TECHNICAL BULLETIN

Polyol HA-0135

Polyol HA-0135 Economic Advantages in Polyurethane Dispersions

Polyol HA-0135 was specifically designed to eliminate the need for NMP as a process solvent in the preparation of polyurethane dispersions.

However, ***Polyol HA-0135*** also offers formulators the ability to lower the cost of their polyurethane dispersion formulations by reducing the amount of isocyanate typically used in these systems.

Other advantages of this unique polyester polyol include faster process times and lower formulation viscosities. This technical bulletin is an example of how ***Polyol HA-0135*** can affect the cost of a PUD formulation.

*Typical Physical Properties **

Property	*Value*
Appearance	***Clear / lightly hazy viscous liquid***
Acid Value, mg KOH / g (as supplied)	***100 - 115***
Hydroxyl Number, mg KOH / g (as supplied)	***100 - 115***
Non-volatile, %	***98 min***
Brookfield Viscosity @ 100% Non-volatile	***@ 25°C 4000 - 8000 P @ 55°C 150 - 350 P @ 75°C 60 - 80 P***
Density @ 25°C, grams / litre	***1200 - 1235***
Colour, APHA	***450 max***
Moisture, %	***0.5 max***

* The typical values presented here are believed to be accurate; they should not, however be considered to constitute a specification.

EUROPE

Charleston Road, Hardley,
Hythe, Southampton, Hampshire
SO45 3ZG UK
Call +44 2380 245 437

NORTH AMERICA

300 Brookside Avenue,
Building #23, Suite 100 Ambler,
PA 19002 USA

Call +1 215 773 9280 Toll

Free 888 519 3883

Email: PaintsandCoatings@geosc.com

www.geosc.com

GEO® SPECIALTY CHEMICALS

Polyol HA-0135

TECHNICAL BULLETIN

Table 1 - Pre-polymer Formulation

Materials	EXP 1021-68	EXP 1021-70
Polyol HA-0135[3]	99	0
Diexter-G IA66-35[1]	267	305.3
Moisture from HA-0135, %	0.5	0
Dimethylol propionic acid	0	26.8
Desmodur® I[2]	77	108.5
NMP[4]	77	77.6
Total	***520***	***518.2***
Pre-polymer Properties		
Total Processing Time, hrs	3	6
Non-volatile, %	85	85
NCO, %	2.20	3.12
NCO:OH	1.65	1.65
Viscosity, cP at 75°C	12200	10600

1 hydroxyl terminated saturated linear polyester which is a poly(hexamethylene adipate/isophthalate) glycol, product of Coim USA, Inc.

2 Desmodur® I is a product of Bayer

3 Contains 0.5% moisture, adjusted NCO accordingly

4 NMP is a product of Lyondell Chemical

REVISION DATE: JANUARY 2022

GEO® SPECIALTY CHEMICALS

Polyol HA-0135

TECHNICAL BULLETIN

Pre-polymer Formulation Synthesis:

All polyols and NMP were charged to a reactor equipped with N2 spare, agitation reflux condenser with trap & temperature controller. Both reactions were initially heated to 80°C.

At 80°C, reaction EXP 1021-68 was homogeneous and the Desmodur® I was charged. Reaction EXP 1021-70 had to be heated to 105°C and held until the Dimethylol propionic acid was completely dissolved, then cooled to 80°C before the Desmodur® I could be charged. Both reactions were held at 90°C until they reached the theoretical % NCO endpoint, then cooled to 75°C and discharged.

Dispersion Method:

Both pre-polymers were transferred to a dispersion vessel and allowed to cool to 60°C. At 60°C, the triethylamine was charged to the reactor while agitating at a moderate speed. After 5-10 minutes, the agitator speed was increased and the de-ionised water was charged to the vessel at a rate sufficient to maintain a vortex during the inversion. After 5-10 min. of mixing, the pre-mix solution of ethylene diamine and de-ionised water was added over a 20 minute period. Mixing was continued for approximately 20 minutes after the addition was completed.

Dispersion Formulation		
Pre-polymer	520	518.2
Triethylamine	18.2	18.2
De-ionised Water	454.6	454.4
Ethylene diamine	7.2	9.2
TOTAL	1000	1000

Dispersion Properties		
Non-volatile, %	44	44
pH	8.1	8.1
Brookfield Viscosity (cP @ 25°C)	304	7200
KU-2 Viscosity (KU / cP)	60 / 340	116 / 2540

Film Properties 0.05 mm wet, on glass		
Sward Hardness 24hr / 1 wk	8 / 8	16 / 16

REVISION DATE: JANUARY 2022

GEO® SPECIALTY CHEMICALS

Polyol HA-0135

TECHNICAL BULLETIN

Advantages

Reduced Amount of Isocyanate 29%

Incorporating ***Polyol HA-0135*** into the pre-polymer allows for a reduction in the amount of costly isocyanate needed in the formulation.

More Economic Processing

Polyol HA-0135 allows for shorter processing cycles and lower temperature reactions, which saves time and energy.

Low Viscosity Dispersion

Polyol HA-0135 based pre-polymers promote the formulation of lower viscosity PUD systems.

Handling & Storage: Polyol HA-0135 is very hygroscopic. Container should be sealed at all times unless discharging. Due to the reactive nature of the material, containers should be tightly sealed and stored at 0-30°C. If preheating is required for discharging, ***Polyol HA-0135*** should be heated to a maximum temperature of 70°C for no longer than 48 hours.

If the material is exposed to >70°C for extended periods of time, undesirable side reactions may occur that could cause variations in the properties of the prepared formulations.

The shelf life of the material is minimum 1 year if stored in original sealed container at 0-30°C.

REVISION DATE: JANUARY 2022

GEO® SPECIALTY CHEMICALS