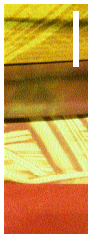
The market for antimicrobial fibres and fabrics continues to grow and more chemical companies and fibre manufacturers are attracted to the concept. The choice of active ingredient or compound is long. So is the list of regulatory bodies involved in keeping consumers protected from harm or over-zealous claims.

Coming up smelling like roses



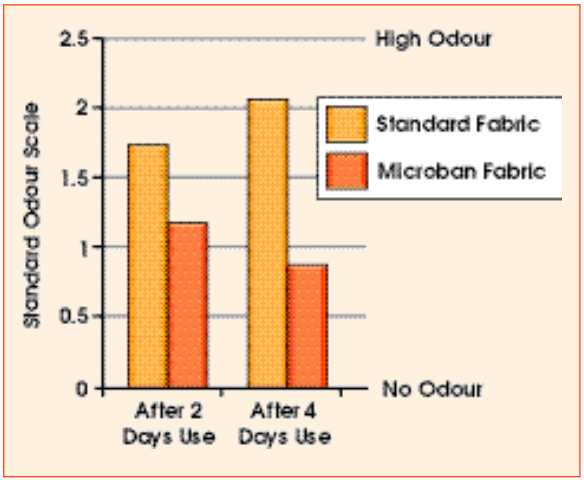
In the English language, besides roses, there's also the sweet smell of success. When it comes to the smell of perspiration, that's something else. To some, the smell of honest sweat is meant to be quite exciting but to the average person there is nothing much pleasant about the odour, especially when it's a few days old and decidedly stale.

It may have started with a desire to get rid of the smell and the bacteria which cause the problem, it may have started as a combination of trying to create textiles which were both antibacterial and antimicrobial. On a higher intellectual plane, the concept of better hygiene and the ability to keep wounds clean must be considered of merit. Some of the treatments have been around since Ancient Greece, most are decidedly new.

When such products were introduced to the broad international market, many manufacturers could immediately see the genuine benefit. At the same time, the introduction of antimicrobials attracted a great deal of government attention, especially in the United States where regulatory bodies began to stamp down on excessive claims. Analysts also began to study carefully the chemistry being offered, whether they were based on acceptable materials: heavy metals suddenly entered the world of fabrics. The companies have paid heed and make sure that the proper guidelines are followed. For instance, Microban Products is able to offer its customers the required approvals/compliance with the EPA (US Environmental Protection Agency, FDA (US Food and Drug Administration), EUSCF (EU Scientific Committee for Food) and ANZFA, the Australian and New Zealand Food Authority.

At the same time, there were other innovators who claimed that the products were flawed because they did not distinguish between 'good' bacteria and microbes and the 'bad'; others said that the body needed some 'dirt' and that sterile conditions on the skin could make people more vulnerable and unable to resist infection. It appears that this argument has also been generally resolved with the bactericides having the ability to target the right micro-organisms while others limit the proliferation of bacteria to acceptable limits. Then there are those innovators who created fibres and finishes which denied the bacteria the climate (warm, damp conditions) in which to thrive at all.

The sector continues to thrive. There are now many compounds which are used to kill bacteria or to interfere with their multiplication, including biquanides, phenols and derivatives, isothiazolones, metals, ammoniums and alcohols. Others are based on zeolite, an inorganic compound of sodium aluminosilicate used in a natural form or produced synthetically, which is combined with metals such as silver, zinc or copper. Another widely used agent is triclosan, a phenolic derivative, while chitin, a naturally occurring substance extracted from the shells of crabs and shrimps, is also claimed to have excellent antibacterial effects.



Graph showing how Microban protected fabrics stay fresher for longer.

It is now some years since their introduction, and the dust that had been stirred up within the apparel and footwear industry, as well as in other sectors such as household goods, seems to have settled - everyone still copes with the competition and more and more fibre producers have been adding the antimicrobial and antibacterial elements to their yarns. Under such intensely competitive conditions, antimicrobials could still be the key to success.

John Payne, technology applications manager at Avecia, the specialty chemical company, reviews the theme on the application of antimicrobials in sportswear. "Retailers have to be totally in tune with their target market if they want to survive. In turn, manufacturers have to be prepared to react quickly to the specifications laid down by those retailers. There is simply no room for mistakes or guesswork in today's sportswear market. The success of sports apparel retailing, especially over the past 15 years, has culminated in an almost unique industry structure. Whilst the largest retail markets are - by far - North America and Western Europe, production is heavily centred in the Far East, with three major brands dominating the world market. The number of small sports retailers has also fallen dramatically as large chains emerge: JJB Sports and Blacks Leisure Group in the UK, and Dicks, Sports Authority, US."

Changing demographics - fewer young people - coupled with increasing competition for their disposable income, particularly from the technology sector, have placed further strain on European and American markets. But, of course, the industry has found other ways to maintain sales and margins through increased technology. From the early waterproof and breathable fabrics to sportswear which can compress muscles at the crucial moment, and even 'wearable computing', high-performance textiles now constitute a significant segment of the market, and offer some of the highest profit margins.

It is not surprising that sportswear is perhaps the most obvious candidate for fabric performance enhancement. Garments and footwear have to endure rigorous conditions: heat, water, wind, sweat, salt, chemicals. Many, especially in the professional arena, are also required to maximise the natural abilities of the athlete. They have to be comfortable, yet offer protection. They need to keep bodies cool when at full stretch, but warm when cooling down.

Antimicrobials help beat the competition

It is a truism that incorporating appealing features that can differentiate their products is crucial if manufacturers and retailers are to attract consumers in today's competitive sportswear market. With the popularity of feature-enhanced products such as trainers with extra bounce facilities, and T-shirts that change colour with body heat, antimicrobials also offer consumers a desirable point of difference. They add value to garments such as socks, shorts, T-shirts and sports bras by offering better fabric performance. An antimicrobial can prolong freshness, guard against discolouration, and maintain the original quality of fibres for longer. In effect, manufacturers benefit from greater consumer satisfaction.

Changes in lifestyle help bacteria multiply

There are certain environmental and lifestyle factors that have resulted in increased levels of bacteria in textiles. Environmental concerns have led to washing at lower temperatures and with less water. Today's fashion trends favour more delicate and closer fitting clothing that is often non-machine washable, and busier lifestyles have prompted demand for high performance fabrics. Combined, these factors contribute to higher levels of bacteria and increase the likelihood of early odour development and discolouration. Applying antimicrobials to sportswear compensates for these factors by improving fabric performance and maintaining freshness and comfort for longer. Tests undertaken at EMPA in Switzerland have shown that there is a difference between treated and untreated garments, where samples have been subjected to the same wear and frequency of wash. After laundering, the untreated samples showed a reduction in bacteria, but bacteria later multiplied at an astonishing rate while the treated garments remained hygienically clean.

The market also appears to be widening: antimicrobial-treated sportswear targets a cross-spectrum of consumers ranging from those primarily concerned with fashion, through busy professionals to the more serious sports activist. The size of this potential market means that sportswear retailers and manufacturers can offer consumers genuine technical advantages without limiting themselves to small or highly specialised niches.

The treatment of the fibres and fabrics vary, as do the active agents designed to destroy the micro-organisms. The essential aspects are that the active ingredients are of low toxicity and skin friendly, but it is also the degree of permanence that must be tested. In some instances, the agents are permanently locked into the fibre structure while in others the fibres or fabrics are treated at a later stage. In these instances, washability and abrasion resistance take on increasing importance. The range of fibres which offer antimicrobial properties has broadened, too, and includes polyester, polyamide, acrylic, modacrylic, rayon, glass, acrylic, acetate, polyolefin and polynosic.

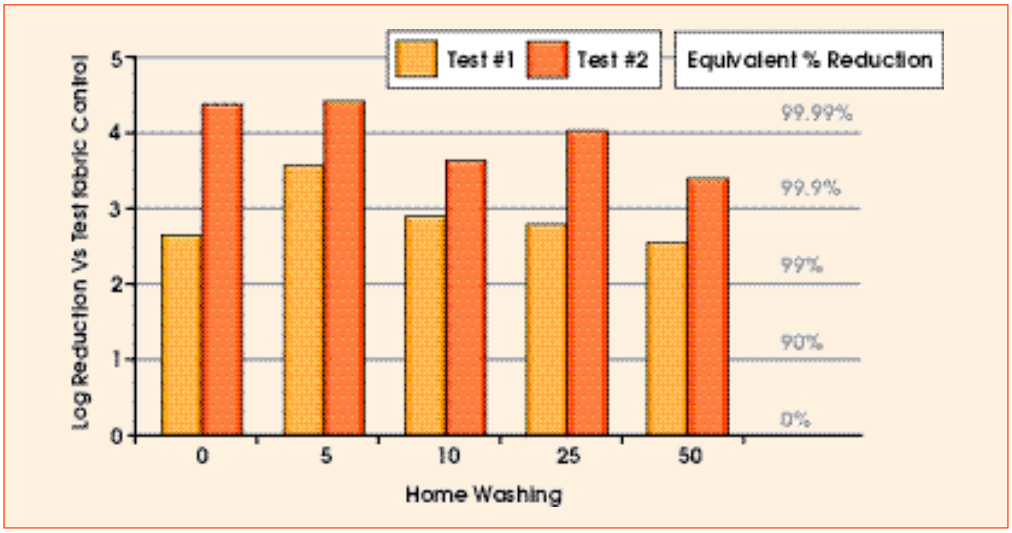


KoSa Imbue yarns deliver antimicrobial benefits into a broader cross-section of the sport and leisure market.

Sporting freshness

"Given the popularity of close-fitting garments in the sportswear market, it is useful to note that certain antimicrobial treatments bind naturally to cellulosic fibres such as cotton, or to man-made fabrics. By remaining bound to the fabric, antimicrobial agents do not affect the bacteria that occur naturally on the skin - an important consideration for those with sensitive skins and young children," says John Payne. "Avecia's research has shown that consumers are demanding more functional, performance-enhanced products, so the appeal of sportswear designed to retain freshness is clear. Close-fitting sportswear, such as sports bras, cycling shorts, wrist- and head-bands, that can easily absorb sweat, can develop unpleasant odours. These garments particularly benefit from antimicrobial treatments to maintain their freshness during and after strenuous exercise. Sport socks, trainer linings and insoles are still principal targets for the application of antimicrobial treatments."

The attraction of the market - not just sportswear - continues to draw more companies into the sector, with continuing research and development. Daiwabo and Daiwabo Rayon in Japan are now using photocatalytic titanium oxide and photocatalytic ceramics. In principle, when a fabric treated with Daiwabo's Solesh finish is exposed to ultraviolet rays, the photocatalytic titanium oxide emits active oxygen. This in turn triggers organic substances, which are the cause of ammonia or hydrogen sulfide, to oxidise. As a result of the oxidation, the organic substances which cause smell will be decomposed, removing any unpleasant odour.



Imbue antimicrobial yarn laundering test data shows how the yarn continues to provide protection against microbes even after extensive home washings.

The antibacterial treatment in the rayon is the result of kneading in photocatalytic ceramics into the rayon fibre with the photocatalysts generating a strong oxidising power. Toray, too, has followed the titanium oxide route, while Kuraray is another company with a photo-deodorant synthetic fibre made by kneading in a special metal-containing ceramic deodoriser. In a recent development, Cognis Textile Technology and Microban International have announced that they will be cooperating worldwide to offer a broad range of products and services for built-in antimicrobial protection and care in textiles.

At the Outdoor Retailer show in August 2001, KoSa introduced its Imbue antimicrobial yarn. The polyester producer is targeting the performance and fashion apparel sectors. The yarn effectively resists the development of bacterial and fungal growth, in this instance relying on an innovative silver ceramic additive embedded into the polyester yarn, in effect built-in to protect the yarn making it an inhospitable place for the micro-organisms.

In an echo of the views expressed by John Payne, David Darwin, KoSa's marketing manager says: "With the increase in active lifestyles, we feel this product has unlimited opportunities."

One opportunity crying out for attention is to be found in restaurants around the world - it is taking a long time for waiters to buy into the concept. Next time I am assailed by that awful stale odour as some server puts a plate of food in front of me I might just say something!

David Buirski