CYMEL® NF 2000A

Technical Datasheet

be ECOWISE™

PRODUCT DESCRIPTION

CYMEL® NF 2000A resin is a unique trifunctional melamine-based crosslinker containing reactive carbamate functionality supplied in n-butanol. It can be used to crosslink hydroxy- and epoxy-containing polymers to give highly durable, acid-resistant films that exhibit a favorable balance of hardness and flexibility. An important feature of CYMEL® NF 2000A resin is that it does not contain or emit formaldehyde on cure. It can be employed as the sole crosslinker in a coating or ink formulation, or it may be used at lower levels in combination with other crosslinkers, such as amino resins or isocyanates, in order to obtain a balance of properties. CYMEL® NF 2000A resin is recommended for high quality durable finishes such as automotive topcoats, exterior can varnishes, and coil coatings.

BENEFITS

- Excellent environmental etch resistance
- Excellent exterior durability
- Non-formaldehyde chemistry
- Non-isocyanate chemistry
- Cure compatibility with other crosslinkers
- Low equivalent weight / high efficiency
- Low human toxicity

APPLICATION AREAS

- Automotive topcoats
- Coil coatings
- Exterior can coatings
- Solvent-borne and waterborne coatings

PHYSICAL PROPERTIES

Property	Range	Method
Appearance[1]	Clear to slight haze	ASTM E284
Non-volatile	48 - 52%	DIN EN ISO 3251 (Pan, 2 hr/105°C)
Viscosity, 23°C	10 - 50 mPa·s	DIN EN ISO 3219
Color, APHA	≤ 50	DIN EN ISO 6271
pH	3.0 - 6.0	DIN 55659-1

[1] Product may become hazy during storage as the active ingredient is near its solubility limit in solution. The haze development has no impact on performance of the product or the clarity of resulting films.

TYPICAL PROPERTIES

(NOT CONTINUALLY DETERMINED)

Property	Range	Method
Sodium Content	< 100 ppm	ICP
Turbidity[1]	< 2.5 NTU	DIN EN 27027

[1] at time of manufacture

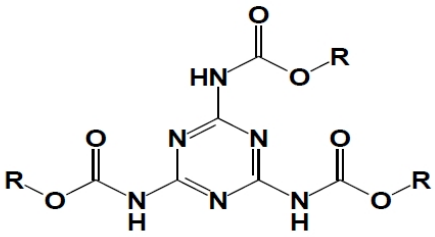
COMPATIBILITY

Acrylic resins	Good
Alkyd resins	Very good
Polyester resins	Very good
Epoxy resins	Good

SOLUBILITY

Alcohols	Soluble
Esters	Soluble
Glycol ethers	Soluble
Aromatic hydrocarbons	Soluble
Water	Insoluble

Tris(Alkoxycarbonylamino) Triazine



R = CH_3, n-C_4H_9

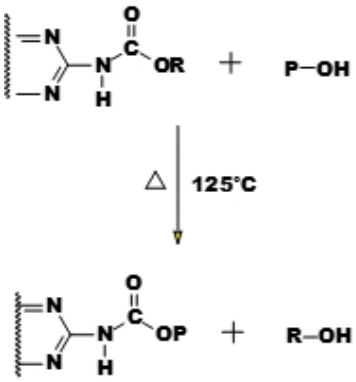
REACTIVITY & BACKBONE POLYMER SELECTION

CYMEL® NF 2000A resin contains a combination of butyl and methyl carbamate functionality which enables it to crosslink backbone polymers containing hydroxy, epoxy and carboxy functionality. Unlike conventional amino resins, CYMEL® NF 2000A resin has very little tendency to self-react during cure, so its effective equivalent weight is in the range of 120 - 130. In formulations where it is employed as the sole crosslinker, the level of CYMEL® NF 2000A resin is normally adjusted to provide a ratio of 1.0 - 1.1 equivalents of carbamate functionality per equivalent of backbone polymer functionality.

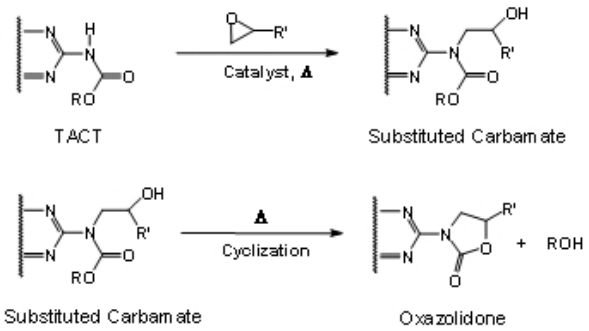
CYMEL® NF 2000A resin reacts with hydroxy functional backbone resins at > 125°C bake schedules to form urethane linkages. Cure can typically be accomplished without use of a catalyst to yield films that exhibit excellent hardness, chemical resistance, exterior durability and environmental etch resistance. Both catalyzed and uncatalyzed formulations show good 1K package stability at 23°C. CYMEL® NF 2000A resin will react with carboxy functional backbone resins, but requires bake temperatures > 150°C.

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CYMEL® NF 2000A resin reacts very efficiently with epoxy functional resins at ~125°C resulting in N-substituted carbamate and oxazolidone crosslinks. Films produced through this cure mechanism often show a favorable combination of environmental etch resistance and mar resistance properties. In most cases, a tertiary amine or quaternary ammonium catalyst such as 4-dimethyl-aminopyridine should be employed in the formulation. However, catalyzed pot life can be limited, making it necessary to treat these as two-component systems.



USE AS A CO-CROSSLINKING AGENT

A significant advantage of CYMEL® NF 2000A resin is its cure compatibility with other thermoset chemistries. Since its cure response with hydroxy-functional resins is not appreciably inhibited by amines, acids, or metal catalysts, it can be used effectively as a co-crosslinking agent with other materials, such as traditional aminoplasts or isocyanates. Incorporation of low levels of CYMEL® NF 2000A resin (e.g. 1 - 5 wt. % on total resin solids) into a conventional polyol/aminoplast coating formulation can significantly improve the exterior durability of the cured film.

USE IN WATERBORNE SYSTEMS

CYMEL® NF 2000A resin can be used in water-reducible resins and with waterborne dispersions. Although it is water insoluble, it can be incorporated into a water-reducible system by blending with the backbone resin prior to amine neutralization. These systems can be cured at ~125°C to give clear, high gloss films with excellent resistance properties. When using the material in water-based systems it is recommended that a tertiary amine be utilized as the neutralizing agent for the system in order to avoid the possibility of degrading the CYMEL® NF 2000A resin.

STORAGE STABILITY

CYMEL® NF 2000A resin has a shelf life of 730 days from the date of manufacture when stored at temperatures below 32°C.

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