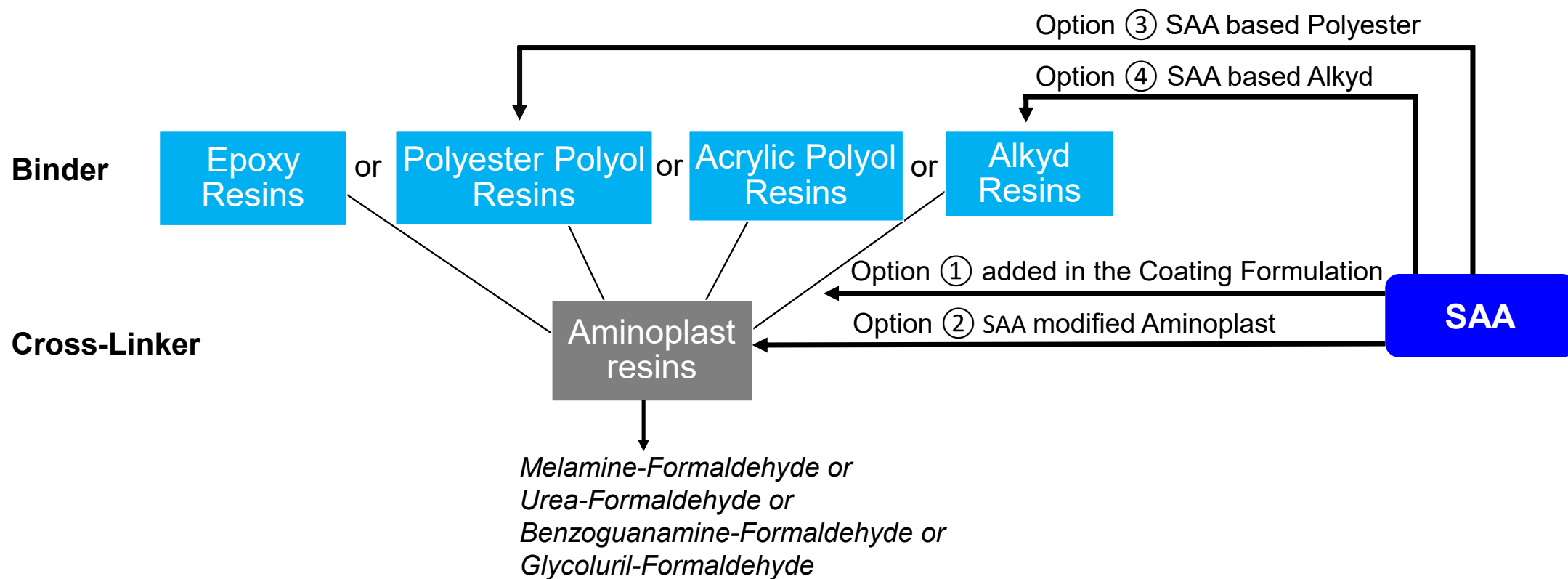
Inks

- Writing Inks
- Printing Inks
- Overcoats

Adhesives

- Polyurethane Adhesives

SAA in Aminoplast Coatings

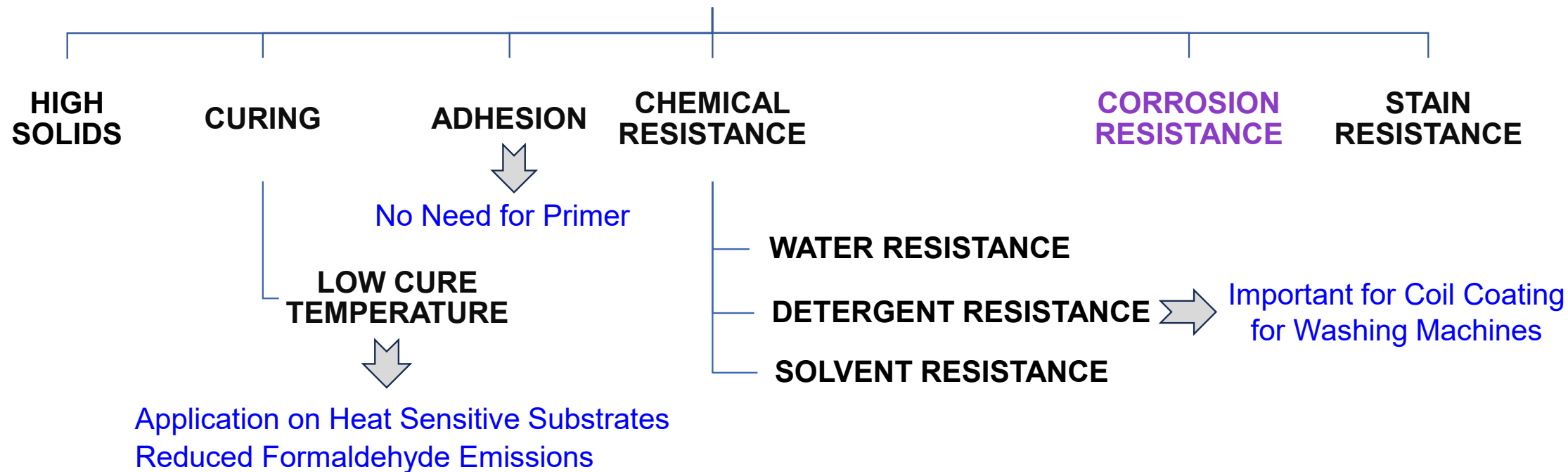


Catalyst: e.g. para-Toluene Sulfonic Acid (p-TSA)

Key Benefits of using SAA in Aminoplast Coatings

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Benefits of SAA in aminoplast coatings



Styrene Allyl Alcohol Copolymer – Major Application Areas

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Coatings/Paints

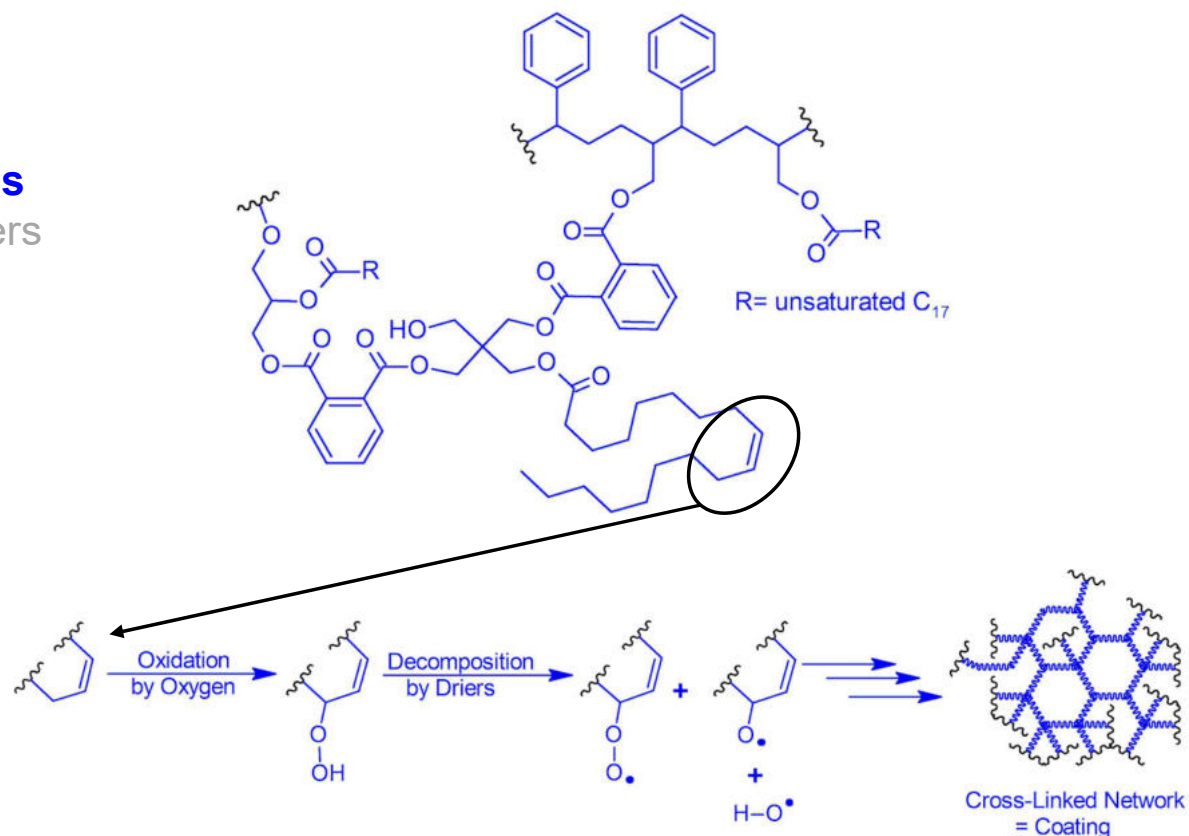
- Polyurethane Coatings
- Aminoplast Coatings
- **Air-Drying Alkyd Resins**
- UV/EB Curable Monomers
- Specialty Resins

Inks

- Writing Inks
- Printing Inks
- Overcoats

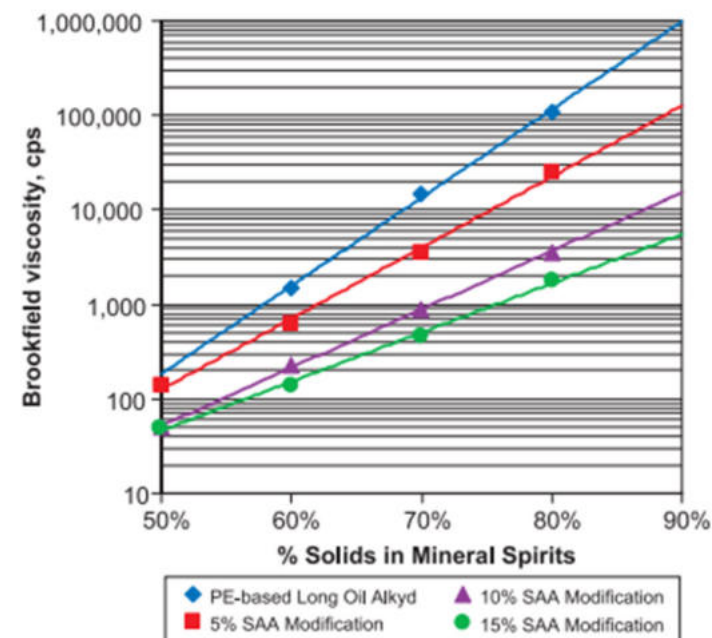
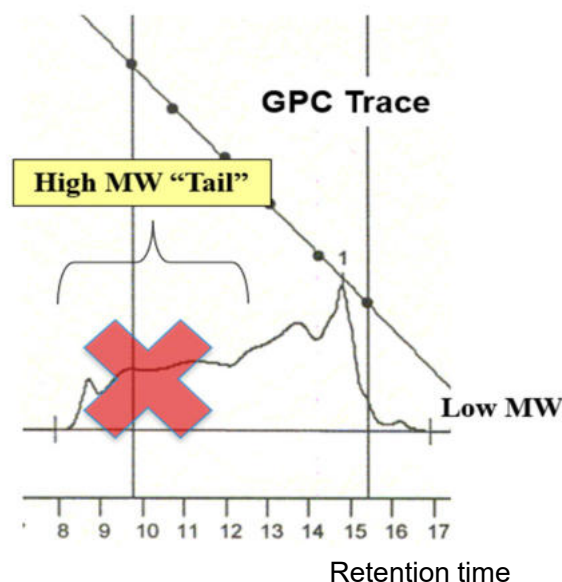
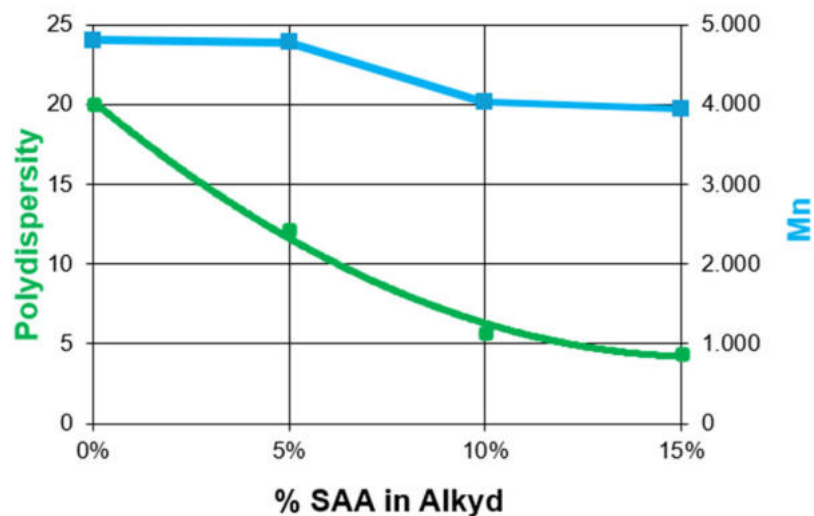
Adhesives

- Polyurethane Adhesives



SAA / Pentaerythritol Air-Drying Alkyd Resins

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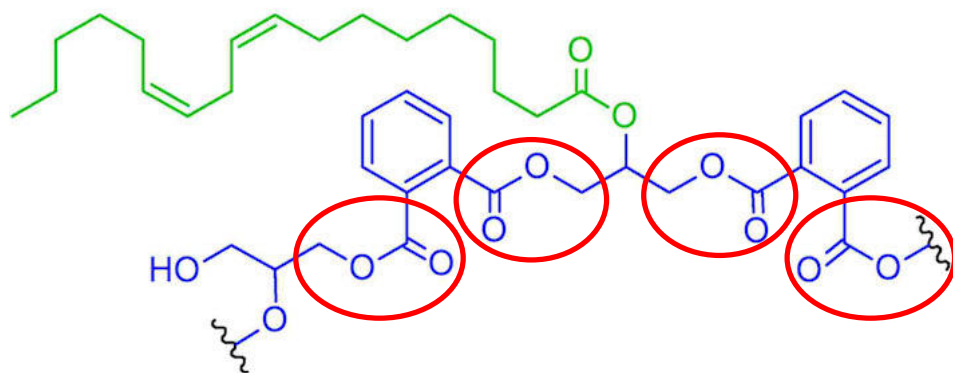
SAA lowers **Pd**
but maintains
Mn

Reducing **Mw** and therefore **Pd** is key to lowering viscosity
Maintaining **Mn** is key to maintaining properties

Info ex Lyondell

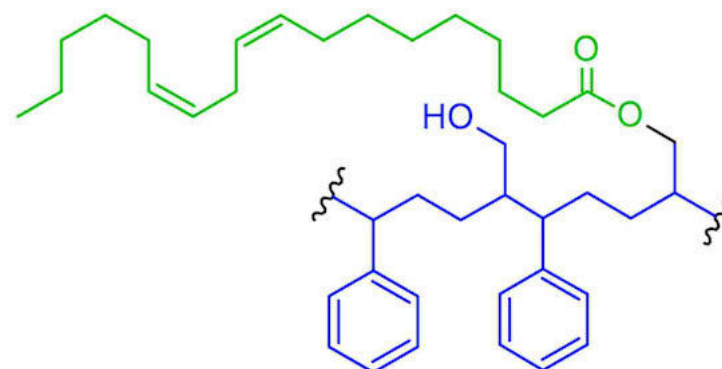
Alkyd Resin versus SAA Fatty (Acid) Ester Resin

Alkyd Resin



Many Ester Groups on Backbone

SAA Fatty (Acid) Ester Resin



Less Ester Groups than in an Alkyd Resin
IMPROVED STABILITY OF THE RESIN IN ALKALI

↓
Waterborne
Electrodeposition

SAA

+ Fatty Acid



SAA Fatty (Acid) Ester

Emulsification

Introduction of Carboxylic groups

Option 1:

Reaction with Maleic (or Trimellitic) Anhydride

Option 2:

Polymerisation of Acrylic Acid/Styrene

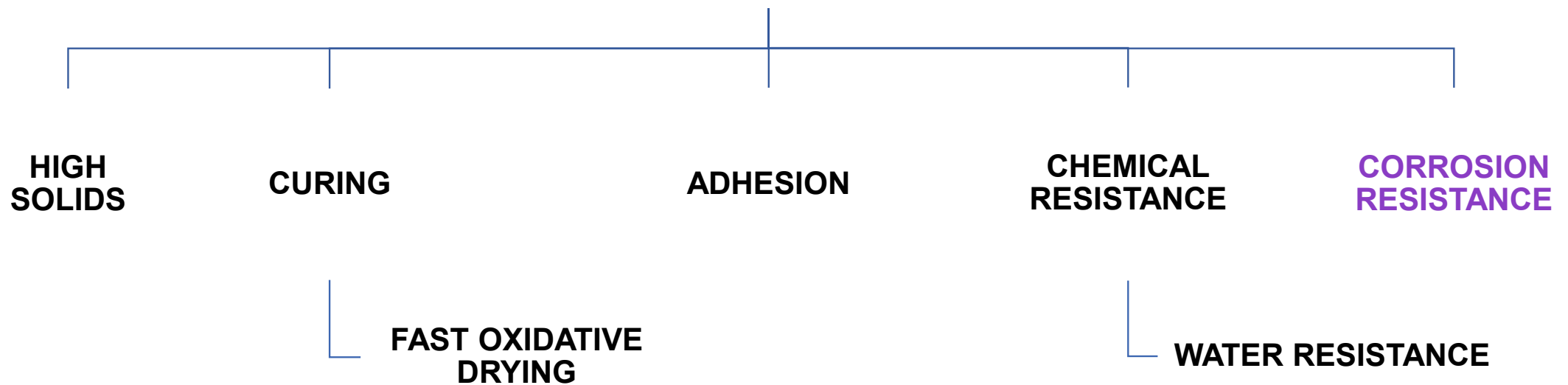
Option 3:

Reaction with Maleic (or Trimellitic) Anhydride
followed by Polymerisation of Acrylic Acid/Styrene

Key Benefits of using SAA in Air-drying Alkyd/Oil Fatty (acid) Ester Coatings

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Benefits of SAA in Air-drying Alkyd Coatings

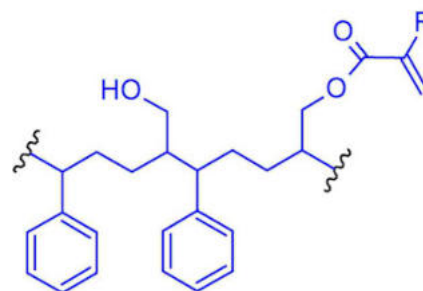


Styrene Allyl Alcohol Copolymer – Major Application Areas

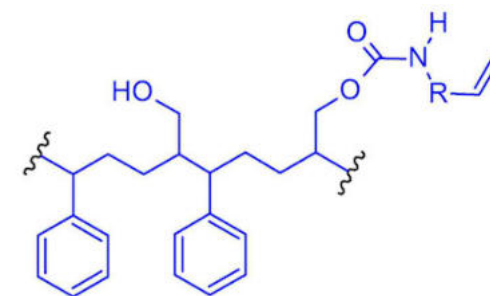
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Coatings/Paints

- Polyurethane Coatings
- Aminoplast Coatings
- Air-Drying Alkyd Resins
- **UV/EB Curable Monomers**
- Specialty Resins



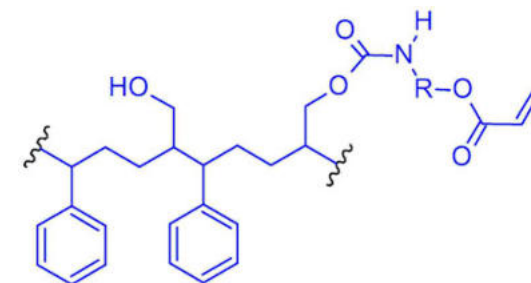
SAA (Meth)Acrylate



SAA Unsaturated Urethane

Inks

- Writing Inks
- Printing Inks
- Overcoats



SAA Acrylic-Urethane

Adhesives

- Polyurethane Adhesives

Key Benefits of SAA Monomers in UV/EB Cure Coatings

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Benefits of SAA Monomers in UV/EB Cure Coatings

HARDNESS

ADHESION

GLOSS

**IMPACT
RESISTANCE**

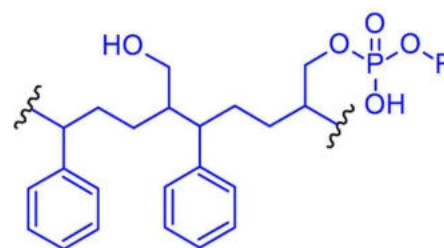
**SOLVENT
RESISTANCE**

Styrene Allyl Alcohol Copolymer – Major Application Areas

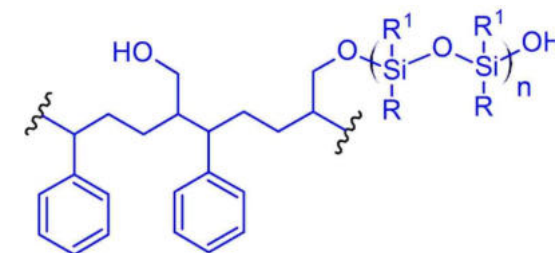
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Coatings/Paints

- Polyurethane Coatings
- Aminoplast Coatings
- Air-Drying Alkyd Resins
- UV/EB Curable Monomers
- **Specialty Resins**



SAA- Phosphate



SAA-Silicone

Inks

- Writing Inks
- Printing Inks
- Overcoats

- **Corrosion-Proofing Primer**
- **Adhesion Promoter**
- **Aluminium Pigment Passivator**

- **Super Hydrophobic Coatings**

Adhesives

- Polyurethane Adhesives

Styrene Allyl Alcohol Copolymer – Major Application Areas

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Coatings/Paints



- Polyurethane Coatings
- Aminoplast Coatings
- Air-Drying Alkyd Resins
- UV/EB Curable Monomers
- Specialty Resins

Inks



- Writing Inks
- Printing Inks
- Overcoats

Adhesives



- Polyurethane Adhesives

SAA and SAA Derivatives in Inks

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SAA

Vehicle (binder)

Writing and **Printing** Traditional or Fluorescent Solvent-borne Inks

Ink-jet Hot melt or Solvent-borne Inks and **Overcoatings**

Toner - Powder

**SAA
derivative**

Vehicle (SAA-alkyd)

Printing Traditional Solvent-borne Inks

Vehicle (SAA fortified rosin & fatty ester)

Waterborne Flexographic Printing Inks

Pigment Grinding Resin (SAA-polyol-fortified rosin ester)

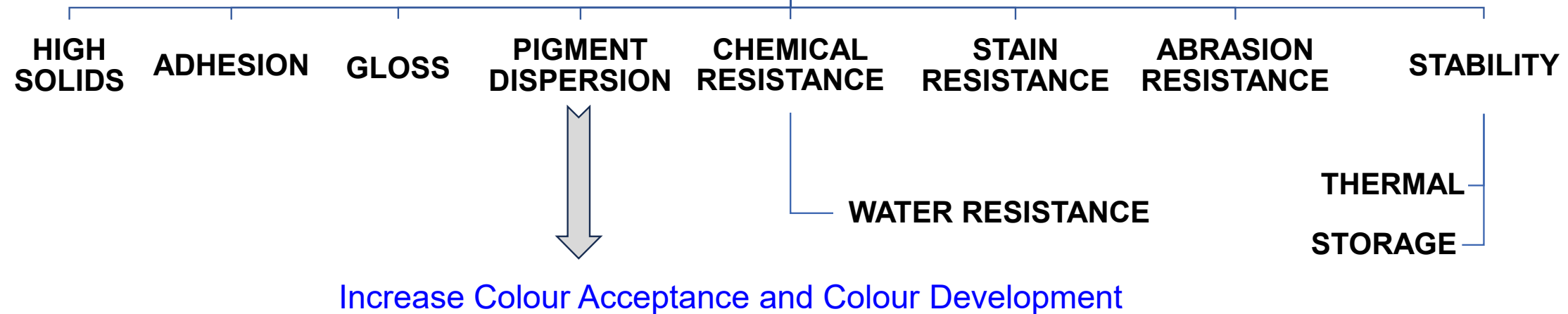
Monomer (SAA (meth)acrylate)

UV Curable Inks

Key Benefits of using SAA in Inks

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Benefits of SAA in Inks



Styrene Allyl Alcohol Copolymer – Major Application Areas

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Inks



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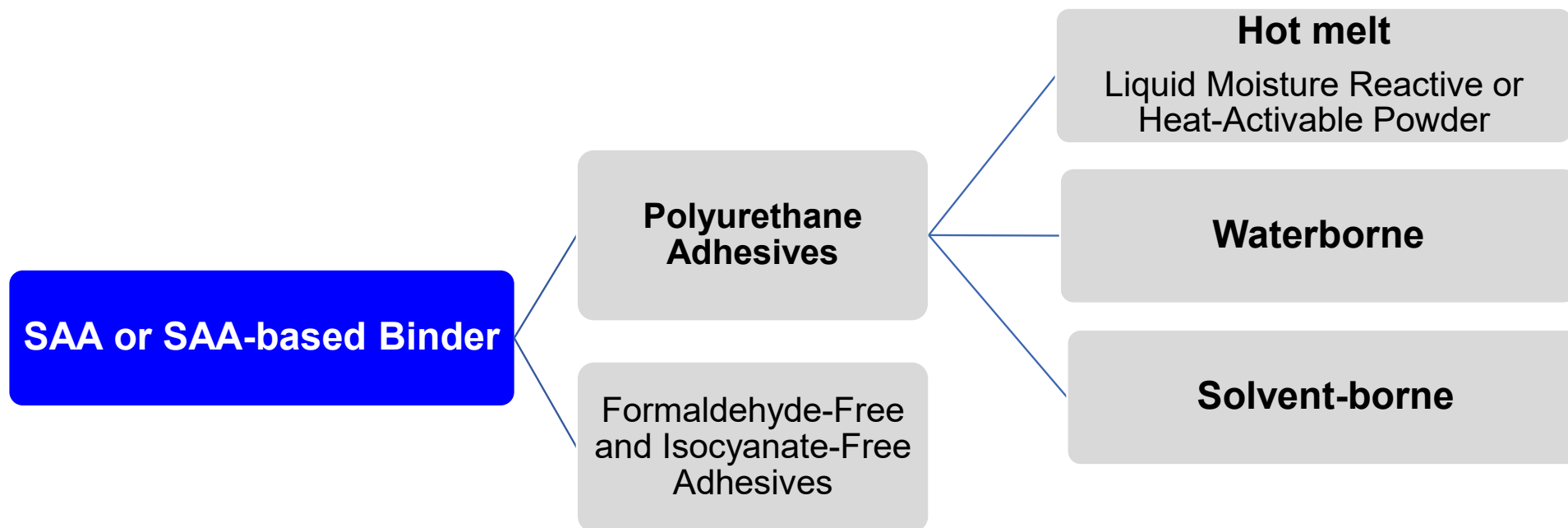
Adhesives



- **Polyurethane Adhesives**

Styrene Allyl Alcohol Copolymer – Major Application Areas

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- Key Benefits of using SAA:**
- **Mechanical Strength**
 - **Rigidity/Flexibility Balance**
 - **Adhesion to Bond Various Substrates**

Summary of Major SAA Applications & Key Benefits

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Application	Technology	Curing	Hardness	Adhesion	Resistance to				
					Water	Corrosion	Detergent	Stain	Solvent
Polyurethane	High Solids Waterborne	High X-Linking	Adjustable	↗	↗	↗	↗	↗	↗
Aminoplast	High Solids Waterborne Powder	Low Temperature Cure	High & Fast Development	↗	↗	↗	↗	↗	↗
Air-Drying Alkyd	High Solids Waterborne	Fast Drying	High & Fast Development	↗	↗	↗	NA	NA	NA
Acrylic Monomer	Radcure	High X-Linking	High & Fast Development	↗	↗	NA	NA	NA	↗

NA = Not Analysed

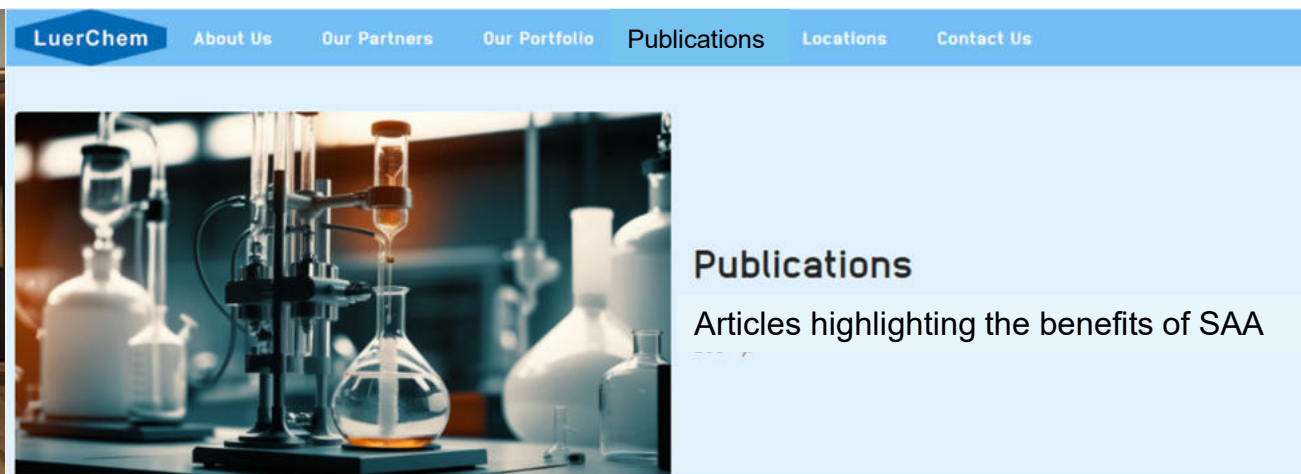
Styrene allyl alcohol is a Powerful Resinous Polyol **Building Block** for a Variety of Chemistries delivering **Enhanced Performance** of Coatings/Paints, Inks and Adhesives.

Thank you for your attention

The Team



Web Site



Questions?