



## **Lugafast® Colorlock Technology – Value Generation to Leather by Application of New Binding Principles for Coloration**

Dr. Stefan Meier, Harald Kiesow and Dr. Gerhard Wolf

BASF SE, 67056 Ludwigshafen, Germany

<sup>1</sup>BASF SE, 67056 Ludwigshafen, Germany, Phone: +49 621 60 92365, Fax: +49 621 60 99381, e-mail: stefan.a.meier@basf.com, harald.kiesow@basf.com, gerhard.g.wolf@basf.com

### **1. Introduction**

Leather has a long tradition of use in the shoe and garment industry. It is still the most important substrate for shoe manufacturing and an integral part of many different items of clothing.

Consumers know and appreciate leather as a material that is associated with attributes such as durability and resilience but also luxury, quality, exclusivity and elegance. However, they also know its deficiencies. Lining leather for shoes is very often bleeding out or less comfortable and garment leather is more difficult to take care of and maintain than textile fabrics.

The current paper shows how consumer related properties of leather can be significantly improved by application of Lugafast® Colorlock Technology.

### **2. Results and discussion**

Today's consumer requirements for leather articles can be focused to four items as shown in fig. 1.

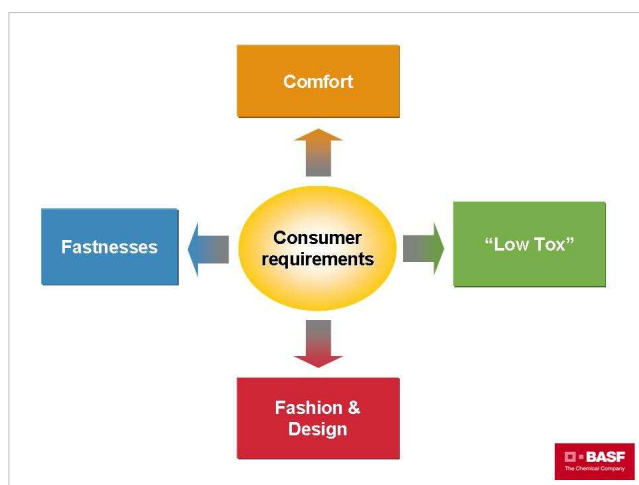


Fig. 1 Consumer requirements for leather goods

Especially fastness properties for unfinished leather are dominated by the used coloration technology. Conventional dyes for leather coloration are acid dyes which bind by means of ionic interaction. Negative charges in the dye molecules are attracted by positive countercharges in collagen created throughout protonation of amino groups e.g. by formic acid.

This type of bonding is normally strong but readily cleavable by change of pH. Under washing or perspiratory conditions the positive charges are neutralized thus mobilizing the dye molecules which are not longer fixed to the substrate. Other dye classes like direct, sulphur or basic dyes either bind by the same mechanism or they are of less importance as they used for specific effects in leather coloration only.

How can a dye molecule be fixed to collagen fibres more permanently? Immobilization or permanent fixation of colorants to substrates is in general a known technology which is e.g. applied in textile dyeing. Well known are reactive dyes, vat dyes or pigments which are fixed by different mechanisms to all types of natural or man-made fibers.

The new and patented Lugafast<sup>®</sup> Colorlock Technology was developed to improve fastness properties of dyed leather by application of reactive dyes to collagen<sup>1)</sup>.

The technology complies

- a range specific, new reactive dyes which have been designed especially for use on leather and
- an application process which allows drum dyeing of collagen fibres at a smooth alkaline pH in an aqueous float.

Textile reactive dyes either for use on cotton or polyamide/wool have been developed for less reactive fibres or application at different pH (fig. 2) which are not suitable for collagen due to its specific stability.

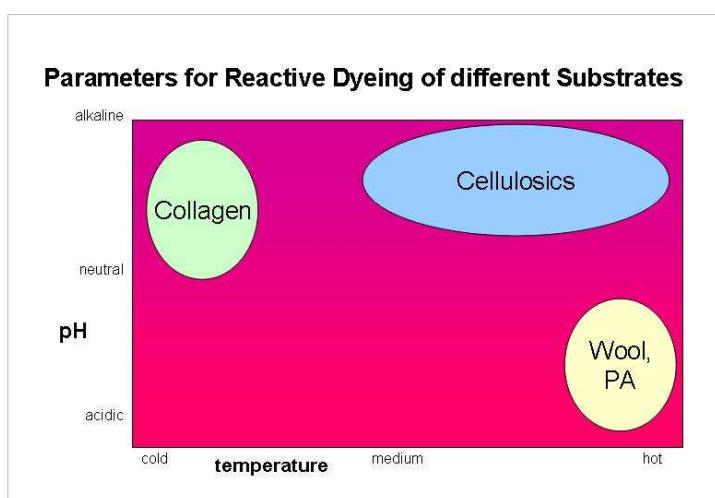


Fig. 2 Parameters for Reactive Dye Application

While polyamide and wool are dyed with reactive dyes under acidic conditions at high temperature, reactive dyes for cellulosic fibres are applied at alkaline pH at temperatures which can vary depending on the reactivity of the anchor group. As both dyeing parameters can not be applied for collagen coloration due its limited stability towards high temperature and / or high pH, a specific range and specific application process had to be developed. This new process is characterized by pH conditions and smooth temperatures as shown in fig. 2.

The new Lugafast<sup>®</sup> Colorlock Technology can be applied in existing equipment of a tannery, only pH control is necessary.

The proof of the permanent fixation of the dyes is easily accessible by appropriate fastness testing. One representative example is shown demonstrating the benefits of the technology against conventional dyeing (fig. 3).



Fig. 3 Fastness comparison

The advantages of the new technology are applicable and available for all kinds of leather, but especially for leather where leather has contact to skin or any kind of textile material and high migration fastnesses are required. Either for shoe<sup>2)</sup> or textile<sup>3)</sup> application

### 3. Conclusions

Lugafast® Colorlock Technology provides a range of reactive dyes and an application process for permanent fixation of dyes to collagen fibres. Extraordinary fastness advantages are now available for leather articles where so far any kind of migration has been observed.

Especially for leather with contact to human skin, either lining leather in shoes, glove leather or garment leather these benefits can be used to position leather in the market in a completely new, until now inaccessible segment.

Thus value generation to the whole manufacturing chain as well as to end-consumers can be provided by application of this new technology.

### 4. References

- 1) H. Kiesow, L. Somogyi, G. Wolf, *World Leather*, 10 (2006), 37-41.
- 2) G. Wolf, *Shoez*, 6 (2009), 29; *ibid.* 7 (2009) 22; *ibid.* 8 (2009) 22; *ibid.* 9 (2009) 60.
- 3) G. Wolf, S. Meier, *Melliand Newsletter*, 5 (2011); G. Wolf, S. Meier, *International Dyer*, in preparation.