TECHNICAL UPDATE

CRAY VALLEY
A BRAND OF TOTAL

Ricobond® 7004 Enhances Film Properties of Latexes Used in Adhesives, Coatings, Graphic Arts, Non-Wovens and Paper Making

Benefits

- Water-based
- Small particle size
- Low viscosity
- Good wetting
- Improved water resistance
- Compatibility with a series of water-based emulsions
- Adhesion to different substrates
- Adhesion promoter of latex emulsions
- Adhesion between rubber and polar substrates

Target Markets

- Coatings
- Textile treatment
- Surface treatment of polar fillers

Additional Information

MSDS/TDS: Ricobond® 7004

Description

Ricobond® 7004 is an aqueous dispersion of a functionalized polymer with small particle size, low viscosity and good stability. The hydrophobic and hydrophilic components of Ricobond 7004 allow for interactions between polar and non-polar substrates. Table 1 lists the chemical and physical properties of Ricobond 7004. The aqueous dispersion shows good compatibility when formulated with other latexes and improved film properties, including increased adhesion, increased water resistance, increased wettability, and reduced tack. Ricobond 7004 has shown good compatibility and property improvement when formulated with carboxylated styrene butadiene (SB) and vinyl pyridine (VP) styrene butadiene emulsions. Blends made with carboxylated SB latexes and Ricobond 7004 showed improved adhesion to an array of substrates such as PET film, polyester and nylon fabrics.

Ricobond 7004 has previously demonstrated good adhesion performance in peroxide-cured ethylene propylene diene monomer (EPDM) rubber when formulated with SB latexes such as GenFlo® 8045 and GenFlo 3003 and VP latex GenTac 106.

Recent work has shown that Ricobond 7004 can be blended with a wide range of emulsions including vinyl acetate ethylene (VAE), acrylic, styrene acrylic, vinyl acrylic, and carboxylated styrene acrylic emulsions. These emulsions are typically used in a variety of applications such as adhesives, coatings, graphic arts, non-wovens, paper making and carpet backing. The blends show good compatibility and, in some cases, improved water resistance, adhesion, and wettability.

Table 1: Physical and chemical properties of Ricobond 7004

Identification	Ricobond 7004
Mn, g/mol	4500-5500
Functional Groups/Chain	11
Viscosity, cps @ 25 °C	<500
pH	8.0-9.0
Solids, wt%	28-31

Results

Blends of VAE, acrylic, styrene acrylic, and vinyl acrylic emulsions and Ricobond 7004 (ratio 90:10 by solids, emulsion: Ricobond 7004) were made. Ricobond 7004 showed good compatibility with all emulsions tested (Appendix). The blends show good stability, and no major separation was observed. Several emulsions showed improved water resistance and adhesion to glass with the addition of Ricobond 7004. Table 2 summarizes these findings. The addition of Ricobond 7004 can also improve wettability and film formation properties and can reduce tack.

Ricobond 7004 has also shown good compatibility with other emulsions used in carpet backing such as carboxylated styrene acrylic (Rovene® 6487), styrene acrylic (Rovene 6066) and carboxylated SB (Rovene 4487 and Rovene 4457). No significant improvements in adhesion or water resistance were observed. Ricobond 7004 slightly improved the water resistance of Rovene 6066 and decreased the brittleness of the film.

Table 2: Blends of Ricobond 7004 with latex emulsions

Commercial Name	Application	Compatibility	Adhesion on Glass* with | without Ricobond 7004	Water Resistance** with | without Ricobond 7004
Acrylic Emulsions				
Rovene® 6005	Adhesives Graphic arts	✓	7 | 9	slight | slight
Rovene 6014	PSA General non-woven	✓	2 | 9	slight | slight
Rovene 6050	PSA Industrial non-woven	✓	9 | 9	slight | poor
Rovene 6117	Concrete sealer Industrial coatings	✓	1 | 9	poor | poor
Styrene Acrylic				
Rovene 6101	Graphic arts	✓	9 | 9	poor | poor
Vinyl Acrylic				
Rovene 40554	Non-woven/textile	✓	0 | 0	good | poor
Vinyl Ethylene Acetate				
Vinnapas® 400	Paper and packaging adhesives	✓	0 | 0	good | slight
Vinnapas EP 6300	Automotive adhesives Paper and packaging adhesives Wood adhesives Floor adhesives	✓	0 | 0	good | slight
Vinnapas EP 7000	Automotive adhesives Paper and packaging adhesives Wood adhesives Floor adhesives	✓	0 | 0	good | slight

*Adhesion scale of 0-9: 0: all or most of the film is not removed; 9: all or most of film is removed

**Water resistance: poor: water drop spreads immediately; slight: weak contact angle/drop spreads over time; good: strong contact angle/drop does not spread over time.

Summary and Future Work

Ricobond 7004 is an aqueous dispersion of a functionalized resin that can be formulated with a wide range of latexes to improve water resistance, wettability and adhesion. Blends of emulsion latexes and Ricobond 7004 show good compatibility and remain stable over time. Ricobond 7004 can reduce tack and enhance film formation properties.

Future work will include testing of other film properties, adhesion to different substrates and compatibility with other aqueous systems. Other work will include the testing of Ricobond 7004 in applications such as carpet backing and asphalt-containing materials. Additional commercial and newly developed dispersions will also be evaluated.

Other Suggested Applications

The aqueous dispersions can also be used to pre-coat high surface energy fillers to improve wetting and ultimate dispersion in elastomers, composites and thermoplastic/thermoset resins.

Appendix

Emulsion Products	Manufacturer
GenFlo 8045, GenFlo 3003, GenTac 106	Omnova Solutions
Rovene 6005, Rovene 6117, Rovene 6050, Rovene 6014, Rovene 6101, Rovene 40554	Mallard Creek Polymers, Inc.
Vinnapas 400, Vinnapas EP 7000, Vinnapas EP 6300	Wacker Chemie AG

About Total Cray Valley

Total Cray Valley is the premier global supplier of specialty chemical additives, hydrocarbon specialty chemicals, and liquid and powder tackifying resins used as ingredients in adhesives, rubbers, polymers, coatings and other materials. Total Cray Valley has pioneered the development of these advanced technologies, introducing hundreds of products that enhance the performance of products in energy, printing, packaging, construction, tire manufacture, electronics and other demanding applications.

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