



# AdCoTec

NEWSLETTER FOR THE COATINGS AND ADHESIVES INDUSTRY

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Editorial

The keynote theme of the second issue of our newsletter for customers and business partners is water. We take the idea that "water is green" very seriously because by producing zero-VOC or solvent-free polyurethane dispersions (PUDs), for example, we minimize the impact on the environment. Whatever waterborne raw materials we develop, you can be sure their excellent ecological properties will be matched by high quality. The Bayhydrol® product range, for example, combines quality and high formulation flexibility with environmental sustainability for a wide variety of applications.

In this issue we show how our waterborne technology makes high-performance industrial flooring or furniture coatings possible and how our waterborne 2K polyurethanes combine high functionality with low viscosity for automotive refinishing applications, for example. As one of the world's leading manufacturers of polyurethane dispersions, we are convinced that these raw materials create more added value for our customers than just green technology. Superior drying behavior and chemical resistance are just two of the properties I could mention.

The main aim of this newsletter is to stimulate a dialog with our customers. And it is with this in mind that I would invite you all to talk to us about these articles, our products and, above all, about your needs!

I hope you find this newsletter enjoyable and useful!

## ■ GLASS COATINGS

### Opening up new perspectives for glass

Glass bottles, transparent or frosted windows, decorative elements in household furniture and fittings – glass is very much a part of our everyday lives, and has been for centuries. Now polyurethane-based coatings from Bayer MaterialScience are opening up new perspectives for colored glass – as an attractive alternative to tinted glass.

There are reasons enough for finding an alternative. Conventional colored glass is expensive and frequently contains toxic heavy metals, which makes recycling tricky. If glass is colored by means of an organic coating instead of the traditional tinting method, only one transparent glass melt is required instead of a separate melt for each color. Another advantage is that specific colors can be produced in small batches without using heavy metal salts. Moreover, coatings make a greater variety of colors and surface textures possible. Last but not least, coated glass is easier to recycle because there is no need for sorting. When the glass is melted down, any organic material in the coating's binder is simply combusted.

#### Functional benefits

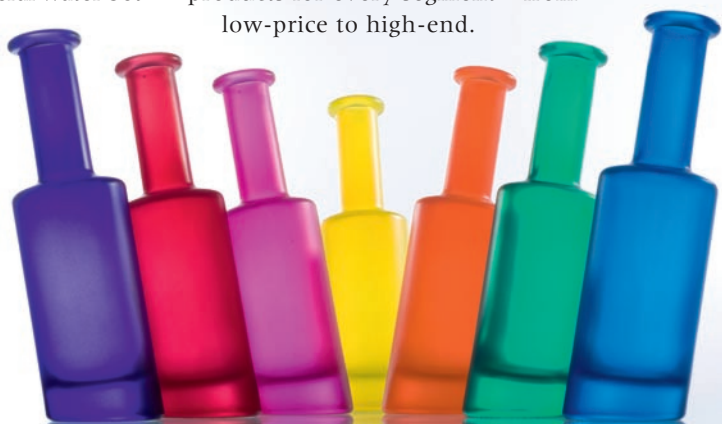
The polyurethane-based coatings used to color glass can also perform functional tasks such as making glass more shatter- or dishwasher-proof and increasing its scratch or internal stress resistance. A coating just a few microns thick significantly improves the internal stress resistance of lightweight glass bottles. Trials with mineral water bottles have proved that PU-based coatings prolong their working life through improved scratch and burst protection. Besides enhancing resistance to

abrasion and chemicals, PU-based coatings can also produce special effects such as frosted, metallic, pearl or soft-feel glass. In the case of frosted glass this avoids the use of harmful chemicals.

#### Attractive alternative

These aqueous organic glass coatings are made up of two components: an OH-functional polyol with an adhesion-enhancing siloxane additive and the respective coloring agent; and a water-thinnable blocked polyisocyanate. The formulation is highly stable in storage and can be handled and applied like any 1K product. Once the water has evaporated, the coating is baked for 20-30 min. at around 170° C. At these high temperatures the isocyanates are unblocked and cross-link with the polyol. The aqueous dispersions are marketed under the Bayhydrol® and the polyisocyanate cross-linkers under the Bayhydur® brand name. Although originally designed for bottles and glasses, coated colored glass is increasingly being used for decorative purposes in kitchens or furniture, and Bayer has products for every segment – from low-price to high-end.

Waterborne organic coatings  
make a wide variety of  
colors possible



■ SOLVENT-FREE PUD: BAYHYDROL® XP 2755

## Fast drying and highly resistant – ideal for furniture coatings

Around 45% of the world market for industrial wood coatings consists of solvent-borne polyurethane (PUR) systems. But as health and environmental concerns increase, there is growing interest in solvent-free solutions – providing their final coating and handling properties meet the required standards. Bayer MaterialScience's new generation of solvent-free OH functional polyurethane dispersions (PUDs) pave the way for new levels of performance in 2K waterborne systems.

The new generation of solvent-free PUDs developed by Bayer MaterialScience allows the formulation of low-VOC coatings with high-performance reactivity, film resistance and visual qualities – and that makes them ideal for furniture applications. Since the soft segment of the polymer chain in these new solvent-free PUDs has been optimized and the synthesis process takes place via acetone distillation, the final polymer requires less co-solvent for proper film formation.

### Outstanding properties

Bayer MaterialScience has developed Bayhydrol® U XP 2755 as a specially designed solvent-free PUD for furniture coatings:

- Fast drying and curing (MFFT 15° C.)
- Very high film hardness (180" König in less than a day)
- Very low VOC coatings possible
- Very long pot life (up to 6 hrs)
- Excellent chemical and mechanical resistance, e.g. to red wine or coffee
- Easy to mix with hardener solution
- Outstanding appearance on wood
- High gloss and easy down-glossing for matt coatings

### Best results in 2K systems

When crosslinked with Bayhydur® XP 2655, a hydrophilic anionic aliphatic polyisocyanate that is the recommended partner, Bayhydrol® U XP 2755 delivers a final hardness close to 200" König after only a few hours of drying. This high level of hardness is combined with excellent elasticity thanks to the PUD's inherent behavior of balancing hard and soft segments in the same molecule. This also results in high levels of abrasion, scratch and mar resistance. As a secondary dispersion, the new PUD looks good on wood,

delivering an excellent grain warmth effect and making highly transparent and glossy coatings possible. Furthermore, the door is now open for the development of solvent-free products, such as a new soft PUD for highly resistant, natural-effect coatings.



Guaranteed dog-proof



Meeting the growing demand for low-VOC furniture coatings

## INDUSTRIAL PVC FLOORING COATINGS

# Resilient, flexible – and green

Driven by the need for more quality, efficiency and environment friendliness, leading manufacturers of resilient PVC and linoleum flooring are now choosing the Bayhydrol® UV range of waterborne UV-curing polyurethane (PU) dispersions for their top qualities. Because besides being resilient and flexible, these industrial flooring coatings are good for the environment.

### Waterborne benefits

Bayer MaterialScience's UV-curing waterborne technology has numerous advantages. In contrast to UV solvent-borne technology it is free of reactive diluents, tack-free before UV and displays no shrinkage, needs less photo initiator, reduces wastage through overspray recycling and delivers easier matting, flexibilization and pigmentation. UV waterborne technology is the fastest-curing waterborne coating technology, has the highest crosslink density, offers close to 0% VOC and 100% overspray recycling, and allows postforming through stepwise curing. These advantages make this technology particularly suitable for pigmented, matt and effect coatings and of course resilient flooring coatings.

**Bayhydrol® UV**  
– for excellent  
surface properties  
in resilient flooring

### Meeting market needs

Quality in industrial flooring coatings means they need to look good, feel right, have excellent mechanical properties and high stain resistance (e.g. against household chemicals, felt-pens and comestibles like mustard and red wine), easy matting and the possibility of pre-UV embossing. Efficiency is mainly about cost and processing efficiency, and the key environmental factors are emissions and energy consumption. Bayhydrol UV binder material makes high-performance UV-curing coatings possible for a number of applications – and performs well in quality, efficiency and environmental terms.

XP 2661 and XP 2721 are the main Bayhydrol® UV products for PVC-flooring substrates. They are suitable for clear coats on semi-gloss or matt surfaces, have good adhesion and high abrasion, chemical and stain resistance properties and display high UV reactivity. Whereas XP 2661 has its strength in stain resistance, Bayhydrol® UV XP 2721 brings the benefits of improved hardness and physical drying (tack-free before UV), which allows improved embossing of the coated flooring before UV-curing. Both XP 2661 and XP 2721 can easily be combined with the other products from the Bayhydrol® UV product portfolio to achieve different property profiles.

The Bayhydrol® UV range proves that waterborne technology not only matches the performance of solvent-borne products but in some cases exceeds it. Nobody doubts that water is green, but just how good this UV waterborne technology's performance is might well surprise some.



## ■ LATENT-REACTIVE TECHNOLOGY

# 2K benefits from a 1K system

High initial and final bond strength, good heat resistance and long-term durability – these typical 2K benefits are available in 1K adhesives thanks to latent-reactive technology. These 1K adhesives based on a Dispercoll® U polyurethane dispersion from Bayer MaterialScience not only offer excellent adhesion properties but are also easy to handle with no need for pre-processing dosing and no pot-life worries.

Latent-reactive adhesives are composed of a semi-crystalline polyurethane (PUR) polymer into which solid surface-deactivated polyisocyanate particles are embedded. The PU polymer only melts when the adhesive is heated to more than 45° C. when crosslinking begins. As the adhesive cools down, the PUR polymer crystallizes and quickly achieves high bond strength.

### Advantages of latent-reactive adhesives

With only one component the logistics of transportation and storage are much simpler. Since no component has to be applied before application, the risk of human error is virtually eradicated. Only relatively brief heat activation at relatively low temperatures and pressure is required to achieve a strong adhesive bond. No pot life means much more flexibility in applying latent-reactive adhesives. And the outstanding adhesive properties include high final bond strength, resistance to oils, fats and plasticizers, and excellent temperature resistance.

### Three application possibilities

The Dispercoll® U product range covers three application areas: as a latent-reactive PUR dispersion with no need for an added crosslinker; as a substrate pre-coating with a storage-stable, latent-reactive adhesive film for separate drying and adhesion processes; and as a latent-reactive hot-melt adhesive film.

The Dispercoll® U grades mainly differ in their polymer softening characteristics. The standard grades Dispercoll® U 53 and U 54 are suitable for most heat-activated applications; Dispercoll® U 56 is ideal for low application temperatures; and Dispercoll® U XP 2578 combines the properties of the standard grades with the option to formulate 1K adhesive systems, e.g. in combination with Dispercoll® BL XP 2514.

Whatever your needs, Bayer MaterialScience can supply you with the right raw materials for a high-performance latent-reactive adhesive.



Three of the many applications where the outstanding properties of the Dispercoll® U product range are particularly beneficial

■ WATERBORNE 2K PUR COATINGS

## Where system competence counts

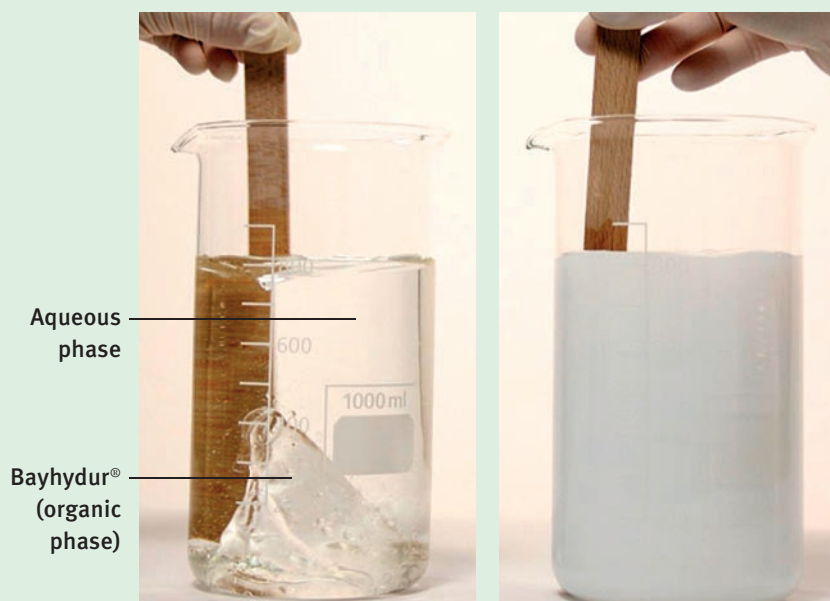
Whereas in the past performance and appearance were the main market requirements in automotive refinishing, commercial vehicle and general industrial coatings, there is now an additional focus on reduced emissions – and thus on waterborne 2K PUR coatings. The secret of successful raw material development lies in a deeper understanding of 2K chemistry, and here, Bayer MaterialScience can point to unparalleled know-how.

In order to restrain the concurrent reaction of isocyanate groups with water in formulating waterborne coatings, the designs of the polyisocyanate (PIC) hardeners and polyol dispersions have to be matched. Besides, a coordinated synthesis of a suitable polyol-PIC combination is crucial for effective emulsion resulting in homogeneous hardener distribution with low particle size in the polyol dispersion. Bayer MaterialScience has both PIC crosslinkers and polyol dispersions in its portfolio – and the necessary know-how to ensure a perfect match in 2K PUR formulations.

### High functionality and low viscosity

Low-viscosity PICs from the Desmodur® product range are easy to emulsify and mix with suitable Bayhydrol® polyols and deliver an excellent film performance. Desmodur® N 3900, for example, has set new standards in “green” 2K PUR coatings with its low viscosity (730 mPas), high average functionality (>3), easy mixability and very good crosslinking performance. As a crosslinking reactive thinner with a viscosity of under 100 mPas, Desmodur® XP 2730 is the ideal solution for low or zero VOC formulations and for lowering the viscosity of the PIC component and improving emulsification – as described in AdCoTec issue 1\_2010.

## Excellent mixability



Spontaneous emulsion: a gentle stir is all you need

### Easy to mix for an excellent coating

The Bayhydur® product range – water-dispersible PICs with an integrated emulsifier function – feature a patented waterborne crosslinking technology for perfect emulsification with little need for stirring. The difference between Bayhydur® and competing products with an external emulsifier is that the emulsifier function is permanently anchored to the polymer chain, ensuring a homogeneous spread and an excellent, ultra-stable coating layer. The Bayhydur® range covers products with low viscosity and low VOC, higher chemical or weather resistance, fast drying qualities, or higher performance and robust processing. One of the most recent additions, IPDI-based Bayhydur® XP 2759, combines fast drying with chemical resistance. But whatever waterborne 2K PUR applications are required, Bayer MaterialScience has the system competence to deliver the right HDI- or IPDI-based components.


 ■ CUSTOMER SERVICE

## Putting you in the picture on REACH

With the implementation of REACH in full swing, the first major milestone, pre-registration, has been passed already and the second, registration of large volume substances, is coming up. Bayer MaterialScience (BMS) is acting to ensure the further availability of its products through appropriate action in the registration process. Through on-going communication with downstream users, industrial associations and suppliers regarding uses of substances that are part of our products, Bayer MaterialScience is making every effort to keep all its customers informed about the latest developments.

The registration process for substances manufactured or imported in volumes exceeding 1,000 t p.a. is under way. As far as applicable, Bayer MaterialScience has taken the use proposals compiled by important industry associations such as CEPE, FEICA and ISOPA to assign possible REACH uses to the products we sell. Through this approach we assume that we have mainly covered the typical processing methods and exposures. However, we will not be supporting all the proposed uses from the relevant industry associations and hope you understand that, at present, we cannot make any formal statements about future uses being covered.

Further on ISOPA, also recognizing BMS contributions, has defined its supported uses through the Use Descriptor System recommended by the updated ECHA guideline for isocyanates and polyols, and provided constructive user guidelines regarding use of the respec-

tive descriptors, which were discussed and aligned with the other above named industry organizations. We support this approach, though with a much broader scope, i.e. applying to all isocyanates and substances containing isocyanate groups and all polyols, amines or other conceivable reactants of said isocyanates and substances containing isocyanates. Since Bayer MaterialScience will not consider any descriptors listed as non-applicable in the ISOPA documents, they will not be part of our future REACH-related investigations.

At present, we are not in a position to forecast any limitations in uses that may result from risk assessments or limitations detailed by our suppliers. Having started already with the issue of the first eSDS we will be communicating such information from mid-2011 on a broader basis through eSDS so that our customers will be able to check whether their uses are covered.

### IMPRINT

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