

## **Personal Care Feature: Bathroom Products 2002**

**John Woodruff**

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Personal care products for use in the bathroom were once bath salts, shampoo, an antiperspirant or deodorant and for men, shave cream. Then came bath foams and shower gels and more recently, cream body washes. Even today that list would be sufficient for the average male bathroom but would hardly fill one shelf for the typical female. This was very apparent by the answers I received from male and female respondents when gathering information for this feature.

Bath salts have progressed from crystals of sodium bicarbonate through the more readily soluble sodium sesquicarbonate to sea salt, bath rocks and bath bombs. Sea salt can be just that, suitably perfumed and perhaps with a foaming aid like sodium lauryl sulfate added. Very popular are Dead Sea salts, which have a quite different mineral composition. It is said that Cleopatra was presented with Dead Sea salts by King Solomon and at her command, pharmaceutical and cosmetic factories were built at Ein Bokek and Ein Gedi near the Dead Sea.

The use of Dead Sea skin care products is effective in the treatment of psoriasis, eczema, arthritis, rheumatism, acne, pimples and rash muscle stiffness. Israeli dermatologist Dr. Zvi Even Paz, **Hebrew University of Jerusalem**, studied the effect Dead Sea bath salts had on fifty psoriasis patients in 1989. In forty-seven cases significant relief was achieved. Maximum improvement was found when patients soaked in one kilo of salt in solution for three baths per week, for a period of six weeks.

Typical composition of Dead Sea salts is given as

Magnesium chloride	31% – 35%
Potassium chloride	24% - 26%
Sodium chloride	4% - 8%
Calcium chloride	0.3% – 0.6%
Bromide	0.3% - 0.6%
Sulfates	0.05% – 0.3%

With the remainder being insolubles and water of crystallisation.

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The properties are described in USP 6,248,340 [REF 1] wherein it is claimed that the sodium ions remove skin scales and improve its permeability. Magnesium is essential for cell metabolism and skin scales of patients that suffer from psoriasis are said to show a significant deficit in magnesium content, which may be corrected by soaking in Dead Sea salt baths. Potassium regulates the electrical process of the muscles and the nervous system and the bromide ion is said to have a relaxing effect. The patent claims that *in vitro* and *in vivo* tests showed that Dead Sea salts inhibited skin cell proliferation after dermal application, making them applicable for care of psoriasis and dry skin conditions.

Bath bombs exploded onto the scene about fifteen years ago; in their simplest form they are anhydrous mixtures of citric acid with sodium bicarbonate, mixed with a suitable binder and compressed into a mould. Tartaric acid is said to increase effervescence and foaming agents can be added with fragrance and colour. Bath rocks can either be big crystals of sodium bicarbonate or miniature bath bombs and there are many variations on this theme.

Bath foams, like the majority of surfactant based personal care products, claim to be mild and suitable for sensitive skin yet the majority are still based on sodium laureth sulfate because formulating with it is easy and cost effective. To modify its harshness and to improve foam texture sodium lauroyl sarcosinate may be added as a secondary surfactant with PEG-7 glyceryl cocoate as a water-soluble emollient with perfume solubilising properties. Mildness data from *in vitro* neutral red assay and *in vivo* trans-epidermal water loss assessments are available from **Croda Oleochemicals** and show significant positive benefits in terms of reduced cell death and less impact on skin barrier function.

Where high levels of perfumes, essential oils or other lipid additives are required in a surfactant system solubilising them can be a problem. A mixture of PEG-6 caprylic/capric glycerides with PEG-60 almond glycerides (Crodasol AC ex Croda Oleochemicals); PEG-10 olive glycerides (Lexol EO from the **Inolex Chemical Company**) and PEG-18 glyceryl oleate/cocoate (Antil 171 ex **Goldschmidt**) are particularly effective and can replace cocamide DEA in most formulations, although not as cheaply.

For many people, washing is no longer just about cleanliness, but about feeling energised and ready for the day ahead, or relaxing in a pampering bath as a means of unwinding after work. Horse chestnut was once the bath additive of choice but now the alternatives are unlimited,

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ranging from real rose petals, suspending them can be a problem, to dozens of different extracts; each guaranteed to soothe, pamper, moisturise or stimulate the imagination. The ultimate bathing experiences are provided by Spas and health & beauty centres so ingredients that mirror their treatments are of interest for home use. **Dragoco** suggest red and white grape seed extracts from its Fruitapone range, which also contain bisabolol or green tea for additional benefits. Oats have long been known for their soothing action and Dragoco have identified and standardised their active ingredients and produce a vitamin C and oat bath treatment and also offer almond, pistachio and honey milks for bathing products from its range of Milk Extraponos.

Baths are for soothing and relaxing but showers are for waking up and energising body and mind for the day ahead. They should also clean, foam and impart a pleasant skin feel. Contact with bath additives is only after considerable dilution but a shower gel is applied in concentrated form with hand or sponge, massaged over the body and then rinsed away. Although copious foam is still required mildness is essential and sodium lauroyl sarcosinate, sodium cocoyl isethionate or polyalkyl glucosides are used to add both mildness and improved foam characteristics. Additives for energising include an extract of *Undaria pinnatifida*, a seaweed known in Japan as "wakame" and its extract from **SECMA** is recommended as an "energy cocktail" for use on tired skin.

For providing skin treatment as well as cleansing, cream body washes are ideal. To incorporate a moisturising emulsion within a surfactant system requires careful formulation or the high levels of surfactant will destabilise the emulsion. Patent WO 94/01084 [REF 2], describes a personal cleanser with a moisturiser achieved by the formation of a stable liquid soap cleansing composition comprising a potassium fatty acid soap with free fatty acid, a high level of a polyol and up to 5% petrolatum and up to 5% of a glycol ester with water and other cosmetic additives. Petrolatum is added to the prepared liquid soap after saponification is complete and the base has cooled to between 35 - 45°C. It is important that the petrolatum is added when the temperature of the mix is below the melting point of the petrolatum and it is claimed that it imparts skin-conditioning benefits.

Cream body washes were very much in the spotlight at the SCS Spring Symposium in 2000 and Tracy Sanderson [Ref 3] described brand fingerprinting with data showing how the technique was used to identify and define the skin feel and performance characteristics of

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seven leading products. The results are of interest to any formulator charged with creating similar compositions because it illustrates consumer needs and perceptions for such products. An easier way to produce a product with moisturising properties and the appearance of a cream is to use a propriety mixture like Lamesoft PO65 from **Cognis**. The principal ingredients are coco-glucoside and glyceryl oleate; it can be added cold and if used at the concentration recommended there are proven moisturising and skin-smoothing benefits. An alternative material is Cromollient SCE, Croda Oleochemicals, an emollient ester designed to be soluble in surfactant systems. Its INCI designation is Di-PPG-2 PEG-10 myristyl ether adipate and performance test data shows excellent wet and dry skin feel when incorporated at 3% in a body wash formulation.

Not everyone likes to see homogenous products; apparently by design there are 2-layer cream body washes and 2-layer and 3-layer bath oils and foam baths. From Quest International is a suggested formula (**attached**) for a two-layer shower mousse with a clear lower phase and a creamy top phase. It is dispensed from an **Airspray** foamer to give a rich creamy mousse and it contains moisturising ingredients to leave the skin feeling soft and smooth.

Including particulate matter in bath foams and shower gels is popular with marketing departments if not with formulators. **A&E Connock** provides a wide range of suitable materials and two published papers available on its web site describe methods of ensuring product stability by selecting the correct rheological additive. Adding shimmer to a product is achieved by the addition of Timeron pigments from **Merck**, and samples available from **S.Black** show the different effects that can be obtained using identical pigments in the same base formula but with different suspending aids. Also from Merck are Colorona Black Stars for adding to bath products and continuing the black theme, Ucuuba butter is almost black in colour and may be used for producing black soaps. This and Andiroba oil, which has some documented insect repellent properties, come from Brazil and are harvested under the control of provincial authorities to provide sustainable business with reasonable remuneration for local communities; both materials are available from S. Black.

Cognis suggest Primasponge millicapsules as a means of introducing visual effects with active ingredients into foam bath and shower gels. The actives, which include panthenol, tocopherol and  $\beta$ -carotene plus various emollient oils and esters are adsorbed onto an agar

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matrix and surrounded by an outer shell of alginate and chitosan. They come in two sizes, 0.7 - 0 1.6mm and 2.4 – 3.7mm and release their load on application to skin. Other encapsulated materials adding both visual and physiological effect include the Confetti range from **United-Guardian Inc** and Lipo Microcapsules from **Lipo Chemicals Inc**.

Inverse solubility characteristics may be used to formulate interesting compositions. Methyl Gluceth-20 Benzoate, Finsolv EMG-20 from the **Cornelius Produce Company** is one such material with emollient properties that can be mixed 20:80 with water and it blooms when added to a bath and forms an emollient film on the skin when added to a shower gel. Bath oils may float; disperse as a milky cloud or foam. They can support higher loadings of aromatherapy oils than the surfactant systems, usually dissolved in a mixture of emollient oils and esters. The concentration of the dispersing aid influences what type of product will result. Typical dispersing aids are PEG-40 sorbitan peroleate, C12-13 pareth-3, oleth-3 or PEG-12 palm kernel glycerides and a useful guide to their use in formulations is available from Croda.

Men may go to the bathroom to get clean; however many women first cover themselves with mud, presumably because they are already too clean to warrant a bath or shower. Dead Sea mud is an obvious choice. It has all the properties of the salts mentioned earlier plus it is suitably black and smells of sulphur. Patents abound for its use; USP 5,866,145 [REF 4] describes a body polisher and skin treatment. It is a two-phase composition containing approximately 67% Dead Sea salt and 33% silicone oil. Other muds include fresh water silt from ancient central European lakebeds via Adina Chemicals and Ghassoul mud from Morocco via Paroxite Ltd., who also supply natural coloured clays.

USP 5,679,378 [REF 5] claims that Dead Sea mud promotes hair growth, which may appeal to men but would horrify females using it as a body wrap. The inventor claims a spark of genius led him to begin to apply Dead Sea mud to his bald scalp. He intuitively allowed each application of mud to remain on his scalp for 30 to 45 minutes. After he had faithfully repeated this treatment procedure every other day for a period of six weeks, he and his spouse clearly noticed the growth of new hair where no hair had existed before. Further trials were undertaken and observers recorded significant hair growth in participants suffering from androgenic alopecia and it was recorded that younger subjects had more marked hair growth restoration compared with those that were older and had more advanced hair loss.

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Thalassotherapy is the therapeutic use of seawater and products from the sea. Sea algae yield many interesting materials with claims for cosmetic activity. Particles of dried seaweed available from A&E Connock are ideal for incorporation into bath gels or body wraps with a sea theme. The particles can be irradiated to ensure freedom from microbial contamination. Although they will slowly hydrate in an aqueous composition personal experience has shown that they remain as discreet particles. Thalaceane, **Nature Algues**, is a green powder that is a mixture of dried and ground green and brown seaweeds that are mixed with water just prior to application. Other variants are available from the same company for slimming and toning wraps. **Exsymol** supply Cafesilane C, Theophilisilane C or Algisium C for the treatment of cellulite and these are also suitable for adding as additives to body wraps.

Soothing ingredients may be lost at in-bath dilution but application in a body wrap brings them in close proximity to the areas where needed and for an extended period. There are many to choose from including Manuka honey and Hippophae oil from **Paroxite** and Sensiline from **Silab**. This is a blend of acid polysaccharides and peptidoglycans from *Linum usitatissimum* (linseed) that form a microfilm on the skin to prevent the penetration of irritants and allergens. Also from Silab is Amanduline, an extract of *Prunus dulcis* (sweet almond), rich in amino acids that form short-chain peptides that are substantive to skin, forming a protective barrier.

Finally multi-functional products are increasingly popular; a formula from **Chemlink Specialities Ltd.** combines mud and cleansing in one shower gel with Dead Sea mud.

### **Cream Body Wash Formula (ref Patent WO 94/01084)**

#### **Stage A**

In situ potassium soap 11.00

#### **Stage B**

Stearic acid 0.67

Palmitic acid 1.13

Myristic acid 1.35

Lauric acid 1.35

Ethylene glycol distearate 1.50

#### **Water Phase**

Water to 100 <sup>w</sup>/<sub>w</sub>

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Glycerin	15.00
Propylene glycol	10.00
EDTA, 4Na	0.02
Sodium lauroyl sarcosinate (30%)	20.00
Sodium laureth sulfate (28%)	7.00
Cocamidopropyl betaine (42%)	9.50
Polyquaternium-10	1.00

### **Cooling Cycle**

Fragrance	0.60
Preservatives	0.80
Petrolatum	3.00

Stage A: prepare an in-situ stearic acid soap solution by saponification.

Stage BL add the fatty acids and ethylene glycol distearate to Stage A and bring to 70c and check for complete melting.

Separately heat the water to 70°C and add the ingredients of the water phase with mixing, mix slowly while cooling.

Cooling Cycle: When below 45°C carefully blend in the fragrance, preservatives and petrolatum.

### **2-Layer Shower Mousse (ex Quest)**

Phase A:

Light paraffinum liquidum	25.00% w/w
Fragrance	2.00

Phase B:

Water (Deionised)	to 100%
Sodium Laureth Sulfate (28%)	20.00
Cocamidopropyl Betaine (42%)	5.00
Cocamide DEA	2.00
Hydroxypropyltrimonium Honey (Honyequat 50)	2.00
Hydrolyzed Milk Protein (Hydrolactin 2500)	1.00
Propylene Glycol	1.00
Sodium Chloride	2.00
EDTA, Tetrasodium salt	0.10

Colour and preservative(s) as required

Dissolve the fragrance in the paraffinum liquidum. Prepare a solution of Phase A. Add Phase A to Phase B.

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**Shower Gel with Dead Sea Mud (Ex Chemlink)**

Dead Sea Mud Powder (Silt) 5.0

Sodium Cocoyl Isethionate (and) Stearic Acid (Hostapon SCI-65) 25.0

Dimethicone copolyol Sulphosuccinate (Mackenate DC-50) 3.0

Disodium Cocopolyglucose Sulphosuccinate (Eucarol AGE-SS) 7.0

PEG-7 Glyceryl Cocoate (Sterol LG 492) 5.0

Potassium Palmitoyl Hydrolysed Wheat protein (and)

Glyceryl stearate (and ) Cetearyl alcohol (Phytocream) 3.0

Perfume & Preservative q.s

Water to 100%

Heat the water to 70°C and disperse the Dead Sea Mud Powder and other ingredients. Once fully dispersed allow to cool to 40°C before adding the perfume and preservative, bottle off at or above 35C

1. Patent USP 6,248,340, Dead Sea Laboratories, Ltd, 19/06/2001
2. WO 94/01084, The Procter & Gamble Co., 25/06/93
3. Sanderson T. Sensory analysis as an aid to formulating better products; SCS Spring Symposium, 2000.
4. USP 5,866,145, Bath & Body Works, Inc, 02/02/1999
5. USP 5,679,378, Olim Industries of Israel, 21/10/1997