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Product bulletin

(Hydroxyl Terminated Poly Butadiene Resin)

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INTRODUCTION

Synthetic rubber LR resins are low molecular weight, hydroxyl terminated homopolymers of butadiene. Synthetic rubber LR resins are characterized by low volatiles content, low glass transition temperatures, excellent hydrophobicity and a high level of reactive functionality.

The facile reaction of synthetic rubber resins with curing agents such as di- and polyisocyanates provides an economical route to the preparation of general-purpose polyurethane elastomers. The unique structure of sysnthetic rubber LR-H1 resins provides properties which surpass typical polyether and polyester polyol based urethane systems, as well as conventional, general-purpose rubbers. All grades of synthetic rubber LR-H1 resins contain unsaturated double bonds that can be cured or crosslinked, and several grades of synthetic rubber LR-H1 resin contain epoxide functionality.

Some of the outstanding performance characteristics Synthetic rubber LR resins provide to
products include:

- Adhesion to a variety of substrates
- Hydrolytic stability
- Aqueous resistance to acids and bases
- Low temperature flexibility
- Low moisture permeability
- Low embedment stress
- Thermal cycling stability
- Electrical insulation properties
- High elongation with good elastic recovery.

Synthetic rubber LR resins are used in various applications including coatings, construction products, waterproof membranes, electronic and automotive. Synthetic rubber LR resins are used in castable elastomers, caulks, sealants, membranes, foams, adhesives, coatings, propellent binders, potting and encapsulation compounds as well as other rubber –fabricated materials.

Synthetic rubber LR resins comply with title 21 (Food and Drugs) of the Code of Medicine

Regulations, , Resinous and Polymeric Coatings.

Synthetic rubber LR 1-H1 resin:-

TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

HYDROXYL TERMINATED POLYBUTADIENE RESIN

Nonvolatile Material, wt% 99.9
Viscosity, mPa·s @ 23°C 8000
Viscosity, mPa·s @ 30°C 5000
Hydroxyl Number, mg KOH/g 47.1
Hydroxyl Value, meq/g 0.84
Hydroxyl Functionality 2.4-2.6
Molecular Weight, Mn 2800
Polydispersity, Mw/Mn 2.5
Water, wt% 0.02
Specific Gravity @ 23°C 0.901
Iodine Number, g/100g 400
Glass Transition Temp. (Tg), °C -75
Solubility, g/100 ml of solvent @ 25°C Mineral Spirits >50
Toluene >50
Chloroform >50
Methyl Ethyl Ketone >50
Ethyl Acetate >50
Acetone <10(1)
Hexane >50
Aromatic 100 >50
Isopropanol <10(1)

(1) Cloudy: 5% solution also cloudy

DESCRIPTION:-

Synthetic rubber LR 1-H1resin is a liquid hydroxyl terminated polymer of butadiene with a number average molecular weight of approximately 2800.
Synthetic rubber LR 1-H1resins have primary, allylic alcohol groups that exhibit high reactivity in either

condensation polymerization reactions or the preparation of derivatives. The degree of polymerization is approximately 50 for the LR 1-H1. Hydroxyl functionality is typically in the 2.4 – 2.6 range for LR-H1. is regulated by the Sudan government Department of Commerce and may not be exported without a license

PRODUCT HIGHLIGHTS

- Hydrophobicity
- Reactive hydroxyl groups
- Low glass transition temperature
- Miscibility with asphalt
- Low color, high clarity

PERFORMANCE PROPERTIES

- Hydrolytic stabiltiy
- Low temperature Flexibility
- Low moisture permeability
- Resistance to aqueous acids and bases
- Excellent adhesion to a variety of substrates
- Electrical insulation properties

SUGGESTED APPLICATIONS

- Potting and encapsulation
- Adhesives
- Sealants
- Binders
- Waterproof coatings and membranes

Synthetic rubber LR 2-H1Resin

Nonvolatile Material, wt% 99.9
Viscosity, mPa·s @23°C 7000
Viscosity, mPa·s @30°C 4400
Hydroxyl Number, mg KOH/g 40.4
Hydroxyl Value, meq/g 0.72
Hydroxyl Functionality 2.2-2.4

Molecular Weight, Mn 2800

Polydispersity, Mw/Mn
2.2 Water, wt% 0.02

Specific Gravity @23°C 0.899
Iodine Number, g/100g 400

Glass Transition Temp. (Tg),°C -76
Solubility

Mineral Spirits
>50 Toluene >50
Chloroform >50

Methyl Ethyl Ketone
>50 Ethyl Acetate >50
Acetone <10(1)

Hexane >50
Aromatic 100 >50
Isopropanol <10(1)
(1) Cloudy: 5% solution also cloudy.

Synthetic rubber LR 2-H1

TYPICAL PHYSICAL AND
CHEMICAL PROPERTIES

DESCRIPTION:-

Synthetic rubber LR 2-H1is a liquid, hydroxyl terminated polymer of butadiene with a number average molecular weight of approximately 2800. Synthetic rubber LR 2-H1 resins have primary, allylic alcohol groups that exhibit high reactivity in either condensation polymerization reactions or the preparation of derivatives. The degree of polymerization is approximately 50 for LR 2-H1. Hydroxyl functionality is typically in the range of 2.2 to 2.4 for LR 2-H1. This resin is regulated by the Sudan government Department of State and may not be exported without a license from that organization.

PRODUCT HIGHLIGHTS

- Low glass transition temperature
- Hydrophobicity

- High solids loading
- Low color, high clarity

PERFORMANCE PROPERTIES

- Low temperature flexibility
- Excellent adhesion to metal
- Excellent dispersion of fillers

SUGGESTED APPLICATIONS

- Binders for military applications.

LOW MOLECULAR WEIGHT HYDROXYL TERMINATED POLYBUTADIENE

Synthetic rubber LR 3-H1Resin is a low viscosity, low molecular weight liquid, hydroxyl terminated polymer of butadiene Synthetic rubber LR 3-H1resins have primary, allylic alcohol groups that exhibit high reactivity in either condensation polymerization reactions or the preparation of derivatives. The degree of polymerization is approximately 25

Synthetic rubber LR 3-H1Resin

TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

DESCRIPTION

for the Synthetic rubber LR 3-H1and the molecular weight is 1200. This product is regulated by the Sudan government Department of Commerce and my not be exported without a license from that organization.

Nonvolatile Material, wt% 99.9
Viscosity, P @ 30°C 14
Hydroxyl Number, mg KOH/g 101.0
Hydroxyl Value, meq/g 1.8
Hydroxyl Functionality 2.4-2.6
Molecular Weight, Mn 1200
Polydispersity, Mw/Mn 2.0
Water, wt% 0.05
Specific Gravity @23°C 0.913
Iodine Number, g/100g 420
Glass Transition Temp. (Tg),°C -70
Solubility
Mineral Spirits >50

Toluene >50
Chloroform >50
Methyl Ethyl Ketone
>50 Ethyl Acetate >50
Acetone <10(1)
Hexane <50
Aromatic 100 >50
Isopropanol <10(1)
(1) Cloudy: 5% solution also cloudy.

PRODUCT HIGHLIGHTS

- Reactive hydroxyl groups
- Hydrophobicity
- Low glass transition temperature
- High solids loading
- Low color, high clarity

PERFORMANCE PROPERTIES

- Hydrolytic stability
- Low moisture permeability
- Resistance to aqueous acids and bases
- Low temperature flexibility
- Electrical insulation properties

SUGGESTED APPLICATIONS

- Potting and encapsulation
- Adhesives
- Sealants
- Waterproof coatings and membranes

SAFETY, HANDLING & STORAGE INFORMATION

I. General

Synthetic rubber L R1-H1, and L R3-H1resins are liquid, hydroxyl-terminated homopolymers of butadiene. These resins are only slightly combustible with flash points greater than 400°F (205°C). They exhibit excellent stability if properly handled and stored.

Drum Storage

Synthetic rubber resins are supplied in 55-gallon non-returnable, open-head steel drums having an epoxy phenolic lining. Storage of the drums out of direct sunlight at temperatures between 50°F (10°C) and 90°F (32°C) is recommended. Due to the viscosity of the products heating may be required to facilitate removal from the drums. Exposure of the drum or contents to temperature in excess of 150°F (66°C) should be avoided. As a result, the use of band or bayonet heaters should be avoided due to the possibility of localized overheating and the resultant oxidative crosslinking and viscosity increase. Suggested methods of heating include the use of hot boxes or water baths. After opening and removal of a portion of the contents it is recommended that the vapor space in the drum be flushed with an inert gas, such as dry nitrogen, prior to reclosure. Synthetic rubber resins should be stored in nitrogen padded vessels to prevent moisture contamination and oxygen degradation. The storage vessel should be constructed of 300 series stainless steel or epoxy-lined carbon steel. Since the polymers are viscous, lines must be sized carefully and positive displacement pumps are necessary. Lines should be electrically traced and insulated. Suction heaters are often used to assure good supply to the pump. Traced piping and heater skin temperatures should not exceed 150°F (66°C).

II. Bulk Storage– Detail

Synthetic rubber resins are best stored in low pressure cone roof

tanks under slightly positive nitrogen pressure. The material should be stored at ambient temperature (50 to90°F for 10 to 32°C) so insulation is often advantageous. The tank should be located in a sheltered area to help minimize heat gain and heat loss. Level indicators should be provided as well as a high level alarm to warn of over-filling the tank. The bottom of the tank should be sloped to the pump suction and sump. The section nozzle should be at such an elevation that normal piping layout will put the center line of the nozzle at the center line of the pump. A recirculation line with a back pressure control valve will allow safe operation without requiring pump shutdown. Pumping out the heel, when service or inspection of the tank is required, should be by use of the scavenger line if the suction line is located above the bottom of the tank. Lines should be sized carefully, allowing for the viscosity of the product The use of a suction heater between the tank and pump is recommended to assure good pump operation. The maximum temperature of the product should not exceed 150°F (66°C). Therefore, the use of live steam is not recommended. Hot condensate may be used without overheating the exchanger tube walls. Another possibility is the use of electric heaters which can control the sheath (heating surface) temperature. Where condensate or hot water is used for heating, precautions must be taken to prevent water contact with the product. Before the pump is shut-down, the suction heater should be shut-off and product pumped through to remove the residual heat before the circulation is stopped. This procedure will prevent loss of quality due to "heat-soaking" the product which can result in product crosslinking and viscosity increase. No internal coils, bayonets or other heating devices should be installed.

III. Materials of Construction

A. Tanks

Storage vessels may be made of stainless steel, or epoxy lined carbon steel. Small vessels are usually fabricated from stainless steel while large storage tanks are more economically fabricated in epoxy-lined carbon steel. Tanks should be insulated to minimize heat loss and heat gain.

B. Pumps:-

In general, 300 series stainless steel positive displacement pumps such as Sier-Bath brand double screw pumps or Viking brand gear pumps are recommended. These units are equipped with external bearings which give good service life and are easily in spected and repaired.

C. Heat Exchanger

be Product-wetted parts of heaters should be constructed of 300 series stainless steel.

D. Piping

Lines should be adequately sized considering the viscosity of the material being handled. Electrical tracing and insulation should be provided where lines are exposed to low temperatures. Piping should 300 series stainless steel.

IV. Tank Truck Shipments

Clean, dry, insulated stainless steel trailers, preferably equipped for rear or center off-loading (subject to availability), should be specified. Product is loaded at 140-150°F (60-66°C). Depending on the outside temperature, the product temperature will decrease approximately 5-10°F (3-6°C) per day. Since a minimum off-loading temperature of 120°F-(49°C) is recommended, in-transit heating will usually be required during cold weather. Clean and dry pumps and hoses should be used for product discharge. Positive displacement, double screw or gear pumps and 3 inch hoses and connections are recommended. A minimum 60 gpm pump size is suggested. Off-loading may be assisted by the application of dry nitrogen pressure to the truck