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<p>Improved Performance PUDs Containing PolyFox Fluorochemicals</p>
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DESCRIPTION

An anionic aliphatic lightfast translucent waterborne polycarbonate urethane polymer chemically modified with PolyFox fluorochemicals incorporated into the resin to impart enhanced surface properties such as stain resistance, scratch and mar resistance and durability when crosslinked. These PUD's can be applied to a wide variety of substrates.

CHARACTERISTICS and ADVANTAGES

- * Excellent adhesion to wide range of flexible and rigid substrates
- * Forms glossy, ultra hard films with enhanced durability
- * Excellent hydrolysis, water, and stain resistance
- * Outstanding weather, chemical, and solvent resistance

APPLICATION METHODS

Spray, Knife over roll, rotogravure or saturant

TYPICAL PHYSICAL PROPERTIES

Appearance	Translucent
Weight per Gallon	8.8 lbs
Viscosity	50 - 200 cps
VOC	2.8 lbs/gal
Solids Content	35 - 40%
Softening Point	370 F
pH	7.5 - 9
Cleaning Solvent	Water

TYPICAL TENSILE PROPERTIES

Tensile Strength	5400 - 8000 psi
Elongation	25 - 50%
Modulus (15%)	2500 - 5000 psi
Gloss	70
Sward Hardness	50 - 55

RECOMMENDED CROSSLINKER

OMNOVA Solutions' AT-1093 and 1094 experimental products may be crosslinked with polyaziridines, water dispersible polyisocyanates, epoxy silanes or low temperature curing melamines to increase bond strength and heat resistance.

PREPARATION OF PUDs CONTAINING POLYFOX

Reaction Procedure Guidelines :

The chosen polyols were dried under reduced pressure at a temperature of 70°C. The chosen isocyanates were used as received from the manufacturer.

The reaction between the polyols and the isocyanate was carried out in a 100-ml three-necked flask equipped with a high speed stirrer, thermometer, reflux condenser and a nitrogen inlet-outlet. A continuous flow of nitrogen was maintained throughout the reaction.

The reaction vessel was charged with 0.46pbw (parts by weight) PolyFox diol PF-636, 27.79 pbw Lexorez 1600-55, a linear polyester polyol, and a dispersant containing acid groups such as dimethylolpropionic acid (1.8 pbw), which had been dissolved in N-methylpyrrolidone (NMP) (2.0 pbw).

The reactants were mixed and heated to 110-115°C. After 10 minutes, the reactor was cooled to 37°C and dibutyl tin dilaurate (DBTDL) (T-12) was added at 0.01 pbw.

The contents were stirred for 5 minutes at temperature.

The temperature was then increased to 65°C and 11.08 pbw Desmodur I (Isophorone di-isocyanate) was added with vigorous stirring throughout the addition, to ensure good mixing.

Samples of the reaction mixture were taken to determine the amount of unreacted isocyanate using the di-n-butylamine method (ASTM D-1638-74), with a target of 4.6%.

After two hours the target isocyanate level was reached and the reaction products were cooled to 45°C.

A tertiary amine, triethyl amine (TEA) was added to the reaction at 1.4 pbw at a temperature of about 50-80°C. The reaction was allowed to proceed, with stirring, for 30 seconds to facilitate neutralization of the acid groups from dimethylolpropionic acid (DMPA).

While stirring at a high rate (2000 rpm) 54.3 pbw water was added to the polyurethane prepolymer.

The reaction was then cooled to room temperature and a dispersion was obtained having a solids content of approximately 44%.

Ethylenediamine (EDA), 0.67 pbw was then added as a chain extender to complete the reaction. A stable anionic, waterborne polyurethane dispersion having a viscosity of less than 140 cps and a solid content of 44% resulted.

Typical "paints" were formulated from these modified PolyFox PUDs demonstrating, significantly improved resistance to ethylene glycol (no effect), and gasoline (no effect), as well as a significant reduction in coefficient of friction.

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NOTE:

Although data supplied above are believed to be accurate, each user is advised to make his or her own determination as to whether the described product(s) is/are appropriate for a particular use or application, whether such a use will comply with all applicable laws or regulations, or whether such a use will not infringe the intellectual property rights of third parties.



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