the science of beauty

Vol 8 No 6

June 2019

A S Harrison & Co

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Call for Papers

2020 Annual Conference of the Australian Society of Cosmetic Chemists

ASCC
2020 VISION
FOR A CLEAN AND SUSTAINABLE FUTURE

CROWN CONVENTION CENTRE, MELBOURNE, VICTORIA, AUSTRALIA

19th-21st May, 2020

If you are raw material supplier, finished product manufacturer, brand owner or many other related disciplines such as packaging, marketing or IP protection. The ASCC Conference is an excellent opportunity to highlight new and exciting technologies/ research, update attendees about the latest market trends or provide a hands on experience that people will be talking about well after the event. In the last few years the ASCC Conference has continued to grow and attract a diverse range of delegates all with a link to the Personal Care Industry both in Australia and Internationally. The 52nd Annual Conference looks to build on the close relationship Australia has with our Asian neighbours and by holding this event in Western Australia it represents a gateway for future Innovation and collaboration.

Persons interested in presenting papers or workshops at this Conference are invited to submit abstracts.

Conference programming requirements dictate the following timing:

- Papers should take 20 – 25 minutes to present.
- Workshops should be of 55 minutes duration. These should be of an interactive/ hands-on nature and encourage a high level of participation by attendees. There will be a set of basic lab equipment available to be used for sensory/ formulation workshops.

The abstract shall be submitted by email in the following format:

- The abstract must be typed double spaced, in English, preferably Arial font 12 point, and be between 100 and 200 words in length.
- The title must be in capital letters and include the name(s) of the author(s), with the presenting author's name underlined. If the presenter is not one of the authors, that must be clearly stated.

With your abstract, please ensure that you include the following information:

- Paper title, name of author(s), name of presenter, company or organisation
- Postal address, phone (with country and area code) and email address
- Please indicate clearly whether you are submitting a paper or workshop and for workshops indicate if there is a maximum number of attendees and any special resources required.
- Please provide as much detail as possible within your abstract as this will form part of the selection process. For workshops an understanding of the concept and how you will engage the audience is highly recommended to be included with your submission.
- Please provide a short biography of the proposed presenter and a passport size photograph.

There are four awards presented at the Conference. In brief they are:

- Lester Conrad Award – Best paper presented at the Conference
- Jack Jacobs Memorial Trophy – Best paper based on original research conducted in Australia or New Zealand
- ASCC Educational Paper – Best educational paper not fitting into the criteria of either the Lester Conrad award or the Jack Jacobs Memorial Trophy.
- Peter Strasser Memorial Award- Best Educational Workshop at the Conference.

Full guidelines and eligibility criteria for these awards can be found on the ASCC Website (www.ascc.com.au)

Abstract submissions are to be sent to the Conference Technical Organising Committee; c/- Ric Williams (ric@cosmepeutics.net.au) or the ASCC Secretary Kate Paulette (ascc@ascc.com.au)

Call for Papers/ Abstracts will close on 30th November2019
All accepted submissions will be notified by 15th January 2020
Full papers and presentations must be submitted by 31st March 2020

We look forward to seeing you in 2020.

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meet the team...

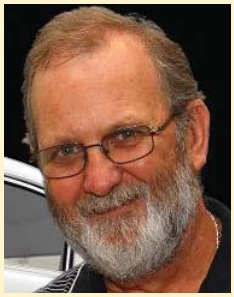
WENDY FREE has degrees in Science (B.Sc) and Technology Management (M.Tech Mngt) and is a member of a number of industry associations including Australian Society of Microbiologists, Royal Australian Chemical Institute, Association of Therapeutic Goods Consultants and is a Fellow of the Australian Organisation for Quality. With more than 25 years industry experience, Wendy's current roles include APVMA GMP auditioning, contributing to the Cochrane Collaboration and on a day to day basis, Scientific Director Quality Matters Safety Matters Pty Ltd (QMSM) that has over the last decade Wendy has provided expertise to over 400 Australian and International businesses. She specialises in regulatory compliance, commercialisation, troubleshooting and GMP systems, and considers cosmetics amongst the most challenging and enjoyable part of her work.

JULIAN JONES, the founder and Managing Director of ikonsulting Pty/Ltd, is Passionate about the Personal Care Industry in Australia and Globally.
Julian has been an active member of the ASCC for over thirty years. During this time he has served as President and Chairman of the Victorian Chapter of the ASCC. He is widely known and well respected both nationally and internationally for his knowledge and skills in developing and marketing the best Personal Care Products.

JOHN STATON has a background of over 40 years experience in the pharmaceutical and healthcare industries. John is a life member of the ASCC and serves in a number of industry representative roles with ASMI, ACCORD, TGA and Standards. He is the Australian representative to the ISO Committee on Sunscreen Testing-TC 217. (The committee for development of sunscreen standards). John is also in demand as a speaker on the International Conference Circuit.

TONI OVENELL is a formulation chemist and consultant for Queensland Cosmetic Formulators. She has worked in the cosmetic industry for many years in a range of roles covering areas of technical sales, quality, supply chain, manufacturing and product development. Most recently Toni has worked for a small contract manufacturer as technical manager, prior to setting up her own business. Toni is passionate about sharing her knowledge, maintaining a viable cosmetic industry in Australia and helping people bring their product ideas to market. She also likes champagne and hockey.

PAM JONES has worked in the Personal, Homecare and Pharmaceutical markets for more than 30 years. She has been working out of Asia since 1996 and is well versed and connected with the Asia Market.
Her experience covers technical, sales, marketing, management and training roles. She has qualifications in Chemistry, Marketing and Management. Her company PCA Consulting is well known for its training programmes. Pam has worked with and consulted to companies such as ICI, Croda, Ashland, Huntsman, Reed Exhibitions (in Cosmetics) and Connell to name a few. She is currently serving on the ASCC Technical Committee and volunteers as Technical Editor for this magazine.



RIC WILLIAMS was educated in Sydney obtaining his Bachelor of Science in Pure and Applied Chemistry from the University of New South Wales (1980) and a Diploma of Environmental Studies from Macquarie University in 1983.
Ric has had 40 years experience in the industry working for many companies and operating his own consultancy business for many years.
He has presented many lectures and workshops at national conferences for the Australian Society of Cosmetic Chemists (ASCC), the Association of Professional Aestheticians of Australia (APAA), Cosmetic and Pharmaceutical Special Interest Group (CAPSIG) and also beauty colleges nation wide.

JEN SEMPLE is Innovation & Education Manager at Accord Australasia, the peak national body for formulated chemical products. She is passionate about communicating the benefits of our industry's products to wider society and has authored a number of public education websites such as furphies.org.au, sunsible.org.au and hygieneforhealth.org.au. Jen also manages Accord's sustainability initiatives and seeks opportunities to build relationships between industry and academia. She has a PhD in Chemistry and Graduate Diploma in Education, and is a member of the Royal Australian Chemical Institute.

STEVE WELSH is a cosmetic packaging specialist with over 20 years experience across all mediums of packaging. As the director of Weltrade Packaging, Steve leads a team of designers, technicians, printers and supply chain professionals. To ensure the best exposure of your beauty, skincare or cosmetics brand. Steve's philosophy is to design your packaging correctly, right from the start, so you can elevate your brand and move more product. Steve works closely with leaders in the cosmetic industry to ensure that your packaging consistently stands out on the shelves within this highly competitive market.

GINT SILINS is a registered patent and trade marks attorney, and a principal of Spruson & Ferguson Patent & Trade Mark Attorneys (incorporating Cullens). He holds a Bachelor of Science degree in chemistry with honours in biochemistry, and a Doctor of Philosophy degree in biochemistry. Gint specialises in protecting branding and innovations largely in the health care, personal care, animal health, food and beverage, biotechnology, industrial chemical, clean energy and agricultural sectors. His practice includes: conducting brand and innovation availability and registrability searches; IP audits; registering patents, trade marks and designs worldwide; enforcing intellectual property rights; resolving IP disputes; and, providing infringement and validity advice.

MARG SMITH is the owner of Syndet Works – an Australian company established in 1984 to formulate and produce soap free skincare bars. Syndet has developed an enviable reputation for custom formulated and manufactured skincare that now extend well beyond the origins of the business.

EMANUELA ELIA is the Director of Ozderm, which specialises in *in vivo* testing and clinical trials for cosmetic and personal care products. Emanuela Elia has a law degree from Rome and a Master of International Business from the University of Sydney. She had collaborated with Australia's longest serving Contract Research Organisation Datapharm for a few years before setting up a cosmetic and personal care products testing facility in 2009. Emanuela is enthusiastic about improving the quality of cosmetic and personal care products' research in Australia through science.

JAMES GILLARD is the Principal of Insurance Made Easy whose services include – business insurance, travel insurance and financial services. Insurance Made Easy has a client list of over 2000 businesses from all industries. The relevant major insurance schemes are – Hair and Beauty, Pharmaceutical Companies and Natural Therapists.

TINA ASPRES has worked as a Pharmacist for almost 20 years in retail, industry and academia as well as being a Cosmetic Chemist. Currently she works in industry and has vast experience in both the pharmaceutical and healthcare arenas. In addition to this she is a casual academic at UTS, School of Health, (Faculty of Pharmacy in Pharmaceutics). Tina has a great interest in clinical research in dermatology and the treatment of skin disease and conditions and is Clinical Trial Coordinator at South West Sydney Dermatology. She is a keen researcher in transdermal drug delivery systems. Tina is a Member of the Pharmaceutical Society of Australia and a Member of the Australian Society of Cosmetic Chemists. She regularly consults pharmaceutical companies in the area of acne, eczema and skincare especially in the area of cosmeceuticals and has devised and written numerous support, training and education material for companies aimed at both professionals and consumers. Tina consults for the Eczema Association Australasia and is on their Integrity Assessment Panel and has worked with Choice Magazine on numerous reports. Tina has presented at the Annual Scientific Meeting of the Australasian College of Dermatologists and has published within the pharmacy and medical literature in the area of sun protection, Vitamin D, skin cancer prevention and eczema as well as co-authoring the book 'All About Kids' Skin – The Essential Guide' published by ABC Books

is less actually more

by Julian Jones

During my 35 years (plus) in the Cosmetics and Beauty industries, I have seen lots of trends come and go. Some become mainstream but many more rise and then fall very rapidly.

When it comes to "Beauty Regimens", the early years were restricted by availability of ingredients, packaging and routes to market – resulting in a fairly small number of product options for consumers. This was seen, rightly or wrongly, as limited choice for consumers as they weren't able to purchase exactly what they wanted.

Fast-forward to around 2015, and we saw the Cosmetics/Beauty industries explode with choices. Thousands of brands, offering hundreds of thousands of products addressing every possible consumer want or need. This explosion undoubtedly increased the number of options available to the consumer, but it also served to increase confusion and buyer fatigue as they tried a never-ending stream of new products.

Brands grew, believing that offering multiple product choices gave them more credibility in consumers' eyes. Consumers perceived that only "serious" brands could offer a huge number of products within their range. In addition, the conventional retail distribution model demanded brands control as much shelf space as possible. This was (is) a strategy to maximise the brands' market share by grabbing consumer's attention for longer when they were in store shopping.

As with many other industries, the Internet came along to disrupt the retail model. As online shopping took hold, the drivers for consumer buying decisions began to change. Suddenly, consumers could research and compare a vast range of choices before making a final buying decision. Whilst it is still certainly true that the bulk of Cosmetic Skin Care products are purchased via a retail store, much of the process of deciding to buy occurs before the customer enters the store.

In contrast, what I have been seeing for a while now is a trend of consumers wanting to simplify their beauty regimen. They are really focussed on getting great results without having to plough through a 10 step (or more) process at least once a day.

The declutter/simplify trend has taken hold in people's homes, businesses and lifestyles. The minimalist approach is impacting on the time the consumer commits to applying cosmetics, be they colour cosmetics or skincare products. Consumers are looking for quicker, more efficient way to apply products that offer multi-functional benefits. Whereas, previously the buyer would consider using an oil cleanser, then a foam or cream cleanser, then a toner, then an essence, then an emulsion, then a serum, a sheet mask, eye cream, moisturiser and finally a sunscreen and that was before they even moved into colour cosmetics routines. An increasing number of consumers won't commit the time and expense to such a complicated routine.

The good news for those brands that are choosing to embrace this growing simplification trend is that there have never been more multifunctional active ingredients that can deliver key consumer benefits in a smaller spread of end- products. Examples of this include: moisturisation combined with exfoliation; pigment control with improved collagen appearance; there are many ways to deliver excellent consumer experiences from a much reduced brand range. In some cases as few as six skincare products can deliver almost everything a consumer is looking to achieve through their beauty regimen.

There is also the opportunity for brand owners to allocate a higher budget for these formulae, allowing better functionality. If consumers reduce the number of different products they buy, their spending budget can be applied to a smaller number of higher priced products.

In my opinion, this declutter, simplify trend is going to continue and increase globally and is actually a great opportunity for existing brands, and new start-ups to embrace.

So the answer is… Yes – Less is More!

Till next time,

Julian

Seal it to Sell it

by Steve Welsh

With Amazon entering the online retail market in Australia, a number of beauty brands are pushing to get their products listed on their platform.

One of the key requirements that Amazon require, is that the packaging must be tamper evident.

Aside from consumers knowing if the product has been tampered with, it ensures the seal is intact until it reaches their home.

Recently at WeltradePackaging.com.au we produced a video on the various tamper evident options that are available for your product. This is to ensure you can comply with various rules and regulations, as well as to make your consumers feel safe in the knowledge that someone has not contaminated your creams or lotions with something foreign.

In this article we will cover four great options that can seal any type of packaging.

Break off Tamper Band Caps

These have been around for years and have been widely used within the food and pharmaceutical industry. The caps are screwed on with a detachable band locking onto the neck of the container. The consumer either turns the cap to break the band away from the body of the cap or pulls a tab to tear the band away (think food cream bottles). Both of these alternatives will show if the package has been opened previously.

For beauty this application works but most cap options are not so cosmetic in appearance.

Bottles and jars require the neck to be made specifically to work with these caps, so while there is a lot of options for food and medicinal products there isn't much that fits brand managers brief to show off their products in a way that the consumer will find attractive.

Pressure Sensitive Wad

An easy wad/gasket application that keeps the product fresh until removed and can be put into almost any cap. The wad has an adhesive that sticks to the neck of the bottle or jar and does not require any special equipment to apply. These wads are usually printed "sealed for your protection", the consumer peels away and can use the product as they

normally would.

These are great for dry product applications such as powder style products. The downside is that even though many brands use these in liquid applications the wad adhesive is not designed for liquids and liquids can dissolve the adhesive stopping it from working as a tamper evident solution.

Induction Seal or Foil seal

A tamper evident seal that is commonly used is a foil induction seal. These work for both liquids and dry products. It uses a foil membrane that when used with an induction foiling machine seals the foil to the surface of the bottle, the jar or tube.

The consumer simply peels back the seal and uses your product. It is a great solution that works with many closures, however you do need an induction sealing machine (although these come in automatic and semi-automatic options for a reasonable investment.) Also check with your packaging professional that the correct foil is being used for the bottle material, glass, or plastic type to ensure there is good adhesion and make sure that the cap does not have a wedge seal that can cut the foil membrane.

Shrink wrap

A visible shrink wrap is also widely used as an option for viable tamper evident and in cases where there is a spray or pump involved meaning a dip tube is in the neck of the container. The shrink sleeve is applied over the package or as much of the package that needs to be shown that it has not been tampered with and then the consumer breaks and peels away.

This can allow for printed decoration, i.e branding, but even clear options are reasonable primary or secondary tamper evident packaging options.

The only downside is that this is an extra step for the filler and potentially an additional cost.

Finally, if the equipment options are limited to apply the seals or your fillers do not want to apply the seals for you, then you could invest in a small additional label to show that the item is secure.

Whatever the option or the package design you would like for your skincare or beauty product don't hesitate to contact us to discuss, our team is experienced in all the options and we look forward to working with you to resolve your packaging needs.

We look forward to discussing you packaging today.

optimising skincare in the treatment of acne vulgaris

by Tina Aspres

Acne vulgaris is the most common dermatological condition that affects approximately 80% of the population aged 11-30 years of age at some time in their lives, with peak incidence seen in 14-17 years in females and 16-19 years in males. Acne is typically seen with the onset of puberty and can persist from a few months to years. Lesions usually occur where there is a concentration of sebaceous glands – on the forehead, nose and chin, jawline (in adult female acne), neck, chest, back and back of shoulders. Severity can be simply classified as mild, moderate or severe – according to its clinical features. The condition can have a significant psychosocial impact on individuals, affecting quality of life and it is often associated with low confidence, low self-esteem, depression and anxiety. Acne is, however, a treatable condition and approximately 60% of sufferers seek some sort of therapy. Treatment and management of acne should not only involve patient education about the condition and selection and use of appropriate therapeutic agents. Of paramount importance in maximising the therapeutic outcome, aiding compliance and reducing inflammation and the risk of scarring is the implementation of an appropriate skin care regime.

There are four main causes for acne:

Follicular hyperkeratinisation (clogged pores)

This is the key element in the pathogenesis of acne. Skin is constantly being shed, but at times the cells within the follicle become cohesive and do not shed normally onto the skin's surface. This causes the pore (sebaceous duct) to become clogged leading to the formation of small non-inflammatory lesions called a microcomedones (whiteheads and blackheads).

Sebum hypersecretion

Epidermal surface lipids contribute to normal skin functions – the barrier function and the maintenance of healthy skin. In acne patients, there is an increase in sebum production (pubertal surge), causing an alteration to the lipid composition of the skin (sufferers often have a deficiency of linoleic acid) and impaired skin barrier function. In addition, high sebum production leads to the accumulation of free fatty acids (in particular palmitic, palitoleic and oleic acid) which can irritate the skin pore and initiate further hyperkeratinisation and comedone formation.

Bacterial hypercolonisation

P. acnes is an anaerobic bacterium and lives on the skin, but when it meets a favourable dermatophysiological terrain inside a clogged pore, it can proliferate and grows out of control leading to the formation of papules (small red bumps) and pustules (small red bumps with

pustular head)

Inflammation

The presence of papules and pustules releases pro-inflammatory cytokines leading to inflammation (oedema, erythema) which when progressive, leads to cyst and nodule formation and associated scarring

There are multiple solutions in the approach to acne medical treatment but the overall goal is to target all four causes of acne and to implement a skin care routine that will help control the acne, reduce flares, prevent scarring and not irritate or dehydrate the skin. The age of the patient and gender as well as the environmental & climatic conditions, skin type & any other existing skin condition such as eczema or rosacea should also be considered and will make a difference to the skin care regime advised.

The medical treatment targeting the above four causes of acne (beyond the scope of this article) will achieve maximal success if combined with a simple easy to follow skin care regime to cleanse, moisturise and protect the skin.

Cleansing

Contrary to popular belief, acne is not caused by poor skin hygiene. Acne sufferers who believe this myth tend to over-wash their skin – perpetuating the problem. It is important to choose the most appropriate cleanser for the particular skin type and body area that is being treated. Cleansers should rinse well off the skin and the skin should not feel tight after use. Cleansers help in the removal of dead skin cells, sweat and skin products from the skin. Recommendations should be for gentle, low irritant, soap-free, alcohol and abrasive free products with a pH around 5.5. Cleansers with BHA's and AHA's may be of benefit to those with oily skin as they help prevent build up in the follicular plug but may be problematic to those with dry, irritated or sensitive skin (particularly with a history of atopic eczema) or anyone using benzoyl peroxide or topical retinoids. Cleansing should be limited to a maximum of twice per day. Any topical treatment that follows should be applied to clean, dry skin.

Moisturisation – skin barrier function repair

Many topical treatments such as benzoyl peroxide, retinoids, AHA's and BHA's may aggravate the epidermal barrier causing skin dryness. Regular use of a topical lightweight, 'non-comedogenic', oil free moisturisers may be beneficial in helping alleviate skin irritation, reducing TEWL and restoring skin hydration. Moisturisers only need to be applied when necessary and where they are required. Products containing isopropyl esters (eg isopropyl myristate, isopropyl isostearate), acetylated lanolin or oleic acid are comedogenic and may block pores, causing formation of comedones. Natural oils can sometimes be the worst offenders also, so cocoa butter and coconut oil/butter are best avoided as these are comedogenic. There are lists available of comedigenic ingredients so pore clogging potential of ingredients can be checked. Some creamy cleansers will provide the additional benefit of skin moisturisation, so the use of an additional moisturiser may not be required by all sufferers. Moisturiser should not be applied under benzoyl peroxide as it will prevent the treatment from penetrating the pore where it is required to work.

Sun Protection

Although some people believe sunlight may help improve acne, some medication prescribed to treat acne may make the skin photo-sensitive. This includes topical benzoyl peroxide, retinoids – both topical and oral (isotretinoin), systemic antibiotics such as tetracycline, doxycycline, minocycline, the use of AHA's and BHA's in topical preparations as well as skin peel treatments.
Sun avoidance and adhering to sun protective measures will help minimise irritation as well as post-inflammatory hyperpigmentation. Broad-spectrum sunscreens with a minimum SPF 30 are recommended to be used by all acne sufferers of all skin types. Formulations should be preferably lotion based.

Cosmetics

Cosmetic products should be limited in their use and should be oil-free, non-comedogenic or acnegenic. Heavy creams and thick foundations are best avoided. Loose or pressed powder mineral makeup is recommended but may be aesthetically problematic when applied to dry, scaly areas of skin. Light mineral liquid foundations may be an alternative – but one should check any ingredient list to ensure there are no pore clogging ingredients. All makeup should be removed at night.

Optimal management of acne involves an appropriate skin care regimen to complement any pharmacological treatment and should be encouraged as a regular, lifelong practice to help control flares and maintain skin at its optimal state. Appropriate advice in choosing the correct cleanser to remove daily skin products, debris and pollution, the correct moisturiser to help retain moisture in the skin and maintain barrier function and advice on correct photoprotection to prevent solar damage, photosensitivity from concurrent acne medication and to avoid post-inflammatory hyperpigmentation will enhance treatment outcomes, patient compliance and help improve the quality of life in acne patients.

assessing exfoliation and skin renewal

by Emanuela Elia

During the 1970's and 1980's, several dermatological studies were conducted to evaluate and compare human skin cell turnover rate in healthy skin on different body regions, as well as examining skin turnover rate in subjects of different age groups. Assessment methods varied from the direct measurement of corneocytes released using specially constructed chambers, to skin staining techniques for visual assessment using different chemicals. In 1973, a study from Jensen et al. introduced the use of a fluorescent dye (dansyl chloride) that – unlike other dyes used in the past – did not cause skin irritation. The method is based on the ability of dansyl chloride to adhere to cells in the superficial layers of epidermis and fluoresce under UV light.

Application in Cosmetics Research

The "Dansyl Chloride Technique" has subsequently been adopted in cosmetics research to assess the efficacy of different skin care products in accelerating the normal skin renewal process. Skin cell renewal, more specifically the rate at which cells renew, is considered one of the major factors in measuring skin 'anti-ageing'. Exfoliating agents are frequently used in many skin care products from 'wash off' (e.g. cleansers) as well as 'leave on' products (e.g. creams and serums). They are intended to improve the skin condition by accelerating the desquamation rate and inducing a faster stratum corneum turnover time (SCTT). By removing dead cells, and smoothen the superficial surface, they facilitate the skin renewal process to generate a smoother and softer new skin layer. Exfoliating properties can be attributed to 'chemical' peeling agents, such as glycolic acid, lactic acid, salicylic acid, etc., and 'physical' exfoliating particles, mainly found in cleansing products.

Refining the study design

In 1988 a study from Ridge et al. further added some important findings to the previous studies using the Dansyl Chloride Technique. They showed that in order to use the cell renewal methods to demonstrate changes in SCTT upon use of topical treatments, the skin must be pre-treated with the study products to establish full epidermal equilibrium at the changed mitotic state before skin staining with dansyl chloride. Therefore, treatment with test product should commence 2 weeks prior to and continued after staining with dansyl chloride. Ridge et al. also concluded that meaningful claims for the effects on skin cell renewal of certain ingredients or finished products should only be made after comparison with a placebo (e.g. base cream started at the same time as the test product) rather than on the basis of comparison with untreated skin only.

Case Study

In one of our recent studies investigating SCTT following use of topical treatment containing exfoliating agents, study participants were instructed to apply the test product on a specific area of the forearm and a reference product on a similar area on the opposite arm for a period of 2 weeks. Patches containing 5% dansyl chloride were then

applied to the forearm skin surface on the area treated with the test product, the area treated with the placebo and an untreated area. Once the patches had been removed, standardised digital photographs were taken under UV light. The photographs were repeated at specific time intervals, and image analysis software was used to quantify the change (i.e. progressive disappearance) in fluorescence intensity, representing the renewal of skin cell layers.

Efficacy claims

For many years skin renewal has been regarded an important outcome for skin care products focusing on anti-ageing effects. In the cosmetic industry, acceleration of the natural skin renewal process in human has been associated with smoother, softer skin and reduction in the appearance of fine lines and wrinkles. The fluorescence staining technique using dansyl chloride, followed by image analysis of digital photos at set intervals, can be considered a suitable method to assess the efficacy of topical cosmetic products in speeding up turnover rate of the stratum corneum.

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where do you get your supply??

by Toni Ovenell

As a contract manufacturer it is always a difficult task to order raw materials in the quantities you require them. In an ideal world our batch sizes would allow us to purchase full pack sizes from authorised agents in our country of choice. The lead times for the raw materials would be minimal and we would use the whole pack so would have no excess inventory.

In an ideal world, everyone would be able to go straight to the manufacture of 5000 units per run and every product would be a success, leading to reorders and no wasted stock.

But alas, this is not an ideal world and many start ups have limited cash flow and want to launch with smaller batch sizes. Also, with the myriad of brands and new products on our shelves, not every brand or product launch will be a success. How do we find the balance between innovation and cash flow?

Fear not, in this age of technology and online business we are now offered a range of choices for raw material supply in smaller volumes. This choice can allow manufacturers and brand owners to test the waters with new products without having to invest in excess stock.

It is still important to ensure that you are getting good quality materials and you should always ask for technical data such as certificates of analysis with your purchase, but these online retailers allow you to purchase raw materials in smaller quantities than ever before. Keep in mind that you will pay a premium for the repacked raw materials. The aim is to build a brand that allows you to eventually purchase full pack sizes.

The below list in not exhaustive but a selection of sites I have used over the years and a short description of their offerings.

Australian Online Cosmtic Raw Material Retailers

New Directions
https://www.newdirections.com.au

A one stop shop that supplies essential oils, carrier oils and other raw materials. New Directions are constantly adding to their range and carry so new emulsifiers and actives not found on more basic online stores. They also sell basic packaging.

Sydney Essential Oil Company
http://www.seoc.com.au/

Specialising in organic extracts, high quality essential oils and natural raw materials.

Aussie Soap Supplies
https://www.aussiesoapsupplies.com.au/

Focussing on raw materials for soap manufacturing but also supply natural raw materials

Aromatic Ingredients
https://aromaticingredients.com.au/

Raw material supplier who also repack and sell online. Specialising in carrier oils, essential oils, extracts and fragrances but also supply limited natural raw materials

Trulux
https://trulux.com.au/

A premium contract manufacture, this company offers online sales of the raw materials it uses in manufacture. Offerings include high end skincare actives as well as emulsifiers, surfactants and other cosmetic raw materials.

Australian Wholesale Oils
https://www.awo.com.au/
This company supplies a range of high quality essential oils, carriers oils, organic oils and natural raw materials in a range of pack sizes.

Escentials of Australia
https://www.escentialsofaustralia.com/
A small repacker in Queensland suppling a range of essential oils, cosmetic oils and cosmetic ingredients.

Auroma
https://www.auroma.com.au/catalogue/
This company has an extensive range of essential oils, vegetable carrier oils, aromatherapy blends and fragrances, and natural raw materials for cosmetics.

Ahimsa Oils
https://www.ahimsaoils.com.au/
Specialists in the supply of quality essential oils.

N-Essentials
https://www.n-essentials.com.au
Specialise in the wholesaling of essential oils and carrier oils in Australia.

Overseas Online Cosmetic Ingredient Retailers

If you can't find what you are looking for there are other options overseas. You may have to pay more to ship to Australia but there can be savings in cash flow and lead times.

Making Cosmetics
https://www.makingcosmetics.com/
This US company supplies a range of raw materials including emollients, emulsifiers, actives and extracts.

The Herbarie
https://www.theherbarie.com/
Wholesale supplier of ingredients for the cosmetic and toiletries industry. Raw materials include botanical extracts, emulsifiers, emollients and other natural ingredients.

Bulk Actives
https://www.bulkactives.com/
Supplier of skin actives, cosmeceutical actives and skincare ingredients for some higher cost ingredients.

Formulator Sample Shop
https://www.formulatorsampleshop.com/
Supplier of specialty ingredients for the personal care industry.

Ali Baba
https://www.alibaba.com/
If you are unable to find what you are looking for a the above sights then Ali Baba may give an option to contact some manufacturers of specialty ingredients directly from Asia.

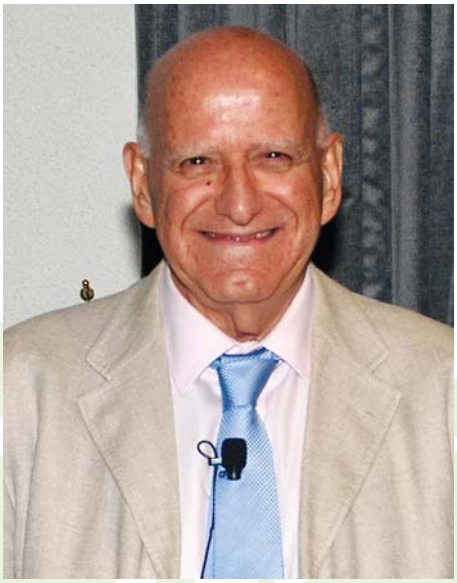
The above list is only a small sample of the online raw material sellers. Access to global supply in this age of technology is unlimited and most of these companies will ship worldwide. It is your job, as a manufacturer and formulator to ensure that ingredients meet local regulations and are the right quality to use in your formulations.

Do your homework, test ingredients in your formulations and these new online sources for raw material supply may offer you solutions for getting your products to market.

Conference round up

by Michelle Kane

Richard Walley Guest Speaker



Above: Alain Khaiat International Guest Speaker

Left: Dr Tamim Darwish receiving the Jack Jacobs Award from Jenny Brown

Below: Best Stand Award Winners, Avenir

Robert McPherson presenting the Lester Conrad Award to Alicia Roso, Seppic

Michele Kane presenting the ASCC Educational Award to Robert McPherson

It was with the greatest of pleasures and a little slice of honour I must admit, that on behalf of the organising committee I was able to extend a very warm West Australian welcome all who attended the 51st ASCC conference.

It was of course the first to ever be held on the West Coast, something that only a couple of years ago seemed unlikely. Whilst many of you fly all over the world, the comment that Perth was just too far away for a conference, that people wouldn't come, was often heard when the initial idea of coming West was discussed.

But guess what, we smashed it! – with more people coming from all corners East and West, from around the globe to take part and come and say G'day to WA.

I do believe it was a brave decision and did feel some pressure to make sure we got the numbers, to make sure this was successful. The numbers did start strong, but the traction in the final days and even hours was amazing. It felt surreal at times and we ended achieving a modern day era record attendance of 364 participants.

I think we have more than proved that the ASCC as an organisation is truly national.

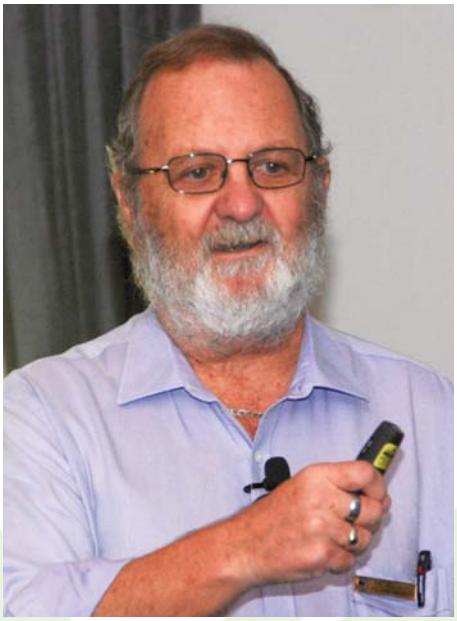
On top of that record number we also had 93 registrations from people who had never attended a conference before, and I'm particularly proud as chair of that statistic.

Our premium sponsors this year have contributed immensely to the success of this event, and their value should not go unrecognised.

Our Gold sponsor was Brenntag. With Silver sponsors Merck & Avenir Ingredients and Bronze sponsors Sensient represented by Chem Supply, Trapeze and Concept Chemicals.

I also hope that those from the East and around the world, enjoyed the

Above: Barry Hunt and Matthew Martens catching up



Ric Williams was awarded Life Membership for his service to the ASCC

Michelle Kane chairman of the Conference Organising Committee

John Staton giving his presentation

Helen Pearce giving her presentation

Below: Winner Best Stand Award, Avenir

sea change, the traditional cultural experiences with Richard Walley (OMA), world Renowned speakers such as Alain Khaiat, the educative and informative presentations, the creative workshops and the unique social functions we organised. It's hard to go past welcome drinks in a brewery, a sensory experience with Richard Walley and a 'dressed up' lock down in a heritage listed prison.

Exhibition stands sold out, all social functions sold out, every presentation and workshop was busy with people.

Of course, all of this happening required a team of volunteers to work on the organising committee. Due to the location, this committee probably had more first timers on it than usual, including some people who had never attended a conference before, let alone help organise one.

So thank you to Aaron Lorch, Bev Romero, Chelsea Caudwell, Danny Hettiarachichi , Erika Reeves, Helen Pearce, Iman Irhimeh, Jeremy Peters, Kyle Bain, Matthew Martins, Ric Williams, Robert McPherson and our 'unofficial committee member' Kate Paulett, all of whose assistance was tremendously helpful and patience for the newbie chair much appreciated.

This committee proved to be a good mix of experience and energy, of inclusion and learning, of developing for the future. And that is I'm sure part of what the ASCC is about more broadly.

As we head onto 2020, with a new team and a new conference, a final

Thank you all for all that the "Beauty of Opportunity" that "East meets West" provided.

My final act as Chair in Fremantle was to appoint all attendees honouree "Sandgropers". I hope that is a badge you all remember fondly when we all look back in years to come.

everybody needs a hero

When the night is dark, and everything has fallen apart, we look to the sky for a hero to swoop in and save the day. We love the idea of a lone individual, hidden in plain sight, that appears when the odds are stacked against us. This also sounds like the search for a hero ingredient to save our products, doesn't it?

We expect a mysterious new active or botanical trend to appear and do the heavy lifting for the remainder of the ingredients in our bottle. We ignore the bulk of what's inside our product already in our search for this hero. Why would we look to a surfactant, emulsifier or emollient to save the day, when a peptide or stem cell sounds much better? A man from Krypton makes for a better Hollywood blockbuster than the next-door neighbour.

However, product development, much like life, doesn't work this way.

I present the case that the hero of product development is not the label claim; it is the ingredient that makes the consumer want to buy your product again and again, it is the ingredient that gives the bulk of their experience. Picture an activated charcoal face wash that doesn't foam, or a coffee scrub that's lumpy and clumped together. The first purchase can be attributed to the label claims, I agree, but if the product doesn't perform to expectation, the hero has failed. Consumers will blame their experience on the label claim, wrongfully so, and continue the search for a new hero. However, if the bulk of the product offered an amazing experience, they will also incorrectly attribute this to the hero ingredient – but they'll buy it again. "Activated charcoal is great for my skin! I love it!"

Add to this the amount of times I have seen a wash product with a list of villains that it doesn't contain on the label. This still doesn't offer the consumer a great in-use experience, it merely purports that it's safe enough to purchase for the first time.

So, what are we overlooking? The bulk of our product. A great emulsifier can add luxury to the first touch of moisturiser to our skin, and unique emollients can continue that journey for our consumers. Likewise, dense, rich foam in a sulphate-free wash product will make them feel just as special.

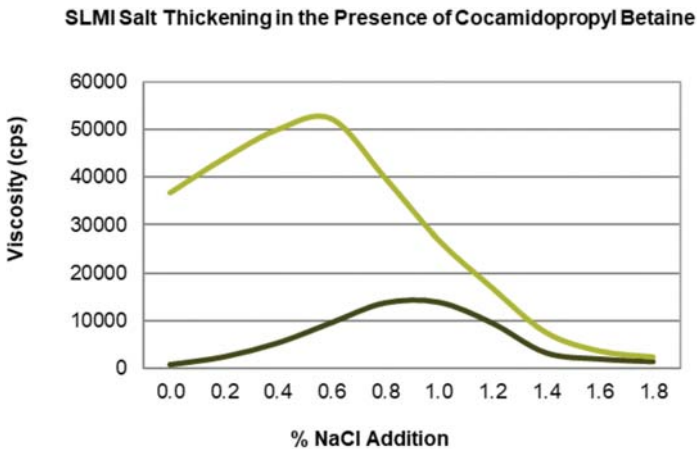
Enter: Iselux®

The first stage of in-use experience for the consumer, with respect to foaming products, is product rheology. Yet they have no idea that they're assessing this until they experience something unpleasant. Is it too watery? Is it too gummy? Or does it sit in the palm of their hand, exactly in a manner they believe a shampoo should?

The difficulty in formulating a viscous sulphate-free product is apparent to anyone that's tried before. Salt doesn't work like it used to. There's a requirement for an array of gums or ethoxylated thickeners to make the product appear to the consumers as a wash product should – and sometimes they still don't quite get there. We have already overlooked the surfactants, that we chose (sometimes) by name only, and attempt to shoe-horn them into the appearance of a wash product with these thickeners so there's a chassis to add in the hero ingredient.

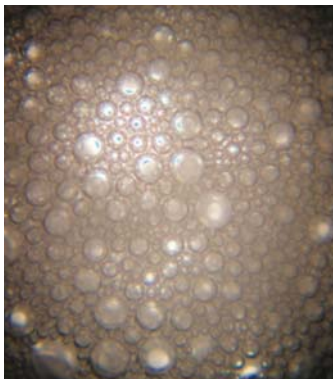
The beauty of Iselux® is that it thickens with electrolytes,

like salt, and a run-of-the-mill co-surfactant such as cocamidopropyl betaine. Better quality betaines will have a significantly lower use rate than others, but that's another story. Chart 1 shows a typical salt-thickening curve.

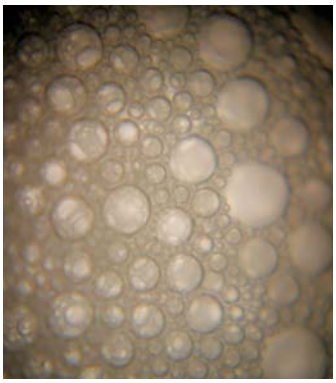


This is the cheapest, and simplest, way to build viscosity in a surfactant product and Iselux® is the most effective it's class that still retains all the other attributes required from a surfactant; like mildness and foam profile.

The second stage of a consumer's experience with a wash product is the obvious one: foam. From a baby in a bubble-bath to relaxing while your hair is being washed in a salon, it is undeniable that luxurious, creamy foam makes the experience. This is the next realm where many sulphate-free products fail to fulfil their promise to the consumer. Yes, the end-product is saving one endangered species or another, and does so with 12 different organic certifications, but that lack of dense foam is a letdown. The ability to have Iselux® made either from RSPO Sustainable Palm, or from Coconut Only feedstock satisfies both sides of the palm oil debate, while offering the consumer a foam profile that only sulphate-containing surfactants have been able to promise previously.



Iselux®



SLES

Upon close inspection, a comparison between Iselux® and SLES reveals a much smaller bubble size, which means a more dense and creamy looking foam. This also offers a more lubricious, and luxurious foam that adds body to certain products like a shaving foam, where the consequences of getting this wrong can be quite unpleasant for the consumer.

The third stage of the consumer's journey with our products is how they feel after they've used it. The after-feel is important, and when we're discussing surfactants, this is normally in reference to mildness. On a personal note, I have a baby wash product at home that I used to clean my hands after I changed the oil in my wife's car. The surfactant in that product is excellent at emulsifying, so it cleaned the engine oil from my hands wonderfully. The catch here is that it's also doing the same to the natural lipids on your skin, which is quite irritating. The surfactant choice not only needs to thicken well, and needs to foam well, it also needs to be respectful of skin.

Skin irritancy tests of Iselux® have shown that it is less irritating than SLS, SLES-2 & CAPB. They have also shown a mollifying effect in combination with other surfactants, reducing the inherent irritancy of individual surfactants. All this leaves the consumer thinking "wow, activated charcoal really feels great my hands…" without knowing who the real hero is behind the scenes.

Saviour of Formulators AND Blenders

When I was offered the chance to lecture to some Personal Care Science students, I thought "how can I make their future careers difficult?" I settled on discussing Iselux®, and sulphate-free technology, and then taught them how to make a shampoo, at room temperature, with a hand whisk, in 15 minutes. Anywhere they go from here, and any other surfactant system they dabble with, will have them scratching their heads in disbelief. "This was meant to be easy, what's going wrong?"

The Iselux® range has a host of different forms and specialty blends to make life easy, regardless of the wash product we're formulating. There are various liquid blends that will change the life of the production staff and blenders making the wash products on the factory floor. Being available in flakes, liquid and now powder form, Iselux® gives you the freedom to make whatever type of wash product you like, from liquid, to solid, to DIY powder wash products or scrubs. There are also some performance blends to increase the simplicity in formulation and production:

- Iselux® SFS was the variant I showed the students. A specific Sulphate Free System blend of surfactants, featuring Iselux®, will make a shampoo or bodywash in 15 minutes, without heating. Dilute in water, add your label claims, preservative, and salt. Bodywash done.
- Iselux® Ultra Mild is a pre-blend of surfactants selected and proven for mildness, for sensitive skin or baby products. As easy to use as Iselux® SFS above.
- Iselux® SLC – Structured Liquid Concentrate – is a way to add a large quantity of oil, or other incompatible phases, into a surfactant system. It will hold up to 20% oil in a freeze/thaw stable system. It can even be coloured and layered to appear as different layers in the packaging.
- Pureact SNDT-CB is an optimised blend designed for

Combo & Syndet bars that are mild, totally smooth, and with a wonderful consumer experience. This also makes processing the bar easier too.

Summary

When we're looking for a hero to save us, why ignore the product itself in search of an exotic botanical trend to swoop down from the skies? Using Iselux® in our wash products gives us the ability to provide the consumer with an experience that will make them think the label claim is the most amazing they've ever tried. Just like selecting a unique emulsifier or emollient will elevate our emulsions, Iselux® will be the hero hidden in your wash products, doing all the heavy lifting, working hard to save the day (for your label claims).

A S Harrison & Co offers a comprehensive range of Iselux® sulphate free surfactants – for more information and samples please contact your A S Harrison & Co account manager or email performanceingredients.ash@harrison.com.au or call us on +61 (0)2 8978 1016

smoothing the natural passing of time

More and more people are concerned about the environment and take personal actions towards a sustainable future. One of the most rising movements is veganism, which promotes the use of animal-free alternatives for ethical and environmental reasons. It has become a lifestyle for many consumers and is reflected in many of their daily life aspects, including their skincare routine.

Cosmetic formulations are starting to include more vegan and environmentally friendly alternatives to renown skin care ingredients. An example of them are retinoids – very effective anti-aging agents but with undesired side effects. Traditionally used as a skin smoothing and anti-wrinkles remedy, stevia can be considered a gentler and more natural alternative to retinoids.

Native to South America, stevia plant can also be found in other places such as the Bordeaux region, known for its incredible natural richness. The latest addition to Lipotec™ Active Ingredients´ technologies also originated in this region – PHENOBIO™ subcritical water is a subcritical water extraction methodology that helps obtain eco-conscious enriched botanical extracts as it allows to recover a broad spectrum of the plant's phytoactives without using harmful chemical solvents that may damage the environment.

Applying the PHENOBIO™ subcritical water technology to organic stevia leaves from the region, STEVISSE™ *advanced botanical ingredient* has been created as a vegan-friendly ingredient with a retinoid-like mechanism that minimizes the appearance of wrinkles.

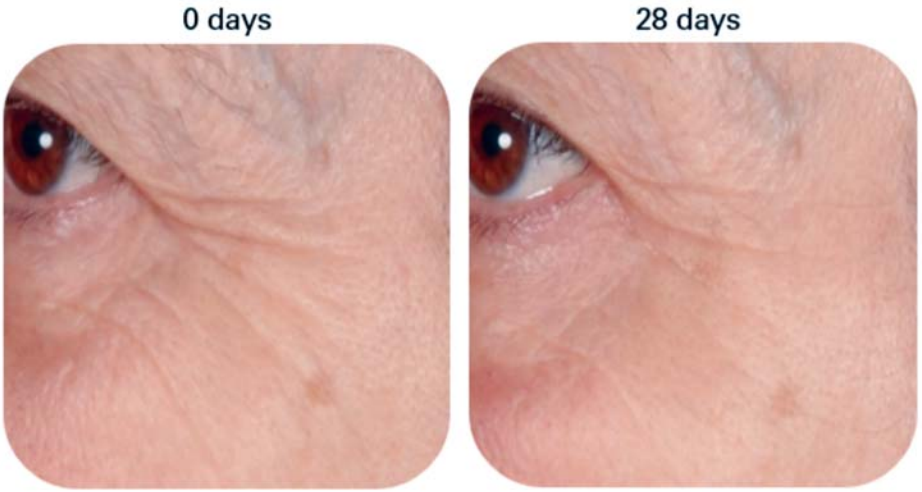
In vitro, STEVISSE™ *advanced botanical ingredient* promoted an improved skin response against oxidative stress and prevented the degradation of key ECM proteins, while reducing skin inflammation.

A clinical test was performed on female volunteers with crow's feet wrinkles that applied a cream with 2% ingredient twice a day. After 28 days of treatment the wrinkle area and length were reduced up to 87.3% and 85.2% respectively, visibly attenuating the crow's feet wrinkles and providing a younger-looking appearance.

Last incorporation to our Active Organics® inspired by nature range, STEVISSE™ *advanced botanical ingredient* offers a similar rejuvenating result to retinoids but without the negative side effects.

It can be incorporated into facial formulations willing to slow down the aging process, minimizing the appearance of wrinkles as well as organic and vegan formulations looking for a wrinkle reduction effect while caring for the planet.

For more information, please contact Robert McPherson, Account Manager for Australia and New Zealand, at Robert.McPherson@Lubrizol.com or Tel: +61 (02) 9741 5237.



A S Harrison & Co invests in new technical facility

A S Harrison & Co announces the commencement of construction of a new Customer Engagement Laboratory (CEL) at its Sydney, Australia site.

The CEL is being designed to support our customers in the region, as well as providing support to our supply partners. The CEL will strengthen our ability to provide solutions needed by our customers and suppliers in the area of end-use product development, formulation design techniques, product launch, field trial management and product testing.

Along with ISO-accredited standards of quality control, the CEL will increase capacity to manage our growing fleet of customised reusable packing and decanted product lines.

The facility will be a valuable hub to our industry, extending itself to training of our staff and customers with video conferencing and product demonstration capabilities.

The CEL is located alongside our existing custom-built Distribution Centre which was commissioned in 2012. Construction of the CEL commenced in April this year and is expected to commence operations in August.

Private Labelling products – do you need Liability Insurance?

by James Gillard

Having a private label brand will set you apart from your competitors and may create an opportunity for you to expand your sales. It can be rewarding, but also puts you at risk if things go wrong. Therefore, new business ventures require lots of research and investigation into private labelling, regulations & legislation before you start the process.

Part of this is to establish what insurance to buy for the best protection. It is wise to seek professional advice from your insurance broker who is the expert.

Private labelling arrangements for your cosmetic products from overseas manufacturers comes with increased risks and responsibilities irrespective of how you are selling and distributing your products i.e. direct to consumer via spa or salon, wholesaling or online selling.

By putting your name/ logo on the bottle or packaging, you are taking on the responsibility as the manufacturing party.

Product safety priorities – Risks and Mitigation

Companies or individuals who import goods from overseas are liable under the Australian Consumers Law (ACL) and will be deemed the Manufacturer- if your cosmetic product is found to be dangerous or causes any person injury or death. It may just be incorrect or inaccurate labelling which causes allergy or irritation. It is vital to include insurance as part of your business plan.

If you are importing products from overseas, manufacturing, relabelling or packaging, be particularly cautious. Even if the overseas manufacturer is reputable, you will not be covered by their insurance if something goes wrong, you need your own insurance.

Under Australian Law, you cannot rely on someone else to protect your business. Some ingredients may be legal in one country, but not legal for use in Australia. It is the responsibility of the Australian suppliers or importers to make sure the products sold comply with product safety laws.

It is also highly recommended for good risk management to ensure that

your products are tested by an external compliance laboratory located in Australia or New Zealand. Should a significant product claim occur, these tests will be relied on for ingredient quality, efficacy compliance with Australia or New Zealand Law and product purpose.

What is Liability Insurance? How does it work?

Product and Public Liability Insurance is a combined policy, for personal injury, and property damage. This cover protects you and your business from financial loss arising from claims by Third Parties against you. The cover is tailored for you and differs from industry to industry and business to business within the same industry. As an importer, Product and Public Liability insurance is a must have.

If you are private labelling your products from a manufacturer overseas and importing the products into Australia, there are some requirements for insurance that you should know and disclose to your insurer.

- Details of the business including whether you are operating as a wholesaler, retailer or distributor of the product
- Type and use of products sold i.e. skin care, a hair tonic.
- Where do the products come from i.e. Which overseas countries are they sourced from including the details of the suppliers and how long they have been in business in that country, the percentage of sales from each country along with the details of the products i.e. ingredients and purpose of the finished products.
- Estimated turnover for the next 12 months
- Number of staff
- Any claims in the last five years with details

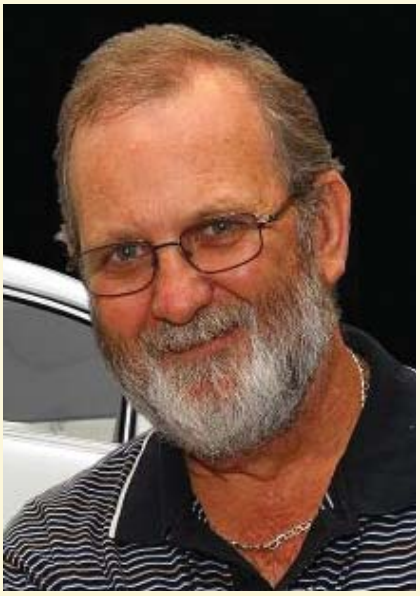
Do you need liability insurance?

The answer is yes; you do need liability insurance if you are going to private label your product, regardless of whether the product is sourced from overseas or at home. Mislabelling products may result in an adverse reaction, risk your reputation and incur the cost of a product recall.

The insurance cost is minimal when compared to the possible consequences of an unexpected event.

If you would like to know more about Product and Public Liability Insurance cover then contact the friendly team at IME Insurance Brokers –Insurance Made Easy , we offer personal assistance to discuss your individual circumstances 1800 641 260 or visit us www.imeinsurance.com.au

Ric Williams made a Life Member



At the 51st Annual ASCC Conference, Fremantle, Ric Williams was made a Life Member

Work

50 years working in the cosmetic/therapeutic industry (as at November 2019). All of this has been in the technical area working for customers such as Colgate-Palmolive, S.C.Johnson, Unilever Rexona, F.H.Faulding, Medical Research (MR Manufacturing), NxGen Pharmaceuticals as well as his own consultancy, Cosmepeutics International.

The Australian Society of Cosmetic Chemists

Full Member since 1982
Granted the honour as a Fellow of the Society in 2014 and Life Member in 2019
South Australian Branch Organiser, 1985-1993
Australian Technical Committee Member, 1984-2016, 2017-, Chairperson, 1997-1999, 2018-
Australian Council Member, 1986-1994, 1997-2002, 2018-
IFSCC International Congress Steering Committee Member, 1988-1996

ASCC Position Papers written and published

The Use and Safety of Hydroxy Acids (Alpha Hydroxy Acids, Beta Hydroxy Acids and Alpha Keto Acids) in Cosmetics; September, 2005
Preservatives Used in Personal Care Products; September, 2010, Revised January 2018
Cosmetics and the Use of Animal Testing; July, 2015.
Environmental Pollution of Cosmetic (and other) Plastics in Waterways; March, 2016.

Publishing

Currently write a continuing column entitled "Formulators Forum" in the Australian published magazine "The Science of Beauty", published by Manor Enterprises Pty Ltd., on behalf of the Australian Society of Cosmetic Chemists.

Lectures/Papers presented at ASCC Conferences

Australian Society of Cosmetic Chemists 24th Annual Conference (April 16 - April 19, 1989)
"The Manufacture of Basic Toiletry Products"
Australian Society of Cosmetic Chemists 27th Annual Conference (February 27 - March 1, 1992)
"Supplier - Formulator Interactions – What Can I Do For You ?" co-written with Barrie Dean (Ungerer)
Australian Society of Cosmetic Chemists 28th Annual Conference (March 25 - March 28, 1993)
"A Computer Based Auditing System for the Code of Good Manufacturing Practice"
Australian Society of Cosmetic Chemists 29th Annual Conference (April 28 - May 1, 1994)
"The Creation of a "Natural" Skin Cream - How to Design an Emulsion"
Australian Society of Cosmetic Chemists 42nd Annual Conference (March 23, 2007)
"Drug Delivery from Cosmetic Emulsions"
Australian Society of Cosmetic Chemists 43rd Annual Conference (March, 2008)
"Pain Management using Essential Oils and Aromatherapy – Validated by Digital Thermal Imaging Technology"; co-written with Cheryl Gilbert (Balanced Essentials P/L) and Pauline Rose RN (Contemporary Medicine P/L)
Australian Society of Cosmetic Chemists 49th Annual Conference (May 3-5, 2017)
"Infra-Red Light and Its Effect on Skin"
Australian Society of Cosmetic Chemists 49th Annual Conference (May 3-5, 2017) *(Written for but not presented.)*
"Pollution, Its Effects on Skin and Hair and What Can Cosmetics Do to Help."
Australian Society of Cosmetic Chemists 51st Annual Conference (May 7-9, 2019)
"Cosmetic Claims and the Implications If You Get It Wrong."

PAM JONES has worked in the Personal, Homecare and Pharmaceutical markets for more than 30 years. She has been working out of Asia since 1996 and is well versed and connected with the Asia Market. Her experience covers technical, sales, marketing, management and training roles. She has qualifications in Chemistry, Marketing and Management. Her company PCA Consulting is well known for its training programmes. Pam has worked with and consulted to companies such as ICI, Croda, Ashland, Huntsman, Reed Exhibitions (in Cosmetics) and Connell to name a few. She is currently serving on the ASCC Technical Committee and volunteers as Technical Editor for this magazine.

new column starts in August issue

by Pam Jones

With a growing middle class in the majority of our Asian neighbours, many of us look to these lucrative markets as the future. Some of our local Australian companies have been able to successfully enter these markets but not without great challenges. Finding contacts to help understand market trends, distribution networks, legal pitfalls and government regulations to name a few make it all seem too hard.

In this column, I will start by introducing some of the Cosmetic Chemists and Cosmetic Manufacturers Associations in the region. All of these associations have regular meetings and conferences and are a rich source of networking for our industry. I look forward to connecting the ASCC members with their counterparts as well as sharing information on these markets with you.

manufacturers musings

and now for something completely different . . .

by Margaret Smith

Excellent news came to me in late April when I got wind that CRC Press had published a much updated version of – "Cosmetic Formulation : Principles and Practice."

Why was this so exciting? Well, last year I was approached to write a chapter for an upcoming book on cosmetics and that is the book just published!

So Manufacturers Musings is an International published author.

My contribution is Chapter 21 titled *"From Formulation Design to Production: The Scale – Up Process."*

I am well pleased, and a little bit proud to be included, and, amongst some pretty amazing people like Heather Benson and Kenneth Walters– also to be invited to be a contributor in the first place.

Thanks to CRC Press & Ken Walters (editor) for the opportunity to be a contributor to the new book.

Anyway….

Let's take a break from the pressing business of business, customers wants and woes and the roundabout of suppliers, communication and prices.

It is something that I have not done for most of my working life and I often pay dearly for taking it all so seriously 24-7.

However, recently I have taken advice from my soul, and taken up a hobby that literally removes me away one day a week from the hurley burley of running a business. Away from the constant calling of the seagulls … Marg, Marg, Marg, Marg et al. Can you do this or that or another thing?

So what's happened? Well, I have renewed my vows to an old passion – pottery … or should I be posh and call it ceramics? Nah it is pottery and I am learning at the local council "clay room". Marvellous.

Pottery began a long time ago for me. I started when at high school and just fell in love with getting down and dirty and having something created almost at once. For me it was both a meditative and creative outlet. In more recent times, my meditative outlet has revolved around gardening in all its aspects. I didn't have time (or so I thought) to do pottery although I thought fondly about it (a bit like remembering an old friend or special occasion) when in a reflective moment.

My introduction to pottery began when I was 14 or 15 and just started working part time (after school) at a local pottery factory. They made those wonderful colourful vases covered in roses and lustre glaze and gold highlights. They made bright angel fish with clocks in their stomachs. More than that there was an entire zoo of animals, all clocked up. When I began, I was a packer. Making sure that the delicate bunches of roses and gladioli were not harmed when transported to the likes of fabulous shops and displays by Franco Cozzo in Bruns-awick and Foot-es-craay.

After a short while I was taken on as someone serious, as I did turn up pretty much every afternoon and stayed back to

watch the master potters at work.

Then one of the Master Potters let me loose on the wheel. I can't really overstate just how important this was to me – someone (other than my parents) was taking an interest and encouraging me.

The short version of this is that 40+ years ago pottery wheels were a lot harder to use. The one I was let loose on was a stand-up version where one leg did the work of making the wheel go round and round – no electric motors! Turned out that despite my enthusiasm I was crap. I was way too small and short and nowhere near strong enough, but I did come home with a "dad" mug or two and mum and dad appreciated this.

Jump forward to my next birthday came around. I can't remember the actual one but it was either my 15th or 16th (… time has faded the actual birthday as it does now).

On the morning of my birthday I woke up to find a strangely shaped parcel at the end of the bed.

Bloody heck … it was a pottery wheel. An electric one. I think I remember almost fainting with surprise and joy. My parents weren't rich and even as a kid I knew that this wheel had cost a fair bit.

The electric wheel led to 2 to 3 years of potting about. Not much got fired, but what did, I still have, at least most of them. It led me to Art College (as one did in the '70s!). Then I got married, bought land, built a house and, well, that was that. Tree jobs at a time, then 8 years of University, two uni courses and a divorce later and my Pottery hobby had well and truly melted into the past. Bugger.

But I kept the wheel. The wheel was one possession from my deep past that survived.

At least I have had the fortune to have plenty of storage space over all this time. My wheel waited patiently and the only time it was touched for decades came when it was moved into the latest factory. Thank goodness that Marie Kondo wasn't around then, otherwise I may well have tidied up and disposed of my old pottery wheel.

I always hankered to go back to pottery but never found the time.

The shift in my time priorities came after getting a General Manager at Syndet. Best bloody thing I have ever done. It was fortune that allowed Greg Moses to start nearly two years ago. And because he is so bloody great, I am now able to set myself free for a day a week. I am a slow learner to take the bull by the horns!

Forty plus years after the wheel last operated it got pulled out of storage and the dust cleaned off. Fortune smiled upon me as I plugged the wheel into power. The wheel FUNCTIONED!

And the sort of skill that I sort of had 45 years previously, well apparently, it is like falling off a bike. Ones body, in this case hands, remember. And even my brain remembers falling off a bike … lots.

So you might be wondering what has this to do with my usual column about musing and manufacturing?

LOTS and LOTS. I no longer climb into bed thinking about the days events, grinding and mulling. I now think about pots and glazes, and because I am almost exclusively making little garden pots, what plants or orchids to put into them. And I am refreshed in the morning. And I am very renewed with coming up with new ways of making grouse things in the factory. Formulating and doing the thing that I truly love, which is still work, but now it is balanced.

So I get it that I am a slow learner when it comes to recreation. Getting back into pottery, is pretty well the best thing I have done. Achieving a work/life balance by renewing my love for an old passion – who would have thought!!!

. . . what are chemicals?

by Wendy Free

I've recently been asked a number of questions about CAS and INCI and whether or not two products are the same. In that case the answer was no, but it did get me thinking about just how very valuable a basic knowledge of chemistry is and how necessary it is when ensuring compliance, so in this edition I've decided to go back to some basics about the language of chemistry.

Starting with star dust; with the exception of energy (ie light, heat) EVERYTHING around us, everything we experience is, according to current knowledge, made of chemicals, and all of these chemicals are combinations of star dust, some are naturally occurring combinations (like sea salt), some are biologically derived combinations (like soil) and some are man-made (soap). There are also products that are mixtures or combinations of these.

Simplicity and complexity; most highly purified substances, for example table salt, sugar (sucrose) and pharmaceutical active ingredients (such as aspirin), are clearly defined "chemical substances", with known content and highly predictable chemical characteristics, and they can be formally described in many different ways.

Chemical Formulas; when we have a single substance (a molecule) of know composition it can be defined by its chemical formula. Just like spelling words using the alphabet, chemical formula use specific letters (either one or two) to describe the type of elements present. Elements are also called atoms. The most common elements on the in the earth's crust are Oxygen (O), Silicon (Si), Aluminum (Al), Iron (Fe), Calcium (Ca), Sodium (Na), Potassium (K), Magnesium (Mg), Titanium (Ti) and Hydrogen (H). When it comes to biology and living systems, we are pretty good at concentrating and using Carbon (C) > Hydrogen (H) > Nitrogen (N) > Oxygen (O), Phosphorus (P) and Sulfur. These elements are intrinsic to every cell, and every molecule within our body.

So, each molecule of Sodium Chloride (table salt) has one atom of sodium (Na) linked to one atom of Chlorine (Cl). Atoms, and molecules are invisible to the human eye, they are really, really small. One gram of NaCl contains around 10,000,000,000,000,000,000,000 (ten sextillion) atoms of sodium and around 10,000,000,000,000,000,000,000 (ten sextillion) atoms of chlorine.

But isn't Chlorine toxic? As a gas, yes chorine is toxic, but our in our diet, our body uses the sodium part for osmotic

Simple name	Common Chemical Name	Chemical Formula	CAS	IUPAC Name / designation
Table salt	Sodium Chloride	NaCl	764714-5	Sodium Chloride
Sugar	Sucrose	$C_{12}H_{22}O_{11}$	57-50-1	(2R,3R,4S,5S,6R)-2-[(2S,3S,4S,5R)-3,4-dihydroxy-2,5-bis(hydroxymethyl)oxolan-2-yl]oxy-6-(hydroxymethyl)oxane-3,4,5-triol
Aspirin	Acetylsalicylic Acid	$C_9H_8O_4$	50-78-2	2-acetyloxybenzoic acid

balance and then binds the chlorine to hydrogen to form Hydrochloric acid (HCl) in our stomach. In our stomachs, HCl is essential for us to digest and process foods. If you ignore basic bio-chemistry its quite easy to publish bunk about any element or any substance …

What are the little subscript numbers? For sucrose we have a chemical formula of $C_{12}H_{22}O_{11}$ and this tells us that each discrete unit (molecule) of sugar contains 12 carbon atoms, 22 Hydrogen atoms and 11 oxygen atoms. What it doesn't tell us is how they are arranged, to do that we need to have a diagram of the structure or the IUPAC description.

IUPAC[1] is the international Union of Pure and Applied chemistry (who would have thought they had a union?) essentially this is the organisation that tries to achieve internationally recognised harmonisation for naming elements and chemistry and they have 'dictionary' on what is what![2]

But back to structures … just because a substance has the molecular/ chemical formula $C_{12}H_{22}O_{11}$ doesn't mean its sucrose.

The way in which those atoms are arranged makes a BIG difference to what it's called, and how it reacts and can be digested. For example $C_{12}H_{22}O_{11}$ can be any one of Allolactose, Cellobiose, Galactose-alpha-1,3-galactose, Gentiobiose (amygdalose), Isomaltose, Isomaltulose, Kojibiose, Lactose, Lactulose*, Laminaribiose, Maltose, 2α-*Mannobiose*, 3α-*Mannobiose*, Melibiose, Melibiulose*, Nigerose, Sophorose*, Sucrose, Trehalose, Turanose.

Some of these sugars we can digest, because our body makes enzymes (specialised active proteins) that can cut the chemical bonds, and some of them we can't, because we don't make that enzyme. But happily, the bugs in our gut can make some of these enzymes, that's why some of these naturally occurring sugars are classified as pre-biotics, they feed out healthy gut bacteria but not us. Others can act as *molecular switches* turning genes on and off or acting as signally molecules in cell membranes and the like. Others* have different effects.

Three very different 'sugars' with the same formula ($C_{12}H_{22}O_{11}$)

In the pictures below, the lines represent the links between atoms; where the atom at the intersection is not named, it is Carbon (C).

So, what is a CAS number?

Rather than using the full IUPAC descriptions that can describe the individual bonds, a US based organization called Chemical Abstracts Service (CAS) assigns number is discrete molecules and mix-substances (ie complex materials and biomolecules) so that their 'content and function' can be referenced to the 'official' (CAS) source. CAS is a subscription only service, but their assigned numbers can and should be used to ensure that what you buy is what you think you are getting (it's not infallible). EU also has a system that gives us EC# or EINECS (European INventory of Existing Commercial chemical Substances) they use a different numbering system but it has the same purpose.

So, what if I want to see if my substances are allowed in Australia…

My apologies, there ***IS no easy way***. Unfortunately, you have to be 'multi-lingual' to do this because just about every single one of our regulators uses as different system of naming substances; and there after that we have to consider if what we have meets their (often un-named / unreferenced MANDATORY specifications).

- TGA uses "AAN" which is Australian Approved Names, which has its own set of rules and criteria for how products are described
- NICNAS uses "CAS" names and numbers BUT sometimes NICNAS CAS names are right and the rest of the world gets them wrong (!)
- INCI uses International Nomenclature for Cosmetic Ingredients
- FSANZ uses 'food names' and additive codes.
- APVMA uses 'established' names and
- SUSMP uses (?) a mixture of all of the above.

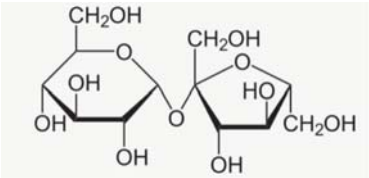
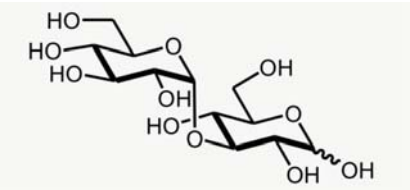
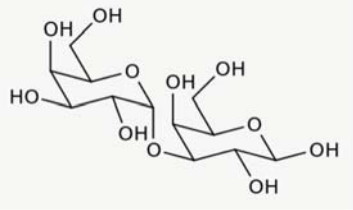
For example….

CAS	99-76-3
INCI	METHYLPARABEN
NICNAS	Benzoic acid, 4-hydroxy-, methyl ester
AAN (TGA)	METHYL HYDROXYBENZOATE
FSANZ	218 or Methyl p-hydroxybenzoate

So far, I've stuck to PURE chemicals, that is substances that have a clearly defined chemical content.

For 'extracts' and 'natural' these are far more complex

As, an example take an orange, a plain citrus fruit; as a consumer you'll appreciate that there can be lots of different extracts from an organic that might include, Orange juice, dried orange juice, orange juice concentrate, Orange oil, (sweet or bitter), orange peel extract, Citrus bioflavonoids etc. All of

Name	Sucrose	Nigerose	Galactose-alpha-1,3-galactose
CAS	57-50-1	497-48-3	7313-98-6 (or) 13168-24-6
Structure			
Function in humans	Energy Source	Prebiotic	Influences allergenic reactions

these can off course be commercially described as "Orange extract". Some companies appear to take this extension even further, for example implying that citric acid is derived from oranges (in theory it can be but that's not how it's made commercially, is made using bacterial fermentation), or even in one case synthesizing CBD (Cannabidiol) from the terpenes in oranges and claiming that because it's from oranges and not Cannabis it is safe and not subject to restrictions on trade (not true).

Extracts are usually named from their complex biological source and this gives us NO true indication of the chemical nature, safety or composition.

I'm lost … welcome to the club!

Many decades ago, I moved from biotechnology to cosmetic chemistry and was totally gob-smacked / lost / confused when it came to the way in which the cosmetic industry describes products, compared to the rest of the scientific world.

Similarly, as a consumer I'm conditioned to be 'scared' of chemicals because they are un-natural and therefore dangerous.

As an industry professional however, my biggest and most ongoing concern is the way in which people who either do or don't know chemistry manipulate names and claims to make the rest of us feel good about a product or ingredient….and how this can and often is translated into misinformation and people falsely believing that given product is either safe or dangerous based on no objective data what-so-ever.

So from the QMSM wall of fame/shame please consider…

1) Propylene Glycol is

a) Deadly in any form
b) Food additive E1520
c) Antimicrobial, humectant
d) Solvent, plasticizer
e) Sweet tasting

2) Mineral Make-up and its major ingredients

a) are safe and natural
b) are ethically sourced
c) Usually contains aluminum, rubidium and/or cesium
d) Can cause irritation to the respiratory tract and after prolonged exposure can cause scarring of the lungs and nodular fibrotic pneumoconiosis, similar to silicosis
e) are different to those used in 'mainstream' eye-shadows and powders

3) Which of the following oils are cytotoxic to Fibroblasts[3] (ie kill skin cells)?

a) Lavender
b) Lemon Myrtle
c) Myrrh
d) Tea Tree
e) Lemon

4) Cosmetic Peptides are

a) Proteins
b) East to formulate
c) Natural
d) Safe
e) Specific molecules of known amino acids that can have very powerful drug like effects

5) Which name/description is the odd one out?

a) Peppermint oil
b) Benzoic acid
c) Bitter almond Oil
d) Benzoin
e) Peru balsam

Chemistry is complex and compliance is difficult, it requires substantial care and attention; PLEASE be very careful in all of your claims and advertising; thousands of people are relying on YOU to do this correctly.

Best,

Wendy Free

talktous@qualitmatterssafetymatters.com.au

Answers

1) all except a are correct.
2) c and d are known to be correct[4], b is not always clear see[5],
3) All except e.
4) only e is essentially correct.
5) a only peppermint oil does not contain benzoic acid, in fact some studies show that it reduces the uptake of benzoic acid across the skin.

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1 https://iupac.org/what-we-do/
2 http://www.chem.uiuc.edu/GenChemReferences/nomenclature_rules.html
3 According to Tisserand & Young 2014
4 https://toxnet.nlm.nih.gov/cgi-bin/sis/search2/r?dbs+hsdb:@term+@na+MICA
5 https://www.revlon.com/ingredients

sunscreen highlights

by John Staton

Final word on water resistance sunscreens

On June 19th, ISO Working Group 7 will meet to finalise the two new ISO Water Resistance methods for sunscreens…

ISO 16217 (1) describes the method for running the water immersion challenge for sunscreens claiming resistance.

ISO 18861 (2) provides the procedure for calculation of percentage wash- off when using the 16217 method.

The only issue outstanding in these two projects is the harmonization of the limits for post immersion SPF of the P2 reference sunscreen used to validate the methodology in individual test laboratories. Several ring studies have shown this to vary, most likely as a result of water flow variation inherent in differing immersion devices, which can range from bath tub size spas to much larger types of 2 metres or more diameter.

40 minutes, 80 minutes, 4 hrs – how long is "water resistant"?

In line with other ISO standards for sunscreens, the two new publications will only define the test methods and not the interpretation. Implementation in individual markets then becomes a localised regulatory process. For most of the World, "Water Resistant" is 40 minutes immersion testing and "Extra Water Resistant " is 80 minutes. However, in Australia, a relationship between SPF category and maximum allowed claim applies, so that, for the higher categories of SPF 30 and above, up to 4hrs can be claimed if the testing supports this.

50% or 75% wash off or SPF post immersion. Who is right?

Whilst Australia requires that, for sunscreens claiming water resistance, the SPF shown on the sunscreen pack is supported by the number obtained post immersion challenge, in most other countries a "discount" of up to 50% is permitted. In Israel, this number is 25% i.e. 75% retention.

There is a potential risk for a visitor from E.U. who visit Bondi Beach and uses, say, a European compliant sunscreen product labeled as SPF 50 and "Water Resistant". This product is very likely to fail in the warm and swelling surf and may even completely wash off. Conversely, an SPF 50 4 hr water resistant sunscreen compliant with AS/NZS 2604 (and TGA) requirements should provide very high protection under the same usage conditions.

Australia is likely to continue to enforce our stringent requirements for water resistance into the future. Europe was recently under pressure to justify their much less stringent requirements (3).

References

1. **ISO 16217 (DIS)** Cosmetics — Sun protection test methods — Water resistance — Water immersion procedure

2. **ISO 18861 (WD)** Cosmetics – Sun protection test methods – Water resistance – Percentage of water resistance

3 **Water resistant sunscreen claims 'meaningless', says Which?** 24thMay 2018 https://www.bbc.com/news/business-44231575

microbeads – success of the *BeadRecede* campaign

by Jan Semple

You would have to be living under a rock to miss that fact that plastics – in Australia and globally – are under intense pressure.

For the cosmetic and personal care industry, this plastic pressure has targeted microbeads. These tiny solid plastic ingredients have been condemned both by public opinion and coordinated campaigns seeking their ban.

Research around the globe has shown that our industry's contribution to plastic marine litter is very minor. Studies have shown that the main sources of microplastic marine litter are secondary, i.e. from breakdown of plastic packaging, tyre dust, plastic manufacturing pellets and synthetic textiles. Microbeads from our industry's products make up less than 0.3% (www.cosmeticsinfo.org/microplastic).

Nevertheless, in December 2015 Australia's environment ministers identified solid plastic microbeads in cosmetic, personal care and cleaning products as a source of plastic pollution in Australia's waterways. Ministers agreed to *"… secure a voluntary agreement from industry to phase out microbeads in personal care, cosmetic and cleaning products"*. The deadline for the phase-out was 1 July 2018.

Our industry rolled up its sleeves and got to work.

Accord Australasia launched *BeadRecede* in early 2017 to coordinate the voluntary industry phase-out. BeadRecede fosters industry engagement in the phase out, collates data and communicates progress to Ministers.

Some two years later, the effectiveness of BeadRecede has been independently confirmed. Federal Environment Minister Frydenberg stated, *"Industry has successfully risen to the challenge issued by Australia's environment ministers to voluntarily phase out the use of microbeads in cosmetic and personal care products"*.

So is that it? What's next for microbeads?

To support the ongoing success of the phase-out, the Commonwealth issued a *Monitoring and Assurance Protocol* outlining ongoing expectations for *BeadRecede*. Via this Protocol, *BeadRecede* outreach will continue in 2019 and beyond to remind manufacturers and retailers of continued expectations for microbead-free rinse-off products and to enable regular reporting to Ministers.

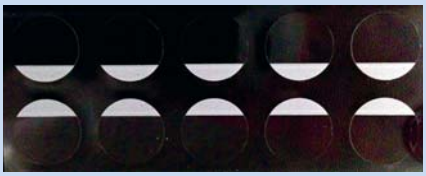
Action on microplastics will continue and, in acknowledgement of our industry's successful phase-out of solid plastic microbeads, it is hoped that future ministerial attention moves onto other more significant sources, such as readily substituted single-use plastic items that produce litter and microfibres from synthetic textiles.

Accord Australasia is the peak body representing companies operating in the cosmetic, fragrance, personal care and toiletries sector – from multinationals to small Australian-owned businesses, importers to local manufacturers. www.accord.asn.au

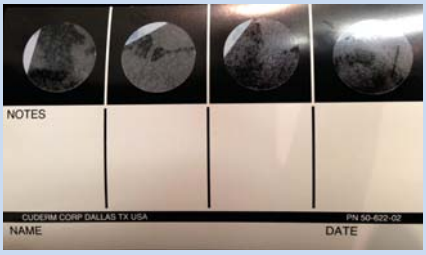
eurofins | Dermatest

No. 14 D-Squame®

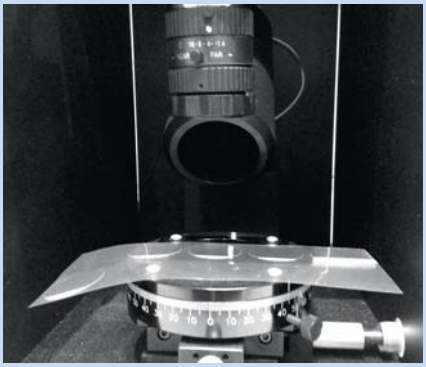
STEPS



1. D-Squame Discs



2. D-Squame Record Card



3. Optical transmission

Eurofins Dermatest Pty Ltd
20 - 22 King St
Rockdale NSW Australia
ph 61 2 9556 2601
info@dermatest.com.au
www.dermatest.com.au

Claims Supported

- Improvement in treatment of Xerotic (Dry) skin conditions by adhesive disk (D-Squame®) stripping.
- Supports claims related to dry skin improvement, moisturisation. Performance measurement of skin peels.

Test Sites

Test site may be nominated and are delineated for corresponding areas.

Test Steps

In order to pre-condition the test sites and keep all topical treatments constant for all test subjects, panelists are required to abstain from using deodorant soaps, moisturising soaps or cosmetic moisturisers on the test area for a period of one weeks prior to study commencement and during the course of the study. Base line is determined on a an adjoining area just prior to commencement of the study.

For Single Day Studies

On the day of the study, test material is delivered to the test sites through plastic volumetric syringes. The materialis then evenly applied back of the hands using a glass rod to rectangular area measuring 2.5 x 10cm on the liberally

A site of equal size is left untreated to serve as a negative control. Panelists are blinded as to the nature of the material being applied. Panelists are required to remain in the lab under controlled humidity conditions for the entire initial test period.

For Multi-day Studies

Product is applied to test area according to client instructions.

At further nominated time points, test subjects are brought back to the laboratory for further measurements. In all other aspects, the methodology is the same.

Quantification

Quantification of removed cry cells by optical transmission measurement. D-SQUAME® discs uniformly sample a fixed area of stratum corneum for precise skin studies. Adhering corneocytes can be analyzed for drugs and other constituents as stripping discs provide a convenient way to reproducibly remove the stratum corneum for subsequent analysis procedures.

Optical Transmission

D-SQUAME® tapes are scored and the optical transmission documented.

References

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Image analysis of scaly skin using Dsquame® samplers: technical and physiological validation

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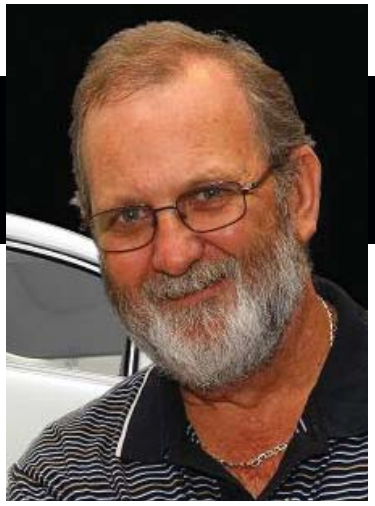


Part 46 –

by Ric Williams

The formulation of natural skin care, hair care and household products using novel surfactants

Abstract/Summary

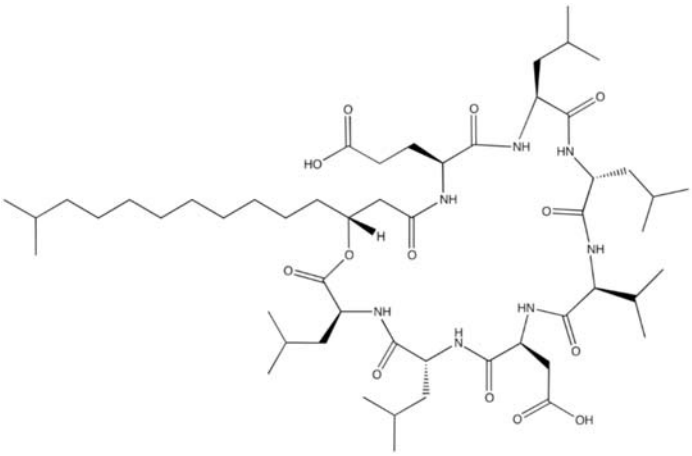
After 44 editions, not that I am running out of topics, but someone suggested I go back to the start and update earlier presentations based on the changes that we have seen over the last 7 to 8 years (Yes, that is how long I have been doing this).

With the market shift towards more natural products, the quest for more natural surfactants/emulsifiers has meant that novel materials have been created, or in some cases, reinvented. The paper revises common surfactant/emulsion theory then looks at four novel surfactant/emulsifier systems (Sodium Surfactin, Hydrogenated Lecithin, Arginine Lauraminopropionate and Soapberry extract) as examples of more natural and exciting cosmetic systems. The paper will discuss their properties and provide some example formulations developed using these "new" surfactant/emulsifier materials.

Sodium Surfactin[1]

Composition / Structure

Surfactin is a very powerful surfactant commonly used as an antibiotic. It is a bacterial cyclic lipopeptide, largely prominent for its exceptional surfactant power. [2] Its amphiphilic properties help this substance to survive in both hydrophilic and hydrophobic environments. It is an antibiotic produced by the Gram-positive endospore-forming bacteria Bacillus subtilis. [3] In the course of various studies of its properties, surfactin was found to exhibit effective characteristics like antibacterial, antiviral, antifungal, anti-mycoplasma and hemolytic activities. [4]



Surfactin's structure consists of a peptide loop of seven amino acids (L-aspartic acid, L-leucine, glutamic acid, L-leucine, L-valine and two D-leucines), and a hydrophobic fatty acid chain thirteen to fifteen carbons long which allows it to penetrate cellular membranes. Glutamic acid

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This column is intended not only as an education tool for non-technical people or beginners in our industry, but as a forum for those wishing to enlighten all about recent technology advances and new ideas. I hope experienced scientists will also contribute to this ideal and if you wish to do so please email me at: ric@cosmepeutics.net.au and I will publish your comments.

and aspartic acid residues at positions 1 and 5 respectively, constituting a minor polar domain. On the opposite side, valine residue at position 4 extends down facing the fatty acid chain, making up a major hydrophobic domain. Below critical micellar concentrations (CMCs) the fatty acid tail can extend freely into solution, and then participate in hydrophobic interactions within micelles.[5] This antibiotic is synthesized by a linear nonribosomal peptide synthetase, surfactin synthetase, and has, in solution, a characteristic "horse saddle" conformation that explains its large spectrum of biological activity.[6]

Properties

Surface tension

Surfactin, like other surfactants, affects the surface tension of liquids in which it is dissolved. It can lower the water's surface tension from 72 mN/m to 27 mN/m at a concentration as low as 20 μM.[11] Surfactin accomplishes this effect as it occupies the intermolecular space between water molecules, decreasing the attractive forces between adjacent water molecules, mainly hydrogen bonds, creating a more fluid solution that can go into tighter regions of space increasing water's wetting ability.[12] Overall, this property is significant not only for surfactin but for surfactants as a whole, as they are primarily used as detergents and soaps.

Skin penetration

When active ingredients are water soluble (logP < 2.0), KANEKA Surfactin enhances skin penetration. When ingredients are less water soluble, it reduces skin penetration.

Biological properties

Surfactin has a nonspecific mode of action, which originates both benefits and disadvantages. It's advantageous in the sense that surfactin can act on many kinds of cell membranes, both Gram-positive and Gram-negative. Its non-specificity also has bearing on its tendency to not produce resistant strains of bacteria. Consequently, this efficient mode of cell destruction is indiscriminate, and attacks red blood cells with deadly efficiency.

Antibacterial and antiviral properties

Surfactin, true to its antibiotic nature, has a very significant antibacterial property, as it is capable of penetrating the cell membranes of all types of bacteria. There are two main types of bacteria and they are Gram-negative and Gram-positive. The two bacteria types differ in the composition of their membrane. The Gram-negative bacteria have an outer lipopolysaccharide membrane and a thin peptidoglycan layer followed by a phospholipids bilayer, whereas the Gram-positive bacteria lack the outer membrane and carry a thicker peptidoglycan layer as well as a phospholipids bilayer.[18] This is an essential factor that contributes to surfactin's detergent-like activity as it is able to create a permeable environment for the lipid bilayer and causes disruption that solubilizes the membrane.

For surfactin to carry out its antibacterial property successfully, the bacterium needs to be treated with a high concentration. In fact, surfactin needs to be in concentrations between 12–50 μg/ml in order for it to carry out minimal antibacterial effects.[19] This is also known as the minimum inhibitory concentration (MIC).

The antiviral effects of surfactin distinguish this antibiotic from others. This property is such because surfactin has been found to disintegrate enveloped viruses. Surfactin not only disintegrates the viral lipid enveloped, but also the capsid of the virus through ion channel formations. This process has been proven through test on several envelop viruses such as HIV and HSV.[20] Also, the isoforms of the fatty acid chain containing 14 or 15 carbon atoms exhibited an improvement in inactivation of the viral envelops. Unfortunately, surfactin only affected cell-free viruses and those that had penetrated the cell were unaffected. Concurrently, if surfactin were exposed to a high medium of protein or lipid concentrations, its antiviral activity would be limited. This is also known as the buffer effect and is a significant drawback in surfactin's antiviral activity.

Molecular mechanisms

There are three prevailing hypotheses for how surfactin works.[13] These are described below.

Cation-carrier effect

The cation-carrier effect is characterized by surfactin's ability to drive monovalent and divalent cations through an organic barrier. The two acidic residues aspartate and glutamate form a "claw" of sorts which easily stabilizes divalent cations. Calcium ions make for the best-fitting cations stabilizing the surfactin conformation and functioning as an assembly template for the formation of micelles. When surfactin penetrates the outer sheet, its fatty acid chain interacts with the acyl chains of the phospholipids, with its headgroup in proximity to the phospholipids polar heads. Attachment of a cation to causes the complex to cross the bilipidic layer undergoing a flip-flop. The headgroup aligns itself with the phospholipids of the inner sheet and the fatty acid chain interacts with the phospholipids acyl chains.[14] The cation is then delivered into the intracellular medium.

Pore-forming effect

The pore-forming (ion channel) effect is characterized by the formation of cationic channels. It would require surfactin to self-associate inside the membrane, since it cannot span across the cellular membrane. Supramolecular-like structures by successive self-association could then form a channel. This hypothesis for the most part applies only to uncharged membranes where there is a minimal energy barrier between outer and inner membrane leaflets.[15]

Detergent effect

The detergent effect draws on surfactin's ability to insert its fatty acid chain into the bilipidic layer causing disorganization leading to membrane permeability.[16] Insertion of several surfactin molecules into the membrane can lead to the formation of mixed micelles by self-association and bilayer influenced by fatty chain hydrophobicity ultimately leading to bilayer solubilization.[17]

Toxicity

No skin irritation observed below 2.5%

RIPT Test shows negative for skin sensitization

Decreases irritation when used with other surfactants

Surfactin has one major drawback: its non-specific cytotoxicity. This is seen as surfactin has the ability to lyse animal cells as well as pathogen cells. The hemolytic effect has been the result of surfactin having the ability to lyse red blood cells that is enough to warrant caution if used intravascularly. Fortunately, these results were seen at high concentrations of about 40 μM to 60 μM. These concentrations also exhibited the effect of proliferating cells in vitro though it also was the LD50 for this type of cells. At concentrations below 25 μM, toxicity effects of surfactin are not expected to be significant.

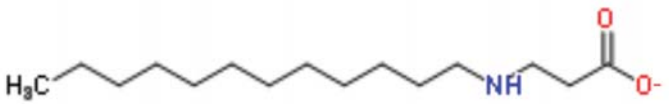
Formulations

Low Viscosity Emulsion Formulation (Kaneka Example)			
A	0.153	**Sodium Surfactin**	
	3.050	Popanediol	**Kaneka's Premixed Oil Gel**
	5.948	Squalane	D phase emulsification
	5.948	Rosehip Oil	(Kaneka Premix)
	0.153	Water	
B	7.25	Jojoba Oil	Emollient
	2.25	Sunflower Oil	Emollient
C	4.00	Glycerin	Moisturizer
	0.15	Betaine	Moisturizer
	0.50	Inositol	Moisturizer
	1.00	Sodium Phytate	Chelator 1.2
	0.25	Sodium Phosphate	pH Adjuster/Buffer
	0.75	Disodium Phosphate	pH Adjuster/Buffer
	2.50	Preservative	Preservative
D	0.50	Xanthan Gum	Thickening agent
	65.60	Water	Solvent

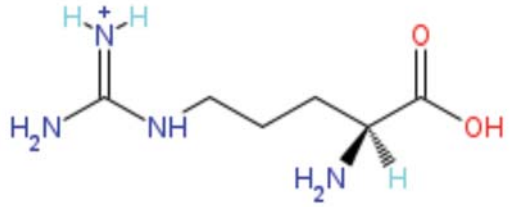
Arginine Lauraminopropionate

Composition / Structure

L-Arginine, compd. with N-dodecyl-β-alanine



Arginine Lauraminopropionate is a vegetable derived amino acid based amphoteric surfactant useful in the formulation of mild foaming products, comprising Lauraminopropionic acid (15-20%) and L-arginine (10-15%).



Properties

Combining the low irritation potential of an amphoteric surfactant with the soothing effect of arginine, creates an exceptionally mild surfactant for personal care products. Arginine Lauraminopropionate produces moderate levels of foam, is an excellent wetting agent and is readily biodegradable.

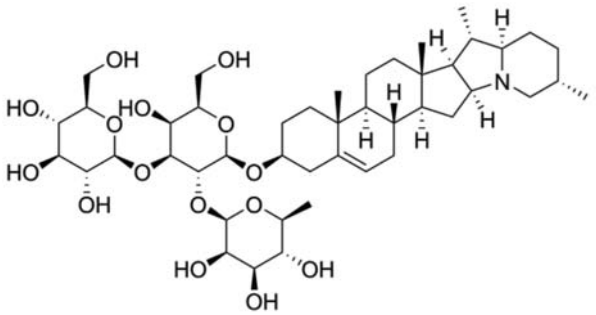
It is mild in nature and offers low irritation potential & soothing effect. Moreover, it produces moderate levels of foam. Arginine Lauraminopropionate finds application in formulating shampoos, conditioners, body washes, liquid hand soaps and bubble baths. Meets TSCA, SARA 313, Canadian NDSL, EINECS, AICS, IECSC, KECI, Japanese ISHL and Japanese ENCS. It has a shelf-life of 24 months.

Sapindus Mukurossi (SoapBerry) Extract

Composition / Structure

Sapindus is a genus of about five to twelve species of shrubs and small trees in the Lychee family, Sapindaceae, native to warm temperate to tropical regions in both the Old World and New World. The genus includes both deciduous and evergreen species. Members of the genus are commonly known as soapberries[9] or soapnuts because the fruit pulp is used to make soap. The generic name is derived from the Latin words sapo, meaning "soap", and indicus, meaning "of India".[10]

The main active ingredient is Saponin.



Properties

Sapindus Mukorossi have been used as safe economical ways of cleaning, native to India and the lower forests of Nepal. The saponin contained on its shell releases when it is brought into contact with water. It is a renowned substitute for washing soap and is also used for the preparation of quality shampoos, liquid detergents, used for washing woolen and silk garments. Sapindus Mukorossi is an effective conventional detergent, which preserves the color of the valuable laundry better than any chemical detergents. Warm water will dissolve

more saponin. Just by putting 6-8 shell-halves in the cloth bag and using them instead of chemical detergent will give an economic and quality wash of costly and woolen clothes; each shells can be used for more than single wash but the temperature of water is factor dependable for the number of washes per shell bag. The remaining can be discarded when they become soggy and dark brown.

By boiling a few soap nut shells for 5 to 10 minutes in a container of water, liquid soap can be made and can be used when cooled and even be refrigerated. This liquid soap solution can be used for washing pet's fur and skin as this removes parasites leaving the pet clean, soft and protected from any further infestations. This is an effective and economical household cleaner that cleans inside and outside of the house including kitchen and bathrooms, as well as the car. In India, it is used as a jewelry polish, by soaking jewelry into the liquid soap.

Without using chemicals this liquid can be used to spray on plants. Sapindus Mukorossi can be used as natural pesticide, as it produces saponins to repel insects. The most important advantage of using (Sapindus Mukorossi) saponin is that it is a completely renewable, biodegradable material which can be put on to the compost heap once it gets spent.

Toxicity

Saponin or Sapindus Mukorossi is allergy free and is especially beneficial for babies and children who have a sensitive skin. People suffering from allergies and those who are suffering from dermatitis will be benefited if they use the liquid soap solution prepared from saponin.

Formulations

The soapberry is an excellent natural cleanser that can be used to substitute most synthetic cleansers in your home.

You can use the soapberry shells, soapberry powder, or extract soapberry liquid by making a concentrated tea with water and use this as a substitute for almost all your cleaning needs. It can be used in the following ways:

1. As a mild shampoo substitute
2. As safe and effective detergent
3. As a hypoallergenic baby fabric detergent
4. As a food safe dish wash product
5. As an excellent antibacterial / anti-fungal floor and surface cleanser.

To prepare a 10% Stock Solution add 5 parts of dried Soapberries to 50 parts of Water (buffered to a pH of 7.0-7.5). The solution is then heated to 35-40°C and stirred for 1 hour at 35-40°C. The solution is then filtered, preserved and stored (preferably at cool to cold temperatures.

The 10% Stock Solution can be used by itself or by adding it to (certified) organic surfactants, such as Decyl or Coco PolyGlucosides, Sodium Laurylglucosides Hydroxypropylsulfonate or Protein Derived Anionics, to enhance foaming or cleansing ability, and with foam stabilisers such as CocoMEA or Glyceryl Laurate. Preservatives, actives, colour and fragrance can then be added.

Commercial product for example;

Aloe & Soapberry Foaming Cleanser (The Apothecary in Inglewood)

Ingredients: Aloe barbadensis (aloe vera) leaf juice*, cocoglucoside, sodium cocoyl glutamate, glycerin*, sodium lauroyl lactylate, Sapindus mukurossi (soapberry) fruit extract, Oryza sativa (rice) seed extract*, Spirulina platensis (algae) extract*, Camellia sinensis (white tea) leaf extract*, PCA glyceryl oleate, Lavandula angustifolia (lavender) flower oil*, Rosa damascena (rose) flower oil*, Anthemis nobilis (roman chamomile) flower oil, Cymbopogon martinii (palmarosa) leaf oil, Cananga odorata (ylang ylang) flower oil, caprylyl/capryl wheat bran/straw glycosides, fusel wheat bran/straw glycosides, polyglyceryl-5 oleate, glyceryl caprylate, sclerotium gum, gluconolactone, sodium benzoate

*Ingredients from Organic Farming

99.628% of the total of the ingredients are from natural origin
57.212% of the total ingredients are from Organic Farming
Natural and Organic Cosmetic certified by ECOCERT Greenlife according to ECOCERT Standard

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Winner: *Lester Conrad Award*
(Best Overall Paper)

3D Innovative Epidermis Models as a New Tool to Assess Tolerance of Cosmetic Ingredients for Specific Applications

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Introduction

In vitro reconstructed human tissue models are recognized as being sensitive and reliable models to replace or reduce laboratory animal use in preclinical studies [1]. In addition to a validated method for skin irritation that applies defined procedures, new and predictive experimental protocols can be designed to address specific applications. Because tolerance is a complex biological mechanism, consideration of the structure and state of the epithelium (e.g. age) as well as choosing end-points tailored to specific biological parameters are essential to support the analysis. Cosmetic and dermocosmetic products target sensitive populations, such as baby products and sometimes products for irritated or with impaired barrier (used after shaving or depilation, after microdermabrasion, sun erythema, etc.). There is consequently a need for ingredient suppliers to build an in vitro testing strategy in order to provide more targeted tolerance data for manufacturers and help them select well-tolerated ingredients. The first objective of the study was to develop two new models: one "immature" epidermis model and one epidermis model with a physically impaired barrier function. In a second step, the behavior of cosmetic ingredients with a well-known tolerance profile was investigated at typical dosages compared to controls and benchmark formulas.

Materials and methods

• Ingredients tested

Pillar ingredients with different chemical structures and functionalities were chosen in accordance with the prospect of designing simple, minimalist formulas: thickening-stabilizing polymers, mild glucolipid-based emulsifiers, a moisturizing active ingredient and two plant-based active ingredients (soothing and repairing). All these ingredients are well-known and classified as non-irritant for skin. Each

Category	Function/code	Structure/INCI	Dosage	Vehicle
Active ingredient	Moisturizer	Xylityl Glucoside & Anhydroxylitol & Xylitol	5%	Water
	Skin repair	Asiaticoside acid & Madecassic Acid & Asiatic Acid	1%	Vaseline
	Soothing	Madecassoside	0.2%	Water
Surfactant	Emulsifier 1	C 20-22 Alcohols & C 20 Glucoside	2%	Water
	Emulsifier 2	C 16-18 Alcohol & C16-18 Glucoside	2%	Water
Rheology modifier	Polymer 1	Hydroxyethyl Acrylate & Sodium Acryloyldimethyl Taurate Copolymer	2%	Water
	Polymer 2	Polyacrylate Crosspolymer-6	1%	Water
	Polymer 3	Hydroxyethyl Acrylate & Sodium Acryloyldimethyl Taurate Copolymer & Squalane & Polysorbate 60	2%	Water
Internal	Control-IC	Anionic Experimental Surfactant structure C12	0.8 to 3%	Water

Table 1 – Raw materials description

Formula	Target	Type	Composition: main emulsifier-oil-gelling agent
Benchmark 1	Baby	O/W emulsion	Stearic Acid/ Glyceryl Stearate/ Paraffinum Liquidum/ Carbomer
Benchmark 2			Glyceryl Stearate/ Ceteareth-20/ Paraffinum Liquidum/ Carbomer
Benchmark 3		Oil	Mineral Oil
Benchmark 4		Gelled Oil	Mineral Oil/ Hexyl Laurate/ Hydrogenated Styrene/ Isoprene Copolymer/ Cyclopentasiloxane
Benchmark 5	Damaged skin	O/W emulsion	Glycerol/ Paraffin Oil/ Vaseline/ Glyceryl Monostearate/ Stearic acid/ Macrogol 600

Table 2 – Description of formulas

raw material was tested at a realistic efficient-cost dose in simple dilutions (shown in table 1). In addition, one Internal Control ingredient (Control-IC with a known dose-effect response from non-irritant to moderately irritant for skin/ experimental substance not available on the market) was evaluated in order to challenge the sensitivity of the models.

Some leave-on formulas from the market with high tolerance targets were also included in the evaluation as comparators. All the formulations were applied pure on the epithelia.

• *In vitro* models

- Reconstructed human "immature" epidermis:

Histologically close to the classic reconstructed epidermis, the model is characterized by a shorter cultured state (SkinEthic® RHE model at 10 days, instead of 17 days for a standard model, protocol developed in partnership with IDEA Lab) in order to obtain a less differentiated epidermis. A 10-day culture leads to lower barrier functions, resulting in epithelium more susceptible to irritation phenomena. Cytotoxicity was assessed after application of 30 µl of the test item (duplicate test performed) at the surface of the epidermis and after a maximized 16 hours of contact (this time was chosen to keep realistic conditions versus the final use and coherent results with the tested benchmarks). The cellular viability assay consisted of measuring the activity of the mitochondrial succinate dehydrogenase, which converts MTT into blue formazan crystal. After 30 minutes' incubation with the MTT, (3-(4,5-dimethylthiazol-2-yl)-2,5- diphenyltetrazolium bromide), the color of each culture was recorded. A blue color indicated that the cells were alive, a white color that they were dead. Quantified results were obtained by spectrophotometric measurement after blue formazan crystal dissolution; the measured absorbance at 550 nm is proportional to the number of living cells. The test was calibrated by a negative control (Phosphate Buffered Saline = PBS) that must be classified as non-irritant and a positive control SDS (Sodium Dodecyl Sulfate) classified as slightly irritant to irritant at 0.5% and irritant at 1%. The results were expressed in viability percentage compared to the negative control absorbance (Abs: Viability % = Test Product Abs / Negative control Abs). The product was classified as non-irritant if the viability was above 50% (corresponding to a predominant blue epithelium) and considered as irritant if the viability was lower than 50% (corresponding to a predominant white epithelium as illustrated in figure 1).

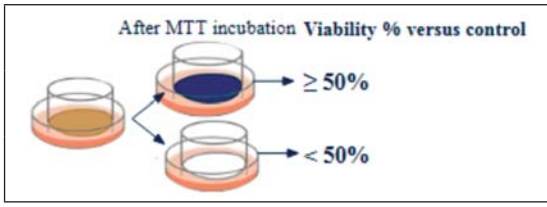

Figure 1 – Cytotoxicity analysis

In order to improve the performance of the test, the inflammatory response (IL1α release) was quantified in the culture media by immunoenzymatic assay (Quantiquine® Human IL-1 α Immunoassay kit, results expressed in pg/ml) and a supplementary epidermis was treated for histological analysis (paraffin included slides, hematoxylin/eosin: H&E staining). The damage was scored according to its occurrence in each of three epidermal layers from 0=absent, to 1=rare, to 2=moderate, to 3=marked compared to the negative and positive controls. Picnosis and perinuclear vacuolization were scored both in the basal layer and in the granular layer, and ballooning was scored in the corneal layer. A global score corresponding to the sum of the effects on the three layers was calculated (from 0 to 15 for marked damage). A tentative final conclusion was established relative to the negative control according to each parameter: cytotoxicity, IL1α release and histological scoring. It was considered a good tolerance when viability and inflammation were comparable to the negative control with or without concomitant slight histological modifications, considered non-significant from the negative control. The tolerance was considered to be acceptable (with reference to the benchmark results) when viability was comparable to the negative control with concomitant significant increase of inflammation and/or histological modifications. Finally, the tolerance was considered poor when viability decreased and inflammatory response increased significantly versus the negative control, combined with marked histological modifications.

- Reconstructed human "impaired" epidermis:

The model started from a standard Reconstructed Human Epidermis (RHE) on which the stratum corneum surface was mechanically abraded to impair the barrier function and increase sensitivity to irritation (SkinEthic® RHE, experiments conducted in partnership with VitroScreen / triplicate measurements). The abrasion procedure, performed using a surgical instrument, was optimized so as not to induce significant viability reduction or generate significant

interference with product exposure (Trans-Epithelial-Electrical-Resistance: TEER checked before and after abrasion). After injury on the epidermal surface, 30 µL of the products were directly applied for 24-h treatment and then washed off. Four parameters were then evaluated according to Multiple Endpoints Analysis [2]. Cellular viability was firstly assessed by the MTT test in order to quantify the toxicity of the ingredients (same protocol and analysis as with the "immature" epidermis model). Overall skin barrier functionality was followed by TEER measurement (in Ohm*cm^2) versus impaired baseline. TEER measures the movement of ions across the paracellular pathway regulated by polarized plasma membrane surfaces and by cell-to-cell tight junctions that together modulate the movement of solutes and ions across the epithelium: it reflects the global integrity of the epidermis barrier, linked both to the structure and to epithelium thickness. Biotin permeability assay (paraffin included slides and Secondary antibody Texas Red Streptavidin Conjugate staining + DAPI for nuclei/ Fluorescent microscopy analysis with Leica DM200 FLUO) was analyzed for a deeper understanding of the interaction between the product and the living epithelial tissue after 24 h treatment. Biotin is a vitamin which can be used as tracker to evaluate the integrity of living epidermis in an inside-out permeation model. Tissues were incubated with biotin solution introduced in the basal chamber (1 h at 37°C) and its penetration into the tissues was monitored in comparison to the negative control (saline buffer). Lastly, Histo-morphological analysis was performed (paraffin included slides and H&E staining/ Light microscopy analysis with Leica DM200 FLUO). The damage was scored from 0 to 4 according to depth of alterations versus the negative control (0=no significant modification, 1=slight modification in stratum corneum=SC, 2=moderate modification in SC and granular layer, 3=strong modification at basal layer such as necrotic cells/ intercellular holes, edema, 4=severe modification leading to a loose structure). The test was calibrated by a negative control (Phosphate Buffered Saline = PBS) that must be classified as non-irritant and a positive control SDS (Sodium Dodecyl Sulfate) classified as irritant at 0.25% and non-irritant at 0.15% but with a highly significant effect on the other parameters.

Results and discussion

• Validation of new models sensitivity versus standard Reconstructed Epidermis (RHE)

The compared cytotoxicity of the internal positive control (Control-IC) with a dose-response effect between the "Immature" and "Impaired" models and the standard RHE model confirmed the higher sensitivity of the new models (Figure 2). Control-IC was indeed already classified as irritant at 0.8% with the "immature" and "impaired" epithelia models whereas a higher dose was required to get the same classification with the standard epidermis model (classified as non-irritant at 0.8% and irritant at 3%).

With the classic positive control, Sodium Dodecyl Sulfate, we observed, as already known by experts, a kind of unstable yes/no answer. Based on preliminary experiments, we selected a 0.15% dosage for the "impaired" model to avoid total tissue destruction and be able to measure the other parameters. At this dosage, SDS did not significantly affect viability, both on normal and "impaired" epithelia.

The higher sensitivity of the two new models was consistent with the different morphology of the corneal layer. As illustrated in figure 3a and 3b, the "immature" epithelium model was characterized by a thinner stratum corneum and the "impaired" epithelium by removal of upper corneal layers as well as reduced cohesion, both expected to affect the barrier function efficacy. The limited viability reduction induced by the mechanical abrasion from 100% to 79% on the negative control indicated that the applied damage occurred at the stratum corneum level, without significantly affecting the viable layers.

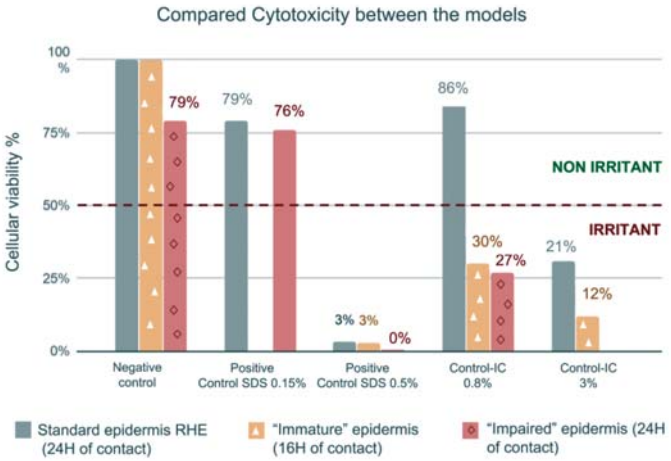

Figure 2 – Compared Cytotoxicity of the controls

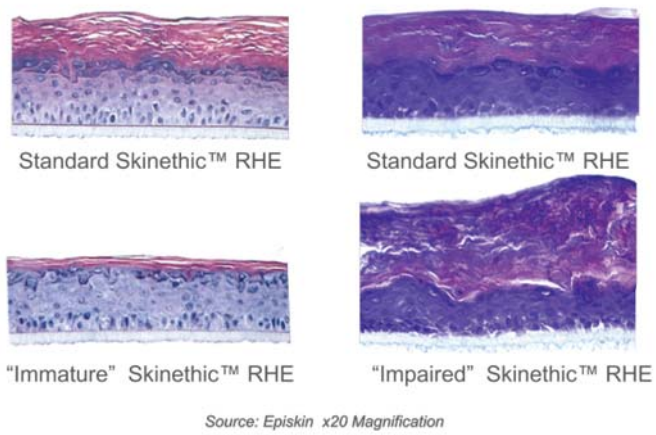

Figure 3 – Compared morphology of Reconstructed epithelia

• Ingredients and benchmarks tolerance on "Immature" epidermis model

Focusing on the experimental reconstructed "immature" epidermis model, the results (table 3) clearly demonstrated the interest of the two added parameters, inflammatory response and histology, to improve the sensitivity of the model and enrich the analysis compared to investigations based only on cellular viability [3]. On one hand, the moisturizing active

Products		Dose	Cellular Viability (%)	IL-1alpha (pg/mL)	Histological Score (/15)	Conclusion
Controls	Negative control	PBS	100	1	3	*Good tolerance*
	Positive control SDS	0.5%	3	304	Not Tested	*Poor tolerance*
	Control-IC	0.8%	30	Not Tested	Not Tested	*Poor tolerance*
Benchmarks	Benchmark 1	Pure	98	10	12	*Acceptable tolerance*
	Benchmark 2	Pure	75	17	10	*Acceptable tolerance*
	Benchmark 3	Pure	100	0	3	*Good tolerance*
	Benchmark 4	Pure	100	0	3	*Good tolerance*
Ingredients (dilution in demineralized water) pH≅6.3-7	Moisturizer	5%	97	3	3	*Good tolerance*
	Emulsifier 1	2%	97	Not Tested	5	*Good tolerance*
		3%	97	3	13	*Acceptable tolerance*
	Polymer 1	2%	96	1	4	*Good tolerance*
	Polymer 2	1%	100	0	4	*Good tolerance*
	Polymer 3	2%	100	3	4	*Good tolerance*

Table 3 – Results with "Immature" epidermis model

ingredient and the three rheology modifiers confirmed their excellent tolerance with no significant increase of IL-1alpha release compared to the negative control as well as no significant modification of the epidermis structure. On the other hand, looking at the histological score, Emulsifier 1 had a tendency to impair the 3D tissular structure and cellular integrity of the epidermis, in the three layers at the first tested dosage: 3%. Complementary testing confirmed its good tolerance at 2%. Interestingly, a similar effect was observed with O/W emulsion benchmarks (1 and 2), fully dedicated to babies and also containing surfactant structures. Figure 4 illustrates some modifications of the epidermis structure according to histology scoring. On the contrary, globally good tolerance was observed with oil-based benchmarks (3 and 4) without any surfactant in their composition. These results should be considered as a first step and need to be supplemented in closer formula compositions.

• Ingredients and benchmark tolerance on "Impaired" epidermis model

The results obtained with the controls (table 4) on other parameters than cell viability confirmed the high sensitivity of "impaired" epithelium compared to standard RHE. The negative control tested on the "impaired" epithelium displayed a modified stratum corneum lamellar structure with reduced cohesion between the layers (score 0 to 1) compared to the standard RHE (score=0; data not shown). These structural modifications were consistently combined with a significant decrease in TEER and an increase in biotin staining in the granular layer. Positive controls (SDS and Control-IC) resulted in severe impairment of the epithelial barrier as shown by the strong TEER reduction, associated with marked morphological damage up to the basal layers (including tissue detachment from the polycarbonate) and biotin migration within the whole tissue. All these factors pointed to reduced tissue integrity and cell to cell cohesion.

Benchmark 5, a medical device dedicated to skin ulcerations, was classified as non-irritant according to the high viability value. However, it generated some structural modifications up to the granular layer as well as strong biotin passage (TEER increase was non-significant -t-test p value > 0.4- compared to basal value).

These results definitively confirmed the high sensitivity of the model, which was what we were looking for from the beginning to maximize the effects of the ingredients. Moreover, they provide some preliminary data on the mode of action.

The high cell viability reflects the absence of toxic effects at basal layer for all the ingredients. Despite a statistically overall barrier impairment versus t0, Emulsifiers 1 and 2, as well as polymer 1 and 2 were not considered different from the negative control in line with the non-significant effect on morphology and non-increased biotin passage compared to the negative control (some biotin assay still need to be completed).

Application of active ingredients and Polymer 3 induced some interesting signs of tissue recovery. The moisturizing active ingredient did not provide a significant increase in TEER, but histology analysis revealed an increase of stratum

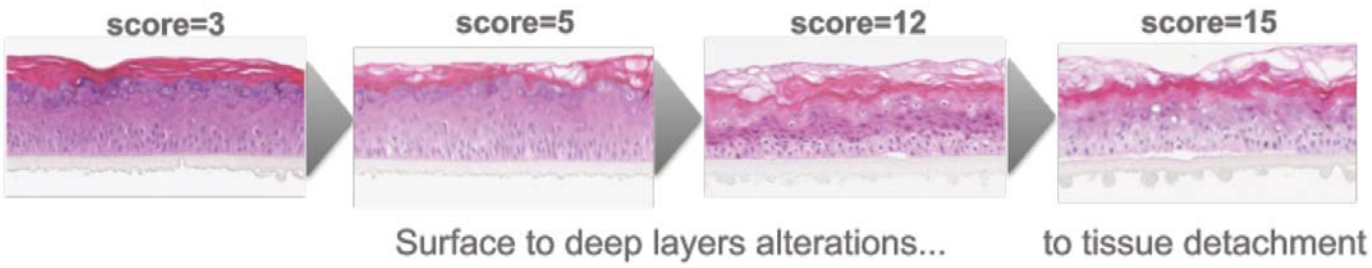

Figure 4 – Illustration of tissue alterations according to histology scoring

Products		Dose	Cells Viability	Conclusion	H&E score	TEER Δ% versus t0	Biotin passage
Controls	Negative control	PBS	100	*Non Irritant*	0-1	-36/-46/-12	*Granular layer/ low passage*
	Positive control SDS	0.25%	*0*	*Irritant*	*Not tested*		
		0.15%	96	*Non irritant*	3	-94	*Biotin in whole tissue*
	Control-IC	0.8%	*34*	*Irritant*	*3*	-87	*High Biotin passage in whole tissue*
Benchmark	Benchmark 5	Pure	97	*Non Irritant*	2	+9	*High Biotin passage in whole tissue*
Ingredients	Moisturizer	5%	137	*Non Irritant*	0-1	0.4 *restored structure & morphology*	*Granular layer/ low passage*
	Skin repair	1%	96	*Non Irritant*	1	+11	*Recovery versus impaired control (lower biotin signal)*
	Soothing	0.2%	97	*Non Irritant*	1	+65	*Recovery versus impaired control (lower biotin signal)*
	Emulsifier 1	2%	120	*Non Irritant*	1	-38	*Granular layer/ low passage*
	Emulsifier 2	2%	130	*Non Irritant*	0-1	-13	*Granular layer/ low passage*
	Polymer 1	2%	99	*Non Irritant*	1	-35	*To be completed*
	Polymer 2	1%	99	*Non Irritant*	1	-46	*To be completed*
	Polymer 3	2%	92	*Non Irritant*	1	+55	*Recovery versus impaired control (lower biotin signal)*

Table 4 – Results with "Impaired" epidermis model

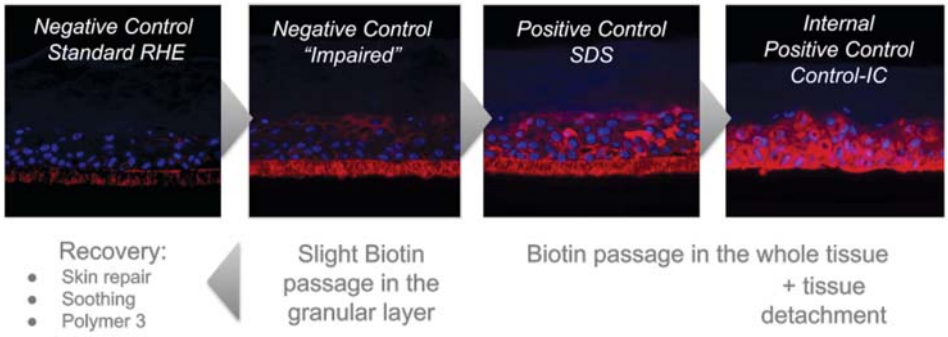

Figure 5 – Illustration of Biotin passage versus standard and impaired epithelium

corneum thickness without any modification in the viable layers compared to the negative control, indicating that the product has been able to fully recover the barrier modifications induced by the impairment. The skin repair active ingredient induced a non-significant TEER increase (t-test p value >0.4) compared to the basal value. However, considering the TEER value registered after impairment, a statistically significant TEER increase +149% (t-test p value < 0.05) was observed in line with lower biotin passage compared to impaired negative control. The soothing active ingredient and Polymer 3 both induced a statistically significant TEER increase (t-test p value < 0.01) compared to both the basal and "after impairment" values (+186% and +117% respectively) concomitant with a lower biotin passage compared to the impaired negative control.

Conclusion and perspectives

The results obtained from these in vitro models confirm the high sensitivity of the epithelia compared to standard reconstructed epithelium and give a first idea of the tolerance of the ingredients. They seem to be interesting tools to select suitable ingredients and determine appropriate dosage for each specific application. Based on cellular viability, the two models provided consistent results for the raw materials tested, confirming their potential good tolerance at usual dosage in a simple vehicle. These tolerance data can be integrated into a global safety assessment before conducting clinical trials.

The selected multiple endpoint analysis tailored to the targeted Adverse Outcome Pathway of each model enriches the basic irritation information with cellular, morphological and functional effect evaluations, thus not only gaging the toxicity, but also providing early identification of some infra-clinical reactions.

Further investigation on ingredient combinations and more complex formulas can be seen as a promising approach to better understand possible interactions. Comparison with clinical tests will also help to refine the in vitro test conditions.

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Winner: *Jack Jacobs Memorial Award*
(Best Australian Research)

Deuterium Isotope Labelling from the National Deuteration Facility for Structure Function and Quality Control Applications of Colloidal Mixtures and Blends

by Dr Tamim Darwish
(ANSTO)

Overview

Deuteration is the process in which all or some of the hydrogen (^{1}H or H) atoms of a compound are replaced by the stable (non-radioactive) heavier isotope of hydrogen, deuterium (^{2}H or D) (For more information see Appendix I). Different isotopes of the same element exhibit nearly identical chemical behaviour. This makes deuterated and protonated compounds almost identical in chemical properties, however they still differ in some physical and nuclear properties which make them useful in a number of characterisation techniques. For example, neutrons interact with (and scatter from) nuclei, rather than with electrons, which makes neutrons extremely sensitive to the difference between the hydrogen atom and its deuterium isotope, since the mass difference between the two nuclei is so pronounced. In biological systems which are typically rich in hydrogen, selective substitution of hydrogen with deuterium can therefore be used to create contrast and highlight the position, structure, interactions or dynamics of individual components within complex macromolecular systems or assemblies (For more information see Appendix II). This is particularly useful in applications using small-angle neutron scattering, neutron reflectometry, neutron protein crystallography and neutron spectroscopy. Deuteration is not limited to neutron studies but is also effective in conjunction with nuclear magnetic resonance (NMR) and vibrational spectroscopies, which are used to study the structure and function of synthetic polymers or other nanotechnology or biotechnology-relevant materials (For more information see Appendix II).

In addition to its use as a characterisation tool, deuteration has been used to enhance the properties of end-use products. For example, the kinetic isotope effect has been recognised broadly, to improve the metabolic fate of numerous drug and healthcare entities. A non-exhaustive list of deuteration applications in this area is summarised below.

- Slowing the rate of oxidation and destruction of materials under ambient or extreme conditions.
- Improving the biological stability of molecules in living systems (slowing the rate of enzymatic breakdown by the kinetic isotope effect) or forcing a switch to another metabolic pathway.
- Tuning intra- and intermolecular interactions (modifying the hydrogen bonding network to modify the stability, reactivity, and self-assembly of materials).
- Altering bond strength (frequency of vibrations), electronic structure (transitions/excitations), physical structure, density, and refractive index (optics).
- Internal standards in analytical chemistry (mass spectrometric quantification of biological analytes).

The diversity of techniques that benefit from deuteration inspired the Australian Nuclear Science and Technology Organisation (ANSTO) to build capability in the *biological* applications of deuteration to neutron and X-ray scattering in 2002. This positioned ANSTO as the only experienced

player when, in 2006, the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS) identified the need for a national deuteration facility to meet demand from the Australian research community. The NCRIS scheme allowed ANSTO to expand its scope to include not only *biological* deuteration but also *chemical* deuteration.

National Deuteration Facility – mission and role

A key part of the mission of the NDF is to expand the range and complexity of applications of the neutron scattering instruments at OPAL for the study of biological, organic and polymeric molecules, opening up new avenues for researchers in the fields of soft-matter and colloids in Australia. The facility aims to provide access to specialist laboratory space, equipment, staff and expertise to enable deuteration of biological and organic molecules for investigation using neutron scattering and other techniques, such as NMR and IR spectroscopies. The NDF has also identified that deuteration technology remains relatively untapped in industry, and that there is great potential to innovate and market new or improved products in the manufacturing sector, including the cosmetic industry. The provision of a wide range of specialised, commercially unavailable, deuterated molecules at Australia's only neutron facility puts NDF at a pivotal role for Australian science. The facility has a mature operational model based on biannual calls for proposals, followed by external scientific review, and attracts a wide range of users from Australia and around the world. [1]

National Deuteration Facility - A Unique Facility

NDF provides two separate platforms for its molecular deuteration capabilities to external users. The first involves the biosynthesis of deuterium-labelled macromolecules and the second involves catalytic exchange of organic chemicals under high pressure and temperature in heavy water. Deuteration initiatives with a research focus are not only limited to a handful of laboratories around the world, but are also restricted in capability and diversity of applications.

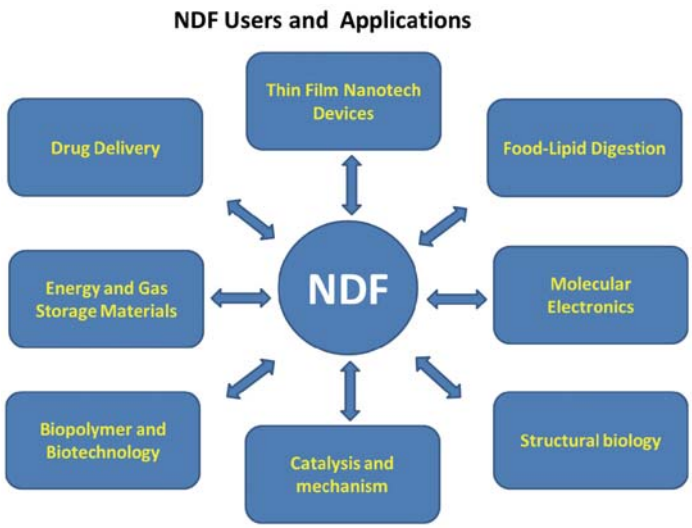

Figure 1: The types of applications that NDF has been involved with since 2010

National and international leading researchers are using the facility, both individually and collaboratively to investigate complex nanoscale systems in various fields (Figure 1), previously hampered by the lack of relevant labelled molecules. Some examples are given below and further case studies will be described in the oral presentation. This has led to publications in high impact and prestigious refereed science journals. [2]

Deuterium labelling of small deuterated organic molecules, lipids, polysaccharides is a key application in developing new methodologies for studying drug metabolism by liquid chromatography and mass spectrometry. Metabolic switching, a strategy to block the site of metabolism by using deuterium to improve therapeutic profile of a drug, has been attracting a wide interest from biotechnology and drug companies. The first deuterated drug was approved by The Food and Drug Administration (FDA) in April 2017 for the treatment of chorea associated with Huntington's disease.

Quality control is essential to minimise costs in the pharmaceutical, healthcare and cosmetic industries. For instance, the distribution and size of active ingredients and/or binders and fillers (e.g. sugars, lipids) is something that requires tight control in order for constant efficacy across drug batches. The same applies to health care and beauty care blends. Imaging pharmaceutical materials using vibrational spectroscopy and deuteration is ground breaking to obtain this information and to ensure uniform solid mixing and homogeneity. This involves selective deuterium labelling of excipients and bioactives for greater discrimination of different particles and their distributions. Combining neutron techniques and deuteration to measure directly ingredient mixing problems within operating machinery with monitoring the heterogeneity of and consistency of the product with vibrational spectroscopy in pharmaceutical industry can revolutionize the manufacture and engineering of such equipment. The NDF can provide deuterated sugars, lipids, deuterated drug precursors and final compounds, triple labelled proteins and deuterated biopolymers that are unavailable elsewhere.

3.1 Biological deuteration

Biodeuteration involves the growth of microbial cultures (most commonly *Escherichia coli*) in heavy water (D_2O), supplemented with either a deuterated or hydrogenated carbon compound, depending on the level of deuteration required. Five laboratories house the infrastructure for production, purification and characterisation of deuterated biomolecules (Figure 2 shows three of these laboratories).

3.1.1 Biodeuteration research activity

Deuteration of proteins, which constitutes the majority of biodeuteration requests, involves specialised adaptation of biotechnological approaches, including cloning, to produce proteins, usually using E. coli bacteria.

Partially deuterated proteins are produced for small-angle neutron scattering (SANS) for structure/function investigations For example, studying the binding behaviour of some key

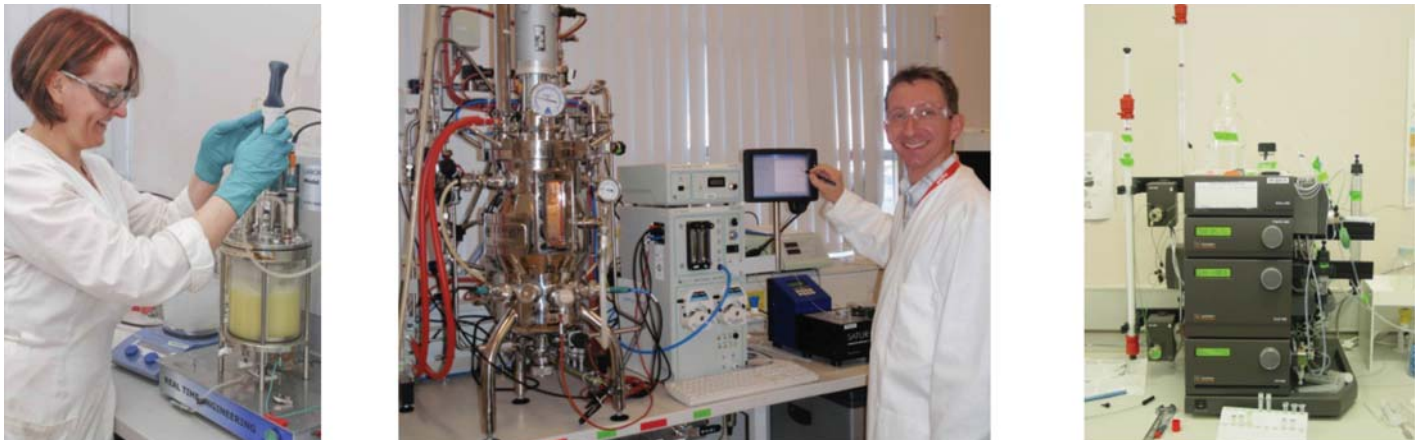

Figure 2: (a) Deuterated recombinant protein production; (b) Deuterated biopolyester production and (c) Fast protein liquid chromatography system for protein purification

proteins associated with diseases including cancers and neurological disorders such as Parkinson's and Alzheimer's, and investigation of the structure of milk protein and how it affects nutritional diseases. Triple labelled (2H/15N/13C) proteins are also produced for NMR-studies such as the solid-state structure of fungal amyloid proteins that are related in structure to proteins that deposit in organs or tissues due to their poor solubility in water, disrupting the normal function of these tissues.

In addition, the NDF produces deuterated native biopolymers, using different bacteria and yeast. These biopolymers are environmentally friendly and are used as bioplastic in biomedical applications. The deuteration of these biopolymers allowed the development of the use of deuteration and synchrotron infra-red spectroscopy as a method to probe phase separation of polymers when they are blended together to achieve better physical properties (e.g., elasticity). The same technique can be used to study the phase separation or aggregation of materials in colloidal mixture or to probe excipients in matrices such as creams. Deuterated cellulose has also been produced to facilitate studies of the binding of molecules, such as antibodies and enzymes, on papers which would facilitate cheap paper-based biosensors and medical diagnostics.

3.2 Chemical deuteration

Chemical deuteration involves deuterating molecules by exposing them to D2O at high temperatures and pressures, in the presence of a metal catalyst. If required, compounds can then be synthesised from the deuterated building blocks using organic chemistry techniques. The chemical deuteration facility at NDF consists of four labs (Figure 3) that are fully equipped for the synthesis, purification and characterization of deuterated molecules. NDF provides a certificate of analysis for each deuterated product produced by the facility for the user.

3.2.1 Chemical deuteration research activity

Molecules deuterated by the chemical deuteration technique include lubricants, detergents, lipids, sugars, and other small organic molecules. These are relevant to applications in health (treatment and diagnosis), cosmetics, molecular electronics, lipid digestion, energy and storage materials and high-technology communications industries.

Deuterated trehalose and sucrose produced by the NDF and neutron membrane diffraction undertaken in Germany, in collaboration with RMIT University, has allowed investigation of the mechanism of these sugars in protecting cells against damage under dry or freezing conditions, and the localisation of the sugar molecules in cell membranes. This not only adds to our understanding of such fundamental processes but is relevant to ultra-low temperature storage of biological material. [3,4]

In thin-film nanotechnology, functional devices containing deuterated components from the NDF have been studied by the University of Queensland using neutron scattering at OPAL. The use of selected combinations of protonated and

Figure 3: Three hydrothermal Parr vessels (left), Liquid Chromatography/Mass Spectrometry/Mass Spectrometry system (middle), 400 MHz NMR spectroscopy lab (right).

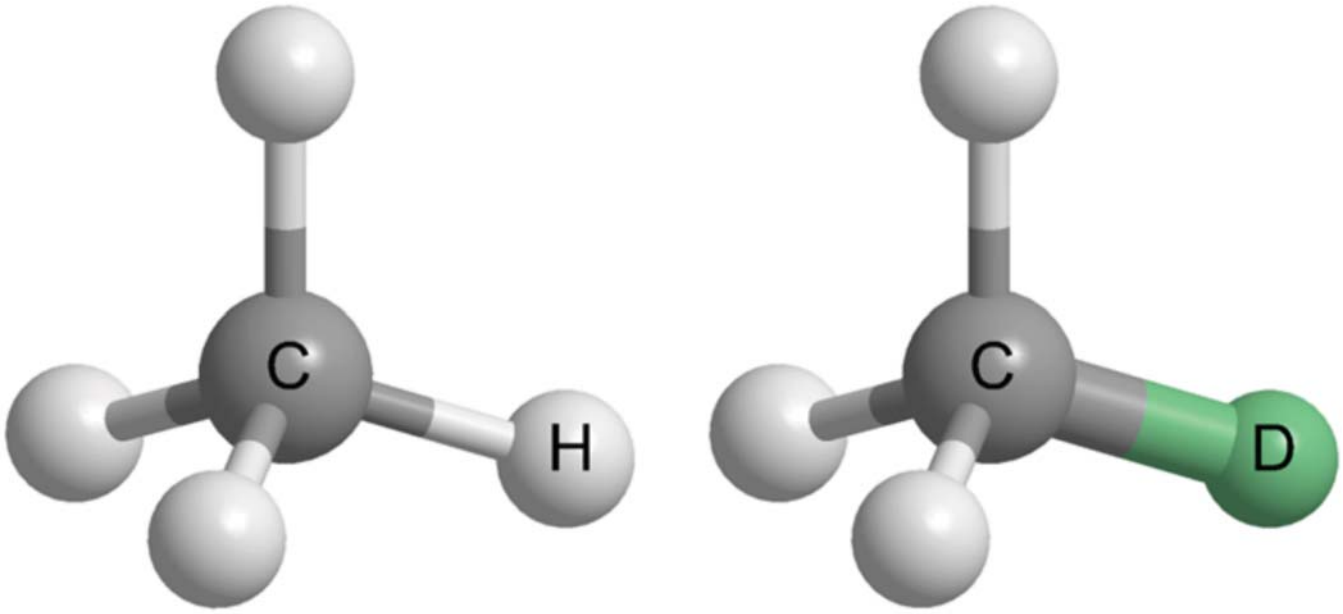

Figure 4: Substituting hydrogen with deuterium strengthens the chemical bond of a molecule.

deuterated components provides contrast between the layers of organic light emitting diode devices enabling detection of diffusion between the layers when the devices become hot, which adversely impacts their performance. [5]

Semi-solid systems based on lipids such as glycerides in water are attracting interest for their potential as (a) controlled-release drug-delivery agents (Monash University) and (b) systems for crystallisation of protein as structures for drug targets (National Institute for Standards and Technology, U.S.A.). Deuterated lipids have a role to play as subjects for neutron scattering experiments, to provide information about the structures, interactions, and kinetics of these systems.

4. Deuteration to enhance the properties of materials

Heavier than hydrogen by a single neutron, deuterium might not seem to have much chemical effect. But this increase in mass atom makes a massive difference in the reactivity of hydrogen versus its isotope deuterium. Deuterium-carbon bonds are generally about six to ten times more stable than the corresponding hydrogen carbon bonds (Figure 4). These stronger bonds are more difficult to break, which can slow the rate of bond cleavage. This effect upon rate is called the deuterium kinetic isotope effect (KIE), which the NDF and the Human Health teams at ANSTO have been investigating in a number of applications that ranges from molecular electronics to healthcare products. For example, once inside the body, a radiotracer (molecule which enable the medical imaging of diseases) or a drug compound must escape the ambush of our metabolic system as it races towards its biological target (Figure 5). The body's devotion to rapidly breaking foreign materials into tiny inactive species and then ejecting them means that some radiotracers won't reach their targets or drugs need to be taken more frequently than they otherwise would. The NDF has already started to explore these valuable opportunities, in which deuterium modification can provide an important industrial, medical and technological advantage, owing to the superior properties of some deuterated materials. These include biologically active materials (e.g., vitamins), biopolymers, lubricants, technology materials, radiotracers and nuclear medicines.

4.1 Development of a rapid screening method for new deuterated molecules

Evaluating the difference in metabolism between deuterated and non-deuterated analogues is typically performed

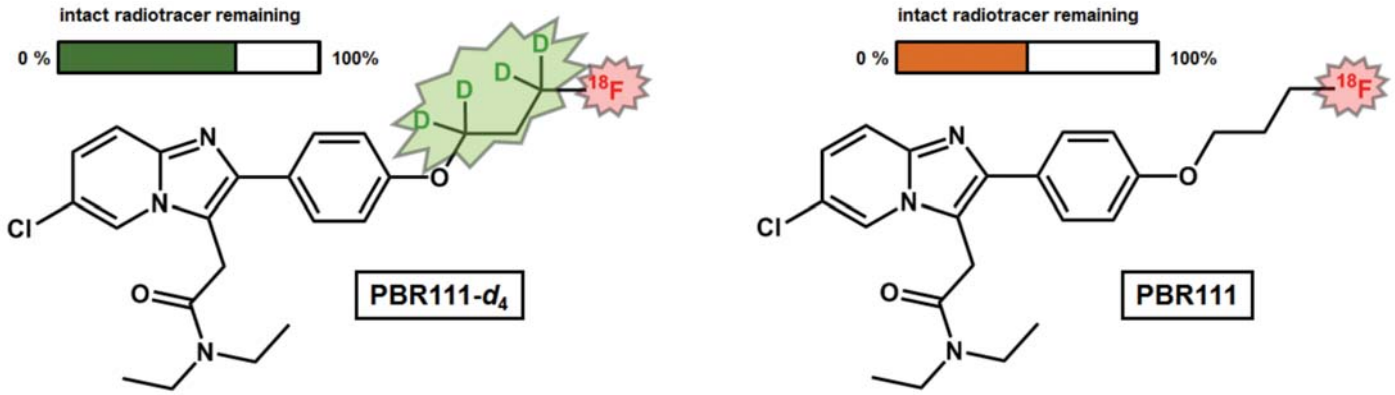

Figure 5. Deuteration (shown in green) of the section of the molecule near the radiolabel (shown in red) increases the metabolic stability of the neuroinflammation imaging agent PBR111 (radiotracer). [6]

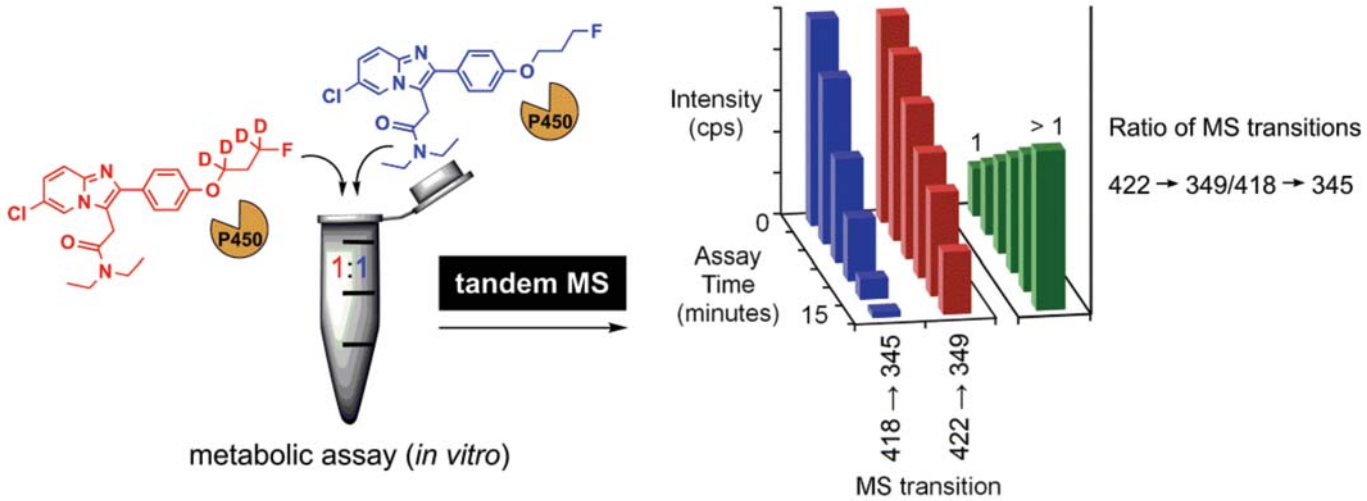

Figure 6. Schematic of the method to determine the difference in metabolic stability between deuterated and non-deuterated isotopologues, as applied to the imaging agent PBR111; (a) metabolic assay of a 1:1 mixture of the isotopologues in one-pot, (b) tandem MS (blue and red bars), (c) calculate the ratio of the MS transitions of the isotopologues with time (green bars), (d) deviation of the ratio from the initial value with time indicates an observable DKIE.

separately for both isotopologues because they cannot be distinguished by methods involving liquid chromatography or radiolabelling.

We recently developed a new screening method [6], which combines an *in vitro* metabolism assay with tandem mass spectrometry to rapidly determine if the site of deuteration has resulted in an improvement to metabolic stability, in a one-pot approach. As the mass (unique to each molecule) is being monitored, there is no need to analyse the compounds independently.

A 1:1 ratio of both the deuterated and non-deuterated molecule is subjected to metabolism, and the relative rate of consumption of both isotopologues was determined by using MS/MS transitions unique to both molecules. A deviation of the ratio of the MS transitions from the initial starting point pre-metabolism with time indicates a KIE. The process is shown in Figure 6.

While this method was applied to the imaging agent PBR111, it could be applied to any pair of deuterated and non-deuterated isotopologues, including pharmacologically active molecules, to aid in determining the suitability of the chosen site of deuteration.

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Appendix I

The Deuterium isotope and deuteration

There are three isotopes of the element hydrogen: hydrogen (protium), deuterium, and tritium. Protium is the most common isotope of hydrogen with an abundance of more than 99.98%, the reason for which protium is commonly called hydrogen. The three isotopes each have one single proton but differ in the number of their neutrons. Hydrogen has no neutron, deuterium has one, and tritium has two neutrons. The isotopes of hydrogen have, respectively, mass numbers (total number of protons and neutrons) of one, two, and three. Their nuclear symbols are therefore ^{1}H (or H), ^{2}H (or D), and ^{3}H (or T).

(See also https://en.wikipedia.org/wiki/Deuterium)

The atoms of these isotopes have one electron to balance the charge of the one proton. Since chemistry depends on the interactions of protons with electrons, the chemical properties of the isotopes are nearly the same. Compounds that have their hydrogen atoms been substituted with deuterium atoms are called deuterated compounds or deuterium labelled compounds, while the original compounds that contain the native (most abundant) hydrogen atoms are called protonated compounds.

Deuterium (^{2}H or D) occurs in nature with an abundance of

~156.25 ppm in the water of the oceans. This means there is one atom of deuterium for every 6420 of hydrogen. Because of the extra neutron present in the nucleus, deuterium is roughly twice the mass of protium or hydrogen. Deuterium can replace the normal hydrogen in water molecules to form heavy water (D_2O), which is about 10.6% denser than normal water. Heavy water is used as a coolant and a neutron moderator for nuclear reactors so that neutrons are more likely to react with the fissile uranium-235 than with uranium-238, which captures neutrons without fissioning. Limited consumption of heavy water does not pose a health threat to humans. It is estimated that a 70 kg person might drink 4.8 litres of heavy water without serious consequences. However it is toxic with 25% substitution of the body water for D_2O causing cell division problems and sterility, and 50% substitution causing death.

(See also https://en.wikipedia.org/wiki/Heavy_water)

Appendix II

Techniques and instrumentation

"**Contrast**" in neutron scattering and diffraction experiments is defined as the difference between the mean scattering density of a component and its background, which can be a solvent or other components of an assembly of biological or chemical molecules. The greater the contrast, the more readily a component can be distinguished from its surroundings. "Contrast variation" involves the manipulation of the contrasts between specific components in a system in order to extract structural information on individual components. For neutrons, one of the largest differences in neutron scattering amplitude is between the isotopes of hydrogen (i.e., ^1H and ^2H). ^1H has a coherent scattering length of -3.74×10^{-5} Å while deuterium has a coherent scattering length of 6.67×10^{-5} Å. Thus the scattering length density of a molecule can be varied by replacing hydrogen with deuterium allowing it to match that of some other component in the system. This technique of contrast variation is one of the key advantages of neutron scattering over X-rays and light scattering.

(See also https://en.wikipedia.org/wiki/Small-angle_neutron_scattering)

Small-angle neutron scattering (SANS) is an experimental technique that uses elastic neutron scattering at small scattering angles to investigate the structure of various substances at a scale of about 1 – 100 nm. Contrast variation by molecular deuteration is used in small-angle scattering as a powerful method for examining the shapes and interactions of biological molecules in solution. If one has ordered samples, then contrast variation used in combination with neutron diffraction experiments can provide important information about the location of disordered components that cannot be seen in X-ray diffraction experiments.

(See also https://en.wikipedia.org/wiki/Small-angle_neutron_scattering)

Neutron reflectometry is an experimental technique for measuring the structure of thin films. The technique provides valuable information over a wide variety of scientific and technological applications including chemical aggregation, polymer and surfactant adsorption, structure of thin film systems, biological membranes, etc. Deuterated compounds are used here to create contrast between the different components of the system so that they can be probed separately.

(See also https://en.wikipedia.org/wiki/Neutron_reflectometry)

Neutron protein crystallography provides a powerful complement to X-ray crystallography, enabling key hydrogen atoms to be located in biological structures that cannot be seen with X-rays alone. In this case deuterium labelling is used to minimize the incoherent noise signal from hydrogen atoms (deuterium has a low incoherent component) which brings significant improvements (orders of magnitude) in the signal to noise ratios and therefore eliminate structural ambiguity which is often associated with unresolved positions of hydrogen atoms in interacting systems.

(See also https://en.wikibooks.org/wiki/Structural_Biochemistry/Proteins/Neutron_Diffraction)

Neutron spectroscopy is a spectroscopic method of measuring the atomic and magnetic motions of atoms. It observes the change in the energy of the neutron as it scatters from a sample and can be used to probe a wide variety of different physical phenomena such as the motions of atoms (diffusional or hopping) and the rotational modes of molecules. Specific deuteration can identify which specific hydrogen atoms are involved in which vibrational modes in the spectra.

(See also https://en.wikipedia.org/wiki/Neutron_spectroscopy)

Nuclear magnetic resonance (NMR) spectroscopy is an analytical chemistry technique that relies on the nuclear spin properties of the atoms for determining the molecular structure of compounds and macromolecule systems. When placed in a magnetic field, NMR active nuclei (such as ^1H, ^2H, ^{13}C, or ^{15}N) absorb electromagnetic radiation at a frequency characteristic of the atom or the isotope of the atom. Therefore different nuclei resonate at a different frequency and information about the nucleus' chemical environment can be derived from its resonant frequency. Because of deuterium's nuclear spin properties, which differ from the normal hydrogen usually present in organic molecules, NMR spectra of hydrogen are highly differentiable from those of deuterium. Substituting deuterium for hydrogens also removes unwanted 1H-1H coupling (spin interaction), simplifying the analysis of complex spectra.

(See also https://en.wikipedia.org/wiki/Nuclear_magnetic_resonance_spectroscopy)

Infrared spectroscopy (IR spectroscopy) is a spectroscopic technique that deals with the infrared region of the electromagnetic spectrum, which is light with a longer wavelength and lower frequency than visible light. It exploits the fact that molecules absorb specific frequencies that are characteristic of their structure. It can be used to identify and study chemicals, and it easily differentiates deuterated compounds from protonated ones. The large mass difference between hydrogen and deuterium strongly affects molecular vibrations resulting in a large difference in infrared absorption frequency between the vibrations of a chemical bond involving deuterium versus a bond involving light hydrogen.

(See also https://en.wikipedia.org/wiki/Infrared_spectroscopy)

Forget K-beauty and J-Beauty it's all about C-Beauty

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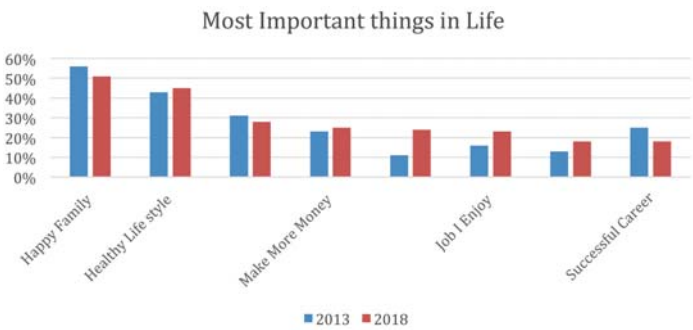
Introduction

Within the beauty industry East is meeting west with the Asiaficasion of the cosmetics industry in the US and Europe, with K-beauty and J-beauty brands becoming more and more popular in western countries but what about C-beauty? Due to the diversity in consumer groups across a large geographical area and a variety of different income celling's in China, has led to the emergence of C-beauty. Unlike K-beauty and J-Beauty which is led by global players such as Shiseido, KAO, Armorepacific and LG, and an extremely hard and expensive market to operate in, C-beauty, on the other hand, offers space, opportunity, and riches for, multinational, local and overseas brands. C-beauty operates on multiple platforms such as E-commerce such as Alibaba, M-Commerce such as WeChat as well as traditional brick and mortar shops such as "New Century Global Center, Chengdu" which is the biggest Mall (and biggest Building) in the world. [2]

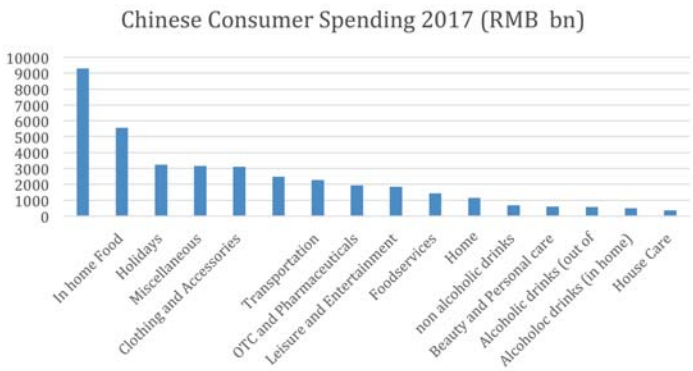
In China, the skincare market alone is expected to be worth CNY250 Billion (AUD$50 Billion) by 2022. So, with such diversity and a large growing market, China offers an opportunity for Australian brands to explore. In this paper, we will explore what Chinese consumers are looking for, how to export without the grueling regulatory process, what social media is best for China as well as some of the latest trends in the beauty industry and how to exploit these opportunities. [1]

What are the Chinese consumers' priorities

When developing products for Chinese consumers, its first imperative that you know what is important to them. In 2018, when asked what matters the most, the top 3 choices: Happy Family, Healthy lifestyles and best education for their children remained the same compared to 2013, however, what was noticeable was that consumers in 2018 had more emphasis on their personal happiness at work, with more consumers wanting to earn money whilst enjoying the work they do. In fact, the desire to have a successful career was less important in 2018 compared to 2013. [1]



Knowing what's important to a Chinese consumer will also let you know how they spend their hard-earned money. It is expected that consumer spending in China will grow at a rate of 8.4% over the next 5 years and reach RMB 57,788 billion approximately AUD $ 12,971 billion in 2022 [1]. It is expected over the next 5 years more money will be spent on out of home



goods and services, such as transportation, holidays, eating out and Spa experiences. Personal and Beauty care is estimated to be around RMB 612 Billion approximately AUD $ 127 billion

Growth in consumer spending particularly in the personal care sector has decreased in 2018 Vs same period in 2017, this softening of the grown maybe a result of the trade war between the US and China.

Social Media in China

Forget Facebook, Instagram, and Linked In, in China, it's all about WeChat!! WeChat was launched in 2016 and by 2018 was one of the world's largest standalone mobile phone apps, based on the number of Monthly active users. WeChat can be used for a variety of functions from Social media, messaging as well as a payment service, amongst other services. Companies in China can use WeChat to help promote their goods and services by pushing messages onto their subscribers.

Another popular and every expanding app in China is Meitu, which initially started as an Instagram styled Selfie posting app, however, Meitu is looking to expand into the E-commerce space to become a one-stop beauty shop. Meitu's sister app Makeup Plus already has an E-commerce feather and currently stock make up brands such as Bobbie Brown.

So, when developing a cosmetic range for the China market, it's important to explore different social media platforms used in China and how you can use these platforms to build your network, advertise your brand and develop loyal brand following.

Daigou shoppers, what are they?

Around a decade ago there began the booming trade of Daigou shopping as a direct result of mistrust in the authenticity of some products sold in China, as the Chinese authorities identified several scandals involving adulterated or fake baby formulas, leading to a thousand or babies becoming ill and in the worst case resulting in the death of some babies. As a result, Chinese consumers preferred to purchase overseas goods from countries they believed to have higher safety standards, Such as Japan, Korea, EU, Australia, and New Zealand [3]

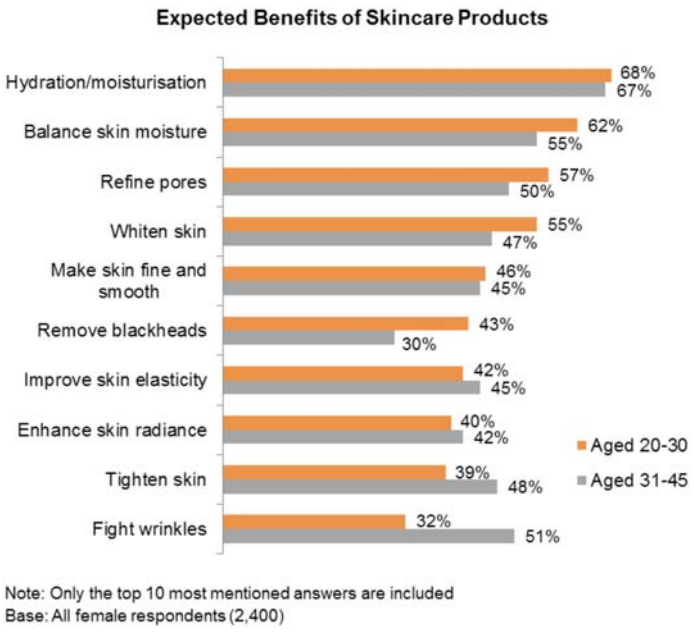
So, what is a Daigo shopper? Dai means "on someone's behalf" and Gou means "to purchase" so essentially a Daigo shopper is an overseas surrogate shopper who buys on behalf of a person living in mainland China and send these goods back to China by mail, if the individual goods are below a certain value they can import without issues or tax. The Daigou shopper would mark up the goods in order to make a profit from the sell, it is believed that some Daigou shoppers are earning in excess of AUD $70,000-$100,000 per year, In fact, Daigou shopping a number of shops have appeared in areas with high levels of Chinese expats selling desirable goods in addition to that Australia Post have opened a number of Post offices specifically for this purpose in areas such as Chatswood in Sydney. This desire for Australian made products in China is so large that companies that sell and market directly to Chinese consumers on behalf of Australia brands such as AuMake become extremely successful over the last year or so.

Are Chinese consumers changing their hair washing habits?

Hair care has become an important but saturated market in China, however there is still room for volume growth in this sector, due to the fact most consumers in China do not wash their hair every day as they believe this will damage their hair and cause hair loss, instead most Chinese consumers only wash their hair every 2 or 3 days. Therefore, increasing the number of washes in China will be the key driver over the coming years. However, what can be done now?? This apparent wash phobia creates opportunity for new product segments such as products designed for in-between washes such as Dry Shampoos, wipes or develop shampoos designed to keep the hair clean for 3 days, such as P&G's Rejoice micellar water haircare range which came with the slogan "Challenge: No hair wash for 3 days". So, the key to growth in this market segment is to differentiate your product, think about what your product can do in between normal wash, such as protect the hair from pollution or provide a gentle cleanse between washing, etc. [2]

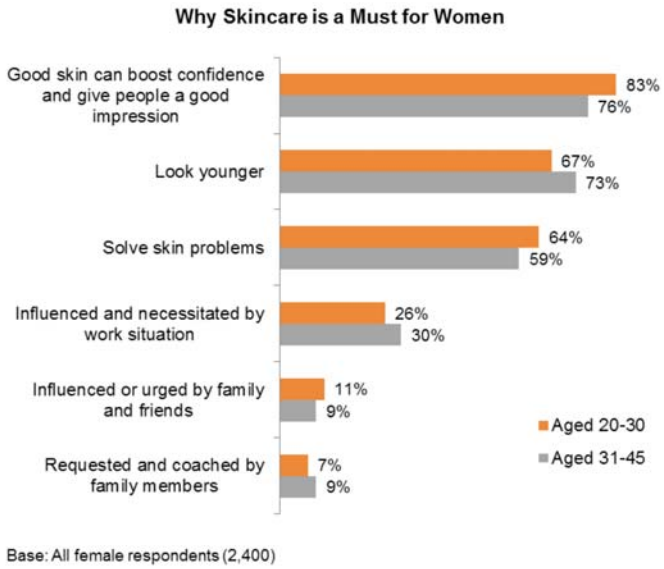
Concerns for Chinese consumers

The signs of aging in Chinese people are different from what we see in more European/ Caucasian based countries. For



example, the crow's feet wrinkles in Chinese woman can take around 10 years longer to be as visible as a Caucasian female's wrinkles. However, yellowing of the skin is much more prominent in Chinese females.

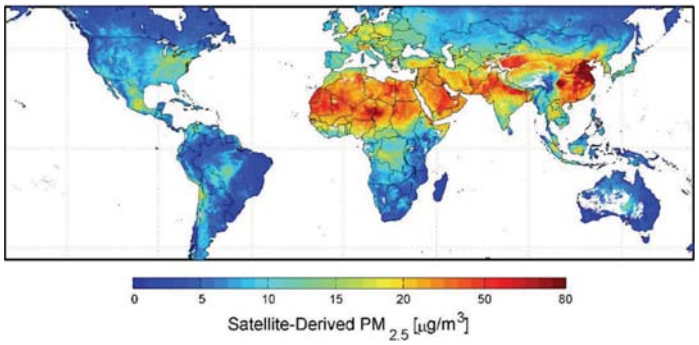
The below graphs show what the expectations and why Chinese consumers say skincare is a must.



Three main trends in skincare

There are three main trends currently in China when it comes to skincare: Health and wellness, instant gratification and facial masks.

Health and wellness are linked to pollution, it will be no surprise to anyone to know that China is one of the most polluted countries in the world. With 2.5 ppm levels reaching dangerously high levels, this affects the two most important things to a Chinese consumer, 1 happy family and 2 healthy lifestyles so it's easy to see why skincare which is promising to protect against pollution would be important.



Source – Global satellite- derived map of PM 2.5 average over 2001-2006.

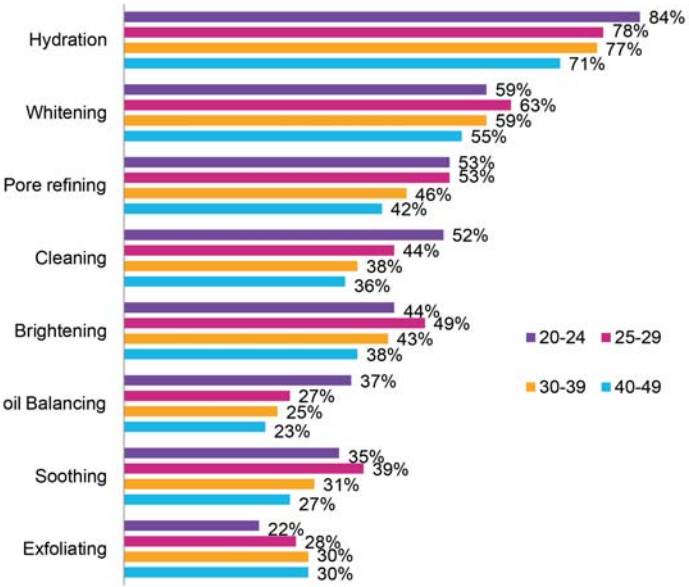
Some anti-pollution products on the Chinese markets are Dior One Essential City Defence, taking the approach that Detoxing the skin = Anti-pollution, it claims to be Anti-Adhesive and to repel pollution particles at the surface of the skin, it has Anti penetration effect to prevent particles from getting into the deeper layers of the skin and finally an Anti-Oxidant effect to help repair damage caused by pollution.

Instant gratification is driven by millennials where the need for immediate results, with minimum preparation time, is required. This has led to the development of multifunction products, such as Air cushion with an all in one approach for pore minimalization, anti-aging, blemish control, Anti-pollution and more. Other instant effect products include pore minimisation products such as Lancôme instant pore minimiser – which helps reflect light from the skin and help minimise the appearance of pores.

Face masks, in China 19 billion face masks are used per year as it is perceived that face masks give the user better results. Face masks can be used at any time, at home, or even on public transport, the major claims associated are moisturisation, whitening and pore reduction.

Claims are slightly different depending on the age of the consumer Among the younger generation, healthy, radiant skin that glows has become the new definition of beauty.

These drives brightening and whitening claims, especially in China as shown by the graph below.



Growth for face masks in China between 2017-2019 has seen an increase by 29% to reach a market value of USD$ 18.074 M similar growth is seen in India and higher growth in Malaysia however both these countries are coming from a lower starting point. The face mask market in China outperforms both Japan and South Korea whereas the market in Australia has contracted by 7%

What product should you launch next to China?

With the growing awareness of having good skin, and ongoing education of the Chinese consumers, the Chinese consumer is now looking for a more complete, high tech and indulgent skincare routine, this has led to the rise in

Facial care: Retail Market Value Projections (m USD)				
Country	2017	2018	2019	% change between 2017 - 2019
Australia	787	722	743	-7%
China	15,805	16,793	18,074	29%
India	1390	1,447	1,520	23%
Japan	13,536	13,844	14,994	16%
Malaysia	452	490	563	41%
South Korea	6,648	6,730	7,075	16%

Ampoule skin care. Ampoule facial products have been used sparing in China over the last few years, only used for special occasions such as weddings, parties, photo shoots, etc, that is until the now. Recently the number of internet searches for ampoule products doubles in only 6 months in the latter half of 2017 and this growth has continued to be strong, with brands such as MartiDerm being valued at RMB 100M (approx. AUD$ 20.9M) in only 10 months since it launched on Tmall International, a B to C operation owned by Alibaba. Ampoule products are hitting the Chinese market containing products such as Retinol, Hyaluronic acid as well as Vitamin C, however, there is room for some innovation in the space, such as using unique active ingredients or Chinese traditional medicine, developing new concepts or technologies or simply incorporating some uniquely Australia ingredients such as Lemon Myrtle.

Conclusion

So, what should a brand owner do if they want to conduct business in the Chinese market? Taking the above into consideration, firstly a brand owner should identify the needs and uniqueness of your products and how you will position these in the Chinese market based on the consumer desires, what advertisement and social media plant forms will you use, how will you ensure sufficient coverage. The route to market, will you register your material, or will you create the need for Daigou shoppers to be buying your products. Whatever path you chose remember, the needs of this market are different to your own domestic market so keep this in mind when developing your brand.

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