



Polyurethanes for effective cosmetics without solvents

Silky smooth skin and hair

Hair spray, styling gel and eye cream are no longer confined to the woman's side of the bathroom cabinet; today, more and more men are using beauty products to enhance their appearance. Research scientists from Bayer MaterialScience have now developed special additives based on polyurethane to ensure that cosmetics are well tolerated, feel pleasant on the skin or hair and keep longer as well.

Looking good is hard work and requires a whole battery of products and utensils: there are hair sprays that give curls natural bounce and vitality, anti-wrinkle creams that make lines vanish miraculously and mascara that highlights the eyes and makes them look seductive. At least that is what manufacturers promise on the countless cans, tubes and tubs that fill the endless shelves in drugstores. In actual fact, the results are often less than satisfactory. Hair sprays, for example, may make your

hair strawy or sticky or may even leave white residue on your clothing.

Now all that could change, thanks to chemist Dr. Steffen Hofacker, Head of Innovation and Business Creation Cosmetics at Bayer MaterialScience, and his team. Hidden behind Hofacker's desk is a box containing some two dozen samples of powders and liquids, glass bottles and one pink can of hair spray – "all purely for professional purposes," insists the chemist with a roguish smile. His team is developing special additives

for cosmetic products based on polyurethanes, or PUs for short. Polyurethane plastics are well known materials for shoe soles, mattresses, coatings and adhesives. Now they are to be included in hair sprays, eye-shadows and creams to ensure that these really are as "long-lasting" and "natural-looking" as the advertisements promise. The PU additives increase the adhesive power of the cosmetics tremendously, which means that the color particles in mascara and foundation creams, for example, remain

Hair spray, suntan cream and co.

Whenever you use a skin cream, lipstick, hair spray or suntan cream, you assume it has been tested for safety and tolerability. In the case of cosmetic products, the safety evaluation is based on the general toxicological profile of the individual ingredients, their chemical structure, the level of skin contact and the duration of application. Since the end of 1997, cosmetic products in all EU countries have had to be labeled according to the International Nomenclature Cosmetic Ingredient (INCI) system. All substances used in the manufacturing process and present in the finished product must be listed together with their INCI nomenclature in decreasing order of concentration on the packaging or directly on the product. This information is particularly useful to allergy sufferers.



Curl test: Dr. Sophie Viala checks the results of a curl retention test. The test shows how well hair sprayed with hair spray containing the new PU molecule retains its curl in moist air.

on the eyelashes or skin and do not run or rub off on the wearer's blouse or shirt collar, even after perspiration-inducing activity.

"It is more or less impossible nowadays to make a cosmetic product without incorporating special plastics with film-forming and conditioning properties," says Hofacker. These high-molecular-weight additives prevent hair from becoming dry, for example, make it easier to comb and control static build-up. The main components in hair sprays, in addition to solvents and blowing agents, are so-called film-forming polymers such as polyacrylates and polyvinylpyrrolidones. When sprayed onto the hair, they form a kind of invisible net that holds the hair in place after drying. The plastics used up to now tend to leave the hair feeling rather sticky, however.

This is not the case with the Baycusan® PU dispersions specially developed in the synthesis laboratories at Bayer MaterialScience by Dr. Sebastian Dörr and his team. "Our ingredients leave the hair feeling neither stiff nor sticky. They hold it in place while still allowing it to move naturally," explains Hofacker. Another advantage is the fact that the PU additives contain neither solvents nor preservatives. "Our products consist entirely of polymers and water," Hofacker continues, "so they are

both environment- and skin-friendly." Despite this, they can withstand tropical humidity – an important factor when it comes to keeping an intricate hairstyle intact over a long period of time. Precisely how well they do this is determined by means of the curl retention test. "This test shows whether a curl remains tight when exposed to moist air," explains Dr. Sophie Viala, Innovation Manager at Bayer MaterialScience. "The looser the curl becomes, the poorer the curl retention."

PU mascaras with special long-lasting action

Tests with mascara have proven that film-forming polymers are equally effective in decorative cosmetics. Various mascaras were applied on a glass plate and then immersed in water. While the Baycusan®-based mascara can withstand four hours in water at 25 °C, the other products are two-thirds washed away. "By modifying the molecular structure, the properties of the film-forming PU additives can be tailored to suit the requirements of the individual product, whether it be a gentle cream or an extra-strong hair lacquer," says Hofacker. "They can be anything from elastic to rigid, waterproof to water-vapor-permeable, and they do not affect either the viscosity or the color."

Baycusan® has also already passed the necessary toxicological tests with flying colors, increasing not just the purity, safety and quality of the raw materials but also the storage stability. So far, the PU additives for the cosmetics industry are only available in sample quantities. However, the relevant production plant in Germany is already being converted so that production can start at the beginning of 2009.

So far, the feedback from test persons has been consistently positive. "The skin feels pleasantly silky and smooth," says Viala. And although Bayer MaterialScience is new to the cosmetics raw materials industry, it has very clear objectives: "We want to be the largest supplier of PU additives by 2015. This is a hotly contested sector and as newcomers we have to be assertive." In concrete terms that means focusing in particular on top-of-the-range hairstyling products for professional hairdressers and also getting a foot in the door in the decorative cosmetics and skin care sectors. As Viala says: "That's where our products have the greatest benefit."

www.bayercosmetics.com



This Internet website provides further information on this topic.