EBECRYL® 8811

Technical Datasheet

ALIPHATIC URETHANE DIACRYLATE

INTRODUCTION

EBECRYL® 8811 is a difunctional aliphatic urethane acrylate that does not contain any intentionally added organic tin compounds, heavy metals*, hydroquinone (HQ) or methyl ether of hydroquinone (MEHQ). (Please note that quinones are present in many raw materials, so the overall quinone content is reduced, but not zero in EBECRYL® 8811.) EBECRYL® 8811 exhibits rapid surface cure response in both low and high energy cure systems. It is especially recommended for use in UV LED and UVA curing in order to obtain good surface cure. Films of EBECRYL® 8811 cured by ultraviolet light (UV) or electron beam (EB) exhibit good flexibility, toughness, abrasion resistance, and are resistant to yellowing.

*As defined by C.O.N.E.G's Toxic in Packaging Legislation, the ASTM Standard Consumer Safety Specification on Toy Safety F 963 (ASTM F 963-08), or the EU Directive 94/62/EC (and amendments) on packaging and packaging waste.

PERFORMANCE HIGHLIGHTS

EBECRYL® 8811 is characterized by:

- No intentionally added tin, heavy metals*, or quinones
- Moderate viscosity
- Light color

UV/EB cured products based on EBECRYL® 8811 are characterized by the following performance properties:

- Improved surface cure in air
- Good flexibility and toughness
- Abrasion resistance
- Non-yellowing

The actual properties of UV/EB cured products also depend on the selection of other formulation components such as reactive diluents, additives, and photo initiators.

SUGGESTED APPLICATIONS

Formulated UV/EB curable products containing EBECRYL® 8811 may be applied via direct or reverse roll, offset gravure, metering rod, slot die, knife over roll, air knife, curtain and immersion coating methods. EBECRYL® 8811 is recommended for use in:

- Applications that must meet regulations for tin, heavy metal*, and quinone content
- Coatings for wood, cement and composite flooring
- Adhesives or sealants cured with low intensity lamps
- Flexible coatings requiring rapid cure in air

SPECIFICATIONS

Appearance	Clear to Slightly Hazy
Color, Gardner, max.	1.0
NCO, %, max.	0.2
Viscosity, 60°C, mPa.s	9000 - 14000

TYPICAL PHYSICAL PROPERTIES

Color, Pt-Co	~18
Density, g/cm³ at 25°C	1.08
Functionality, theoretical	2
Oligomer, % by weight	100
HQ/MEHQ content, ppm	<10/10(1)

(1) amount detected via HPLC with a UV detector (nd = none detected).

TYPICAL CURED PROPERTIES

Tensile strength, psi (MPa)	3000 (21)
Elongation at break, %	80
Young's modulus, psi (MPa)	31300 (216)
Glass transition temperature, °C	52

SURFACE CURE RESPONSE

Table I compares the surface cure response of EBECRYL® 8807 with three commercial acrylated aliphatic urethanes. (EBECRYL® 8811 is expected to perform the same as EBECRYL® 8807.) All were formulated to equal oligomer content. EBECRYL® 8807 requires a significantly lower UV dose to achieve surface cure.

TABLE I: COMPARISON OF SURFACE CURE RESPONSE

	A	B	C
EBECRYL® 8807 (or EBECRYL® 8811)	35		
EBECRYL® 284 (2 functional; 12% HDDA)		40	
EBECRYL® 4866 (3 functional; 32% TPGDA)			50
TPGDA	40	35	25
TMPTA	25	25	25
1-Hydroxycyclohexyl phenyl ketone(2)	4	4	4
Viscosity at 25°C, mPa.s	408	412	1696
UV energy(3), mJ/cm² (300 watt/inch Fusion H lamp)	495	914	640

(2) photoinitiator
(3) Coatings were applied to unlacquered Leneta opacity charts at ~12 µm thickness and cured at the required UV energy to achieve a non-marring surface.

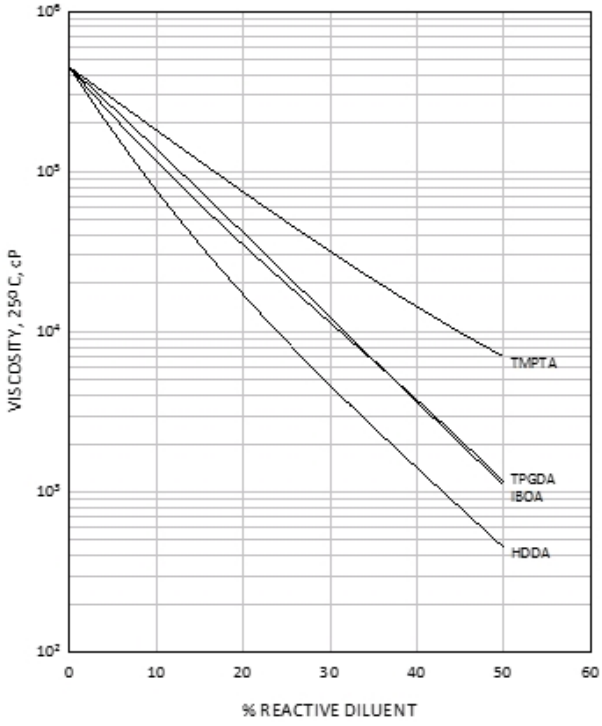
VISCOSITY REDUCTION

Graph I shows the viscosity reduction of EBECRYL® 8811 with 1,6-hexanediol diacrylate (HDDA)(4), trimethylolpropane triacrylate (TMPTA)(4) and tripropylene glycol diacrylate (TPGDA)(4). Although viscosity reduction can be achieved with non-reactive solvents, reactive diluents are preferred because they are essentially 100 percent converted during UV/EB exposure to form a part of the coating, thus reducing solvent emissions. The specific reactive diluents used will influence performance properties such as hardness and flexibility.
Graph II illustrates the change in viscosity of EBECRYL® 8811 with increasing temperature.

(4) product of allnex

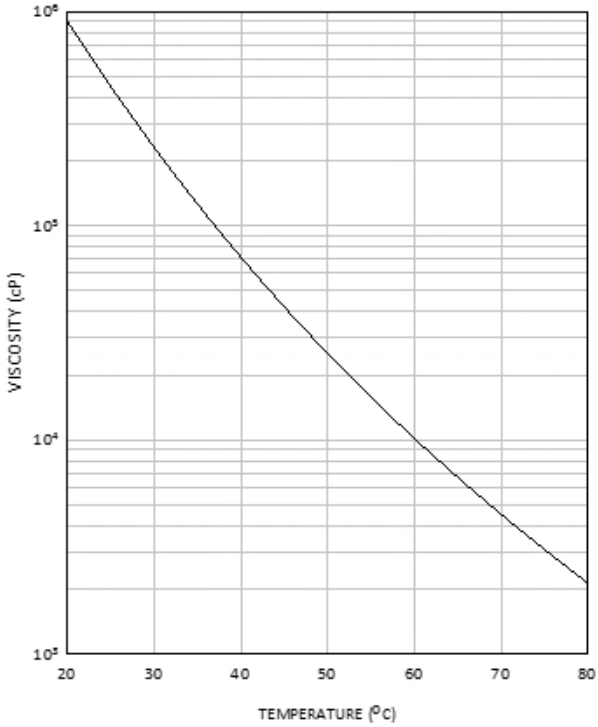
GRAPH I

EBECRYL® 8811 - VISCOSITY REDUCTION WITH REACTIVE DILUENTS



GRAPH II

EBECRYL® 8811 - VISCOSITY VS. TEMPERATURE



PRECAUTIONS

Before using EBECRYL® 8811, see the Safety Data Sheet (SDS) for information on the identified hazards of the material and the recommended personal protective equipment and procedures.

STORAGE AND HANDLING

Care should be taken not to expose the product to high temperature conditions, direct sunlight, ignition sources, oxidizing agents, alkalis or acids. This might cause uncontrollable polymerization of the product with the generation of heat. Storage and handling should be in stainless steel, amber glass, amber polyethylene or baked phenolic lined containers. Procedures that remove or displace oxygen from the material should be avoided. Do not store this material under an oxygen free atmosphere. Dry air is recommended to displace material removed from the container. Wash thoroughly after handling. Keep container tightly closed. Use with adequate ventilation.
EBECRYL® 8811 may be delivered in the form of a high viscous foam. Before usage, this foam can be removed by heating containers of EBECRYL® 8811 to a uniform temperature of 80°C for several days. Ovens or hotboxes are recommended methods of heating. In typical formulations, EBECRYL® 8811 does not exhibit signs of crystallization.
See the SDS for the recommended storage temperature range for EBECRYL® 8811.