

As clean as a second skin

Proteins as additives in cleaning agents protect vehicle surfaces with a water-attracting film.

If "wrinkles" is the first thought that comes into your head when you hear the word "collagen", you are not that far off the mark. The supporting protein gives the skin elasticity and is found in all manner of products that are intended to prevent premature aging. In a recent emerging application, which was already tested in industrial applications and is now also to be used in household products, the protein does not necessarily makes things more beautiful, but it certainly makes them cleaner. It acts as an additive in cleaning agents and gives the surface dirt-repellant properties.

"The proteins adhere firmly to the substrate", declares Matthias Reihmann, Product Manager at Gelita, one of the world's largest producers of collagen. Once attached, they form an invisible and durable layer only a few microns thick. This layer is already applied e.g. in cooling lubricants for metalworking and in mold release agents in die casting. The cleaning and protective effects have been proven in practical testing, according to Reihmann— it has been shown that even permanent marker ink could be removed with just water. The collagen works just the opposite way to the lotus effect or a protective wax film, which allows the water to drip off. With this, water-soluble dirt is rinsed off, but dirt that is insoluble in water continues to adhere to the surface explains Reihmann, saying it's like taking a shower in a raincoat. "Collagen, on the other hand, is hydrophilic—in other words, it attracts water. During cleaning, soil floats on the protein layer and can be displaced from the surface by a gentle rinsing with water, while new dirt has no chance to reach the underlying surface material once the film has been established." Gelita calls this the "Novotec effect", and depending on the application, even a light shower of rain or the humidity in the air should be sufficient for the self-cleaning effect. The protein film should then also have a protective effect against new contamination from aggressive substances, such as bird droppings or tree resin and salts.

Gelita points to the environmental effect; manufacturers of cleaning products to whom the company sells the collagen as an additive under the name of Novotec CB800 can replace harsh substances in the recipe. Gelita itself does not produce any cleaning or care products. The protein itself is non-toxic and is temperature resistant up to 350°C. It does not harm the environment through harmful wastewater, and in order to achieve its effect, the addition of only a small percentage to the cleaning agent is sufficient. Fears of contamination through microbial growth are unfounded, explains Reihmann; an equilibrium moisture content is formed.

A pioneering application is the cleaning of trains. The service provider Reinwerk Solutions is the first company to use agents with such proteins and it holds a joint patent with Gelita for a cleaning agent with collagens. The customers, including several subsidiaries of the German Railways are extremely satisfied, says Managing Director Peter Becker. "The protective effect is clearly visible." The protective layer lasts several months as it breaks down gradually, and is renewed at the time of each clean. The choice of the right surfactants is evidently crucial: which ones work most harmoniously

with the proteins was determined in series of tests. Becker explains that the currently used additives stabilize the protective layer; on a pane of glass it shows how the dirt slides off. Above all, however, with the proteins a neutral cleaner with an excellent effectivity could be produced, as the pH value is below 7.5. With values of more than 12, the agents previously used for trains were strongly alkaline and the subsequent wastewater treatment was correspondingly costly. Reinwerk has calculated the saving for the German Railways subsidiary in Erfurt: Becker explains that although the agent itself is 20 to 30 percent more expensive than conventional ones, a cost saving of 57 percent is achieved. A railway company in Luxembourg switched to this technology last year, and the bacteria in their biological wastewater plant are using the proteins as food. Among the satisfied customers in Germany is Rhein-Neckar-Verkehr GmbH, which operates more than 300 buses and trains. It confirms the statements. "It was the environmental aspect that was most important," says Peter Blass, Manager of the vehicles division. "We wanted to get rid of the skulls on the canisters!" The feedback from the individual cleaning plants has been positive throughout. Cleaning takes place whenever required. The company uses up to 740 kilograms of concentrate per month, in winter more than in summer. On average, the figure is around 300 kilograms.

The possible applications of the collagens are very varied: Gelita has household and glass cleaners with a surface-protection effect in mind, and application in car washes is also conceivable. Reihmann explains that the thin film protects glass from fogging, and the addition of the collagen to the screen wash increases cleaning performance.

Whether there are also drawbacks we cannot say, but so many good properties arouse curiosity. We have therefore obtained and used a sample of the cleaner and some pure Novotec. Long-term experience is not yet available and we do not know how long the protective protein layer will last. But we can confirm that a thin and invisible layer of Novotec diluted with water reduces fogging on a mirror. We also applied the sample to the outside of a car: after cleaning, on the left side of its light-colored surface a coating with a conventional paint preservative was applied and on the right side, a coating of Novotec. A writing with a black permanent marker was left to set overnight. On the left, the ink cannot be washed off, even with a cleaner. On the right, after rinsing off, a scarcely perceptible shadow remained; it was later completely washed away by a rain shower.

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