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Trends in tanning A contemporary look

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INTRODUCTION

The suntan became a fashion accessory in 1923 when style icon Coco Chanel returned bronzed from a cruise around Southern France. Prior to that, the privileged classes would avoid becoming brown at all costs, their pale skin demonstrating their wealth. This concept was turned on its head and from then on the all over tan became a status symbol, an indication that you could afford an expensive holiday abroad. It was many years before anyone would realise how harmful the sun can be.

People continued to toast themselves without any concern for their health up until the late 70's, generally the attitude towards tanning preparations being that they were cosmetic; designed to increase tanning rather than protect the skin. Although important scientific breakthroughs into sun care were made as early as the 1930's. Sources vary as to who invented the first sunscreen:

In the early 1930's Australian chemist Milton Blake experimented unsuccessfully with creating a sunburn cream. However, L'Oreal founder Eugene Schueller had success where Blake did not and is often credited for inventing the first sunscreen later in that decade. Other sources name Austrian scientist Franz Greiter, who in 1938 suffered sunburn whilst mountain climbing. The incident inspired him to formulate a product to protect the skin

from the sun which eight years later became the basis of the PIZ BUIN® range. During WWII Benjamin Greene promoted the use of Red Vet Pet (red veterinary petrolatum), as a physical blocker of ultraviolet radiation. He was interested in protecting the WWII soldiers stationed in the South Pacific. Although the product had limited effectiveness, after the war Greene continued to experiment until he created what became known as Coppertone suntan cream which was the first consumer mass-produced sunscreen product.

The problems of tanning became apparent in Australia in the 1970s when cases of skin cancer soared. It was many years before the British public became so concerned, although slowly the message filtered through. Although the general feeling in the 80's was the browner the better, at least parents were protecting their children's skin.

Today everyone is aware of the dangers of the sun, even if they choose to ignore them, and many do. Indeed, in addition to using the sunshine (a rarity in the United Kingdom) to catch a tan, a large number of people in the western world use sunbeds on a regular basis. Sunbed usage has provoked much debate as to whether it increases the risk of developing skin cancer. Frequent use of sunbeds has been found to increase melanoma risk, regardless of age when indoor tanning began. Elevated risks were observed across devices.

TYPES OF RAYS AND PROTECTION

UVC rays are the shortest solar rays (100-280 nm). These wavelengths are blocked by the ozone layer therefore it is not necessary that sunscreens protect from UVC.

UVB short-wave solar rays (280-320nm) have long been considered the "tanning ray". It is strongest in northern hemisphere summer months or when parts of the earth orbit closest to the sun. This ray only has the strength to penetrate the epidermis. UVB rays stimulate the melanocyte cells to produce more melanin which is evident as a suntan or if in a very small area as a freckle, brown or age spot, etc.

UVA long-wave solar rays (320-400nm) are broken down into two types UVAII (320-340nm) and UVAI (340-400nm). They penetrate the skin more deeply, and are responsible for wrinkling and photoaging. UVA is the same strength year round, no matter how close the sun is to the earth UVA waves can penetrate light clothing and glass and are responsible for the fading of photographs and fabrics in a sunny room.

SPF (sun protection factor): measures the length of time a product protects the skin from becoming reddened by UVB rays, compared to how long the skin takes to redden



without protection. Franz Greiter is credited with introducing the concept in 1962, and it has since become a worldwide standard for measuring the effectiveness of sunscreen.

For many years the SPF rating was the main attribute a consumer looked for when purchasing their sunscreen as the effects of UVA rays were not widely known by the general public. Boots introduced their star rating to Soltan in 1992. This method measures how effective the product is against UVA rays. Ratings are from one to five stars, the more stars the more effective.

Antioxidants are increasingly being used in sunscreens to improve efficacy and give broader marketing claims. UV radiation initiates free radical reactions. Free radicals attack healthy cells, often DNA, contributing to the speeding up of the aging process. Antioxidants reduce the effect of dangerous free radicals by binding together with these harmful molecules, decreasing their destructive power, they can also help repair damage already sustained by cells.

Physical sunscreens (inorganic) prevent the sun's rays from reaching the skin by reflecting and dispersing them. The most common physical sunscreen is titanium dioxide. Chemical sunscreens (organic) absorb ultraviolet rays, thereby preventing them from penetrating the skin. The degree of absorption depends on the particular substance used and its concentration. Some traditional sunscreens are oxybenzone, benzophenones, and paraaminobenzoic acid (PABA). These are increasingly being replaced in favour of newer more sophisticated ones which are easier to formulate with and provide superior skin feel.

CURRENT TRENDS

As we move forward into a new decade a major difference which can be noted is what is regarded as a high SPF, compared to the market of the late 90's. The below SPF guides from 1996 are taken from a Cosmetic & Toiletries Personal Care Formulary.

It is now difficult to find a sunscreen below SPF 8. A brand which does sell these are Hawaiian Tropic who still have tanning oils as part of their range, although they also sell SPF 80 Sheer Touch Clear Spray, proving that all brands have had to move with the times and offer high protection options.

Many of today sunscreens are more than just a simple cream, they often have added benefits, superior skin feels or effects.

	1996	2000
Low	SPF 2 - 8	SPF 8 - 10
Medium	SPF 8 - 15	SPF 15 - 30
High	SPF 15+	SPF 30 - 50

Once-a-day sun protection used to only be available from specialist brands, an example being Riemann's P20, a sunscreen that is

applied before going into the sun and lasts for up to 10 hours. However, some mainstream brands have caught on to how convenient this product type is. Piz Buin's One Day Long Lotion is available in several SPFs and Soltan's Once range comes in a selection of sprays and lotions in SPFs 15 and over.

Several ranges exist for sensitive skins. Hawaiian Tropic supply a Face Lotion, Skin Lotion Spray and Skin Stick. The Simple Sun Sensitive range comprises products for the face, body and lips as well as an after sun. Combinations of soothing materials like Aloe Vera and Bisabolol are seen in Suncare formulations to limit redness and irritation.

Light Feel formulations are relatively new and are now achievable thanks to modern chemical sunscreens. Ambre Solaire launched their Light & Silky range in 2009. Soltan have a Light Lotion and a Light Mist and Nivea Sun have Light Feeling Sun Lotion.

A new innovation for this year is Protect & Bronze Sun Lotion from Nivea Sun. It contains a natural plant extract which helps support the skin's own melanin production for an even and natural looking tan. Other popular added benefits are a cooling effect, added insect repellent and spray applications.

INCLUSION OF SUNSCREENS INTO OTHER SECTORS

Consumer awareness of the harmful effects of UV radiation has seen the demand for protection in every day skin care and cosmetics. This has facilitated the successful transition of sunscreens into skincare and make-up. Many of today popular brands contain UVA/UVB and antioxidant protection. Indeed some innovative new products have recently been launched with an emphasis on sun protection though they would be found on the skincare and colour cosmetic shelves:

Urban Defense Tinted Moisturizer by Urban Decay is a light moisturiser with SPF20 protection that provides coverage with light diffusing pigments.

Dr Brandt has launched a tinted variant of his UV SPF 30 Face sunscreen. As with the original it is lightweight, waterproof and protects against photoageing. In addition to this it provides a bronzed glow.

Moisturisers such as Nivea Sun DNAge SPF 30 and 50, L'Oreal Rivalift SPF 15 and Garnier Ultralift SPF 15 tone and firm the skin and reduce wrinkles whilst UV filter inclusion helps prevent the formation of new wrinkles.

THE SAFE OPTION?

Healthy or not, many of us like to be bronzed and in recent years the fake tan has become increasingly popular. Most of us believe that this is a completely non-damaging way to achieve a tan. Whilst undoubtedly a safer alternative to sunbathing, recent studies have shown their use greatly increases the formation of free radicals. Sun exposure in the first 20 minutes after application increases free radicals within the skin by 200 percent and takes four hours levels return to normal. Addition of UVA filter Diethylamino Hydroxybenzoyl Hexyl Benzoate was found to dramatically limit the number of free radicals to a level even lower than untreated skin.

Raw materials

Today's modern chemical filters allow formulators to achieve the superior skin feels required in moisturisers and foundations. In the past the way to achieve a high level of protection was to load in more product. These high levels could destabilise a formulation, or if they did work gave an unpleasant skin feel. In addition to this the irritation experienced by some sunscreen users can be blamed on high usage levels of the UV filters.

Physical blocker Titanium Dioxide was relied upon to boost SPF's but this gave the whitening effect which made sun protection products unpleasant to use. Whilst still valuable for UV protection, Titanium Dioxide, can now be used at lower levels as newer UV protectors are more efficient. Additionally nano particle sizes are now available which also prevent whitening.

Cost is a factor which influences every formulation and although superior technology can initially be more expensive, in the long run costs are reduced because today's filters are used at lower levels.

To formulate a balanced sunscreen care is needed to select UV filters that will give protection from both UVB and UVA wavelengths. During my research I noted the most common filter found on the INCI listings is Butyl Methoxydibenzoylmethane (BMBDM). BMBDM is a broadspectrum filter, meaning it absorbs in both the UVA & UVB region. In reality to give full coverage a combination is needed. Using a combination of filters gives the benefit of protection across all wavelengths and allowing the formulator to achieve high SPF levels while keeping within the maximum usage level limits set by regulations. Some filters, BMBDM included, are not themselves photostable.

Figure 1 shows several sunscreen absorbance both initial and after irradiation. Another advantage of combinations of filters is to prevent this instability. Octocrylene (Tinosorb® N 539 T) and Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine (Tinosorb® S) are highly photostable and can be effectively employed to stabilise other sunscreens, such as BMBDM.

Using Butyl Methoxydibenzoylmethane alone at its maximum of 5 percent allowed in the EU would give a SPF 10 product. Ethylhexyl Triazone (Uvinul® 150) provides a high level of UVB protection and can be used in conjunction with Diethylamino Hydroxybenzoyl Hexyl Benzoate (Uvinul® A Plus) to give broad spectrum coverage, using 5 percent of each will give a SPF of 20 with 3 star UVA protection. Addition of 5 percent Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine, another broadspectrum absorber, takes the SPF up to 30. To achieve a SPF 50 product even more UV filter is needed, in the region of 30 percent of the total formulation. A combination of 10 percent Octocrylene (Uvinul® N539T), 5 percent Ethylhexyl Salicylate, 2 percent Titanium Dioxide, 4 percent Butyl Methoxydibenzoylmethane 12 percent Methylene Bis-Benzotriazolyl Tetramethylbutylphenol (Tinosorb® M), 2 percent Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine will give the desired effect.

With such high levels of sunscreens suncare formulations can have a oily feel. To overcome this problem water soluble sunscreens such as Tinosorb® S Aqua have been formulated. These increase formulation flexibility as a smaller oil phase is needed. This results in a less oily skin feel whilst also boosting UVA/UVB

protection, due to more homogenous filter distribution. Another way to reduce greasiness is to carefully select your solubiliser. Solubilising esters are used to dissolve filters and disperse nano Titanium Dioxide and Zinc Oxide. Preventing recrystallisation on storage and agglomeration of particulates is essential, C12-15 Alkyl Benzoate (Cor-Sol TN) being the most common ester used. Emollient esters with dry skin feel should also be considered to reduce greasiness, such as Capric Caprylic Triglyceride, Isononyl Isononanoate (Pelemol® IN-2) & Hydrogenated Polyisobutene (Luvitol® Lite).

In Conclusion, despite the dangers, to many of us a tan is still something to be envied and desired. There is no such thing as a healthy tan but we can greatly reduce the dangerous effects of the sun by utilising the many clever filter systems now available. The increasing trend for multi-purpose cosmetics mean that we are ever more likely to have some form of sun protection on our faces on a daily basis, which can only be a good thing.

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14. Manufactured by Cornelius; C12-15 Alkyl Benzoate (Cor-Sol TN).
15. Manufactured by Phoenix; Capric Caprylic Triglyceride (Pelemol® CCT), Isononyl Isononanoate (Pelemol® IN-2).

