Airable
RESEARCH LAB
WHERE SUSTAINABLE SOLUTIONS START

Soy-Based Epoxy Alternatives

Airable is developing a series of bio-based epoxy alternatives to hazardous industrial feedstocks, such as bisphenol-A (BPA), whose pervasiveness raises health concerns. Airable's innovative bio-based chemicals are derived from soybean oil and use polyketonate functionality to grant reactivity similar to traditional aliphatic epoxies. Our environmentally friendly products may be formulated into adhesives, coatings, and composites for industrial and consumer applications.

OVERVIEW

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Characteristics of Airable's soy-based epoxy alternatives

	SWAX-PK	FA-PK	EFA-PK	G-PK
Appearance	White Wax	Amber Liquid	Yellow Liquid	Yellow Liquid
Equivalent Molecular Weight (g/mol)	262	260	172	115
Functional Groups (#)	2	2	3	3
Viscosity (cPs @21°C)	Solid	62.6	908	101
Density (mg/mL)	N/A	1.017	1.083	1.229
Refractive Index	N/A	1.4775	1.4685	1.4645
Soy Content (%)	68	68	60	27

THE TECHNOLOGY

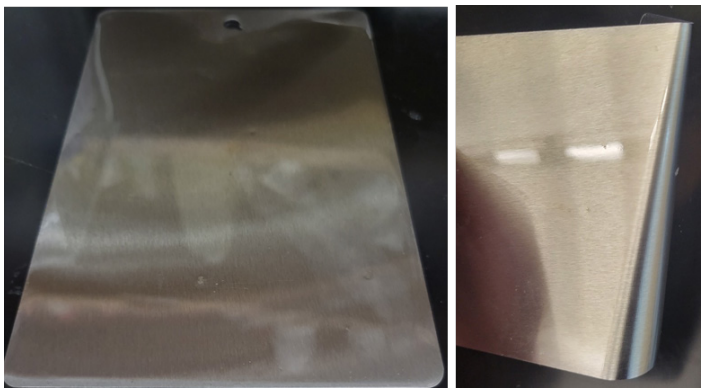
Products were prepared that range from wax to liquid. To demonstrate simple proof of principle, the soy-based materials were formulated for coating applications by mixing 3:1 with Cymel 303 and an acid catalyst. The table below is representative of a basic coating formulation. The data collected suggests that certain soy-based products may be selected and blended to enhance adhesion, flexibility, or solvent resistance. Further formulation development is required to achieve optimized performance targets.

Coating properties of each soy-based epoxy alternative formulated with Cymel 303 and an acid catalyst. The coatings were baked at 120°C for 15 minutes.

	SWAX-PK	FA-PK	EFA-PK	G-PK
Cross Hatch Adhesion	1B	5B	2B	5B
Mandrel Bend (cm)	> 20.9	< 0.13	< 0.13	> 20.9
Pencil Hardness	9B	2B	5B	9B
Water Resistance	Resistant – Hydrophobic	Resistant – Hydrophobic	Resistant – Hydrophobic	Not Resistant – Hydrophilic
MEK Double Rubs	90	> 200	> 200	120

THE BENEFITS

- A non-hazardous replacement for traditional petroleum-based epoxies
- Suitable for flexible coatings
- Applicable for water-resistant and solvent-resistant coatings



EFA-PK formulated 3:1 with Cymel 303 and an acid catalyst. The coating was then baked at 120°C for 15 minutes (left). The panel (right) shows that the coating survives after Mandrel bend testing down to 0.13 cm.

STATUS AND AVAILABILITY

This technology is an extension of Airable's U.S. patent #2016/0297992. Contact Airable to discuss partnership options.

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