

PALM-BASED SHOWER GELS WITH NATURAL EXFOLIATING AGENTS

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Shower gel, also known as bodywash, is the general term for liquid soap. It is available either in emulsion or clear types of products and used as a skin cleansing agent during showering or bathing. Shower gels are a combination of surfactants, water, skin conditioning agents and fragrances. It has chemical advantages over soap because it is milder at cleansing and less irritating to the skin, lathers better in hard water areas and does not leave a mineral residue on the skin or in the bath tub after usage. Almost all commercial shower gels are formulated with petroleum-based materials (Wikipedia).

The objective of this technology is to promote the utilisation of palm-based materials in shower gel products. Palm-based shower gels (*Figure 1*) were formulated with mild surfactants, 83% palm-based materials and natural exfoliating agents, tea tree leaf, apricot kernel and rice scrub.



Figure 1. Palm-based shower gels with natural exfoliating agents.

PERFORMANCE

Palm-based shower gels are made by stirring without heating to dissolve the ingredients. It was formulated with surfactant that provides small and creamy foam for cleansing ability and consumer acceptance.

Foaming Power and Foam Stability

Foaming power is a measure of foam height taken immediately after 200 ml of the test solution is stroked for 30 times using a perforated base rod. The test solution is prepared by dissolving 0.1 g of product with 200 ml water in 500 ml measuring cylinder. Foams stability is the foam height after 5 min. The foaming power and foam stability of the shower gels with tea tree leaf (SBG14), shower gels with apricot kernel (SBG16), shower gel with rice scrub (SBG17) and two commercial shower gels as controls were tested in two water hardness conditions (50 ppm and 350 ppm of water with CaCO_3) and tap water.

In all the types of water, the formulated shower gels showed comparable foaming power and foam stability with those of the commercial products (*Figure 2*).

Foam Structure

The foam size of each formulated product and commercial samples were determined under a microscope of 20X magnification (Olympus AX70). The results showed that the foam size of shower gel SBG14, SBG16 and SBG17 were smaller than those of the commercial shower gels. The small foam size indicated that the products were creamy. The foam size of SBG14 was slightly larger than the foams of SBG16 and SBG17 (*Figure 3*) due to the presence of water soluble tea tree oil perfume.



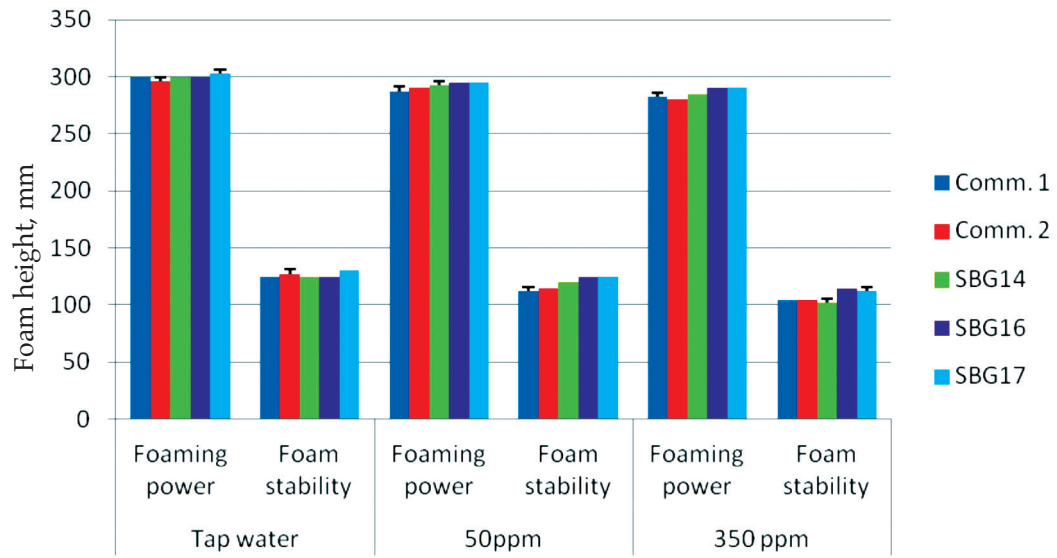


Figure 2. Foaming power and foam stability of the formulated and commercial shower gels.

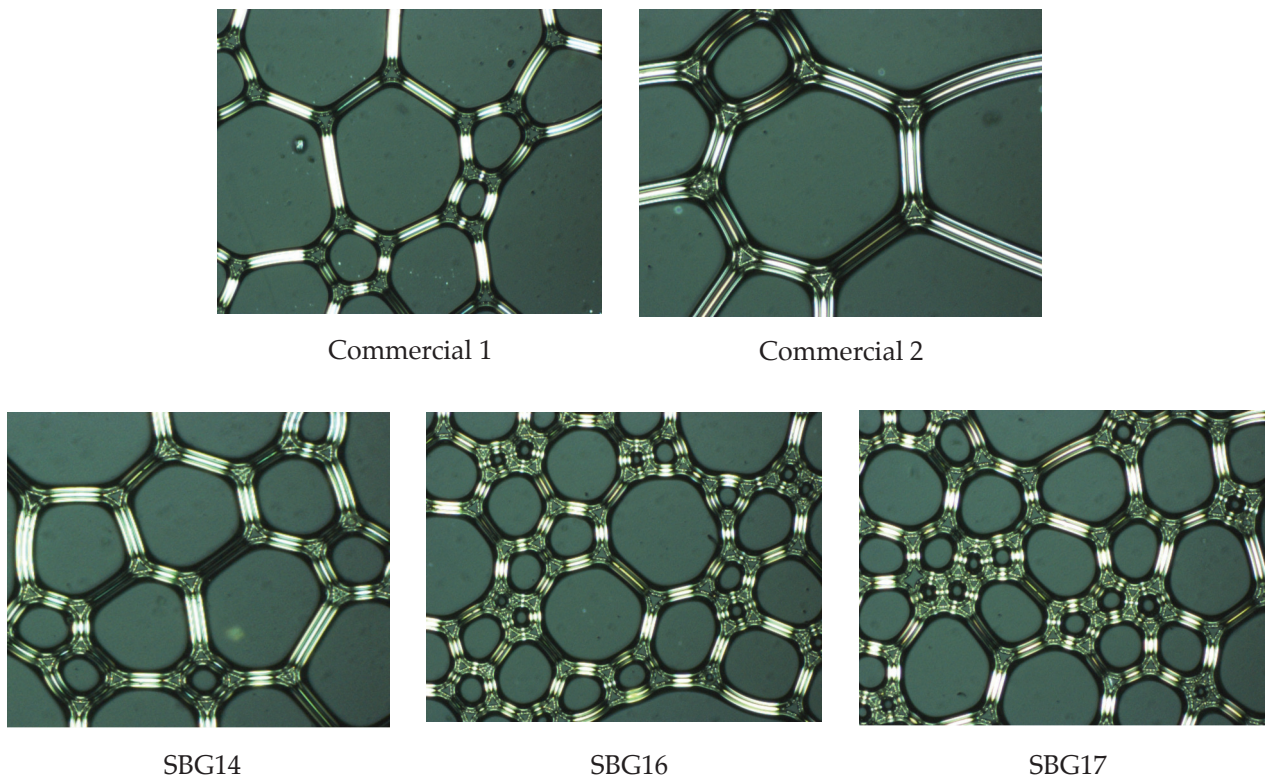


Figure 3. Foam structure of the formulated and commercial shower gels at 20X magnification.

Detergency Test

Detergency tests were carried out on a cotton material CS32 soiled with sebum and black carbon. The test solutions were prepared by dissolving 1.0 g shower gel in 50 ppm and 350 ppm of water with CaCO_3 . The washing tests were done at room temperature (25°C). The sebum and carbon removal properties of the formulated shower gels were comparable with those of the commercial shower gels, in both water conditions (Figure 4).

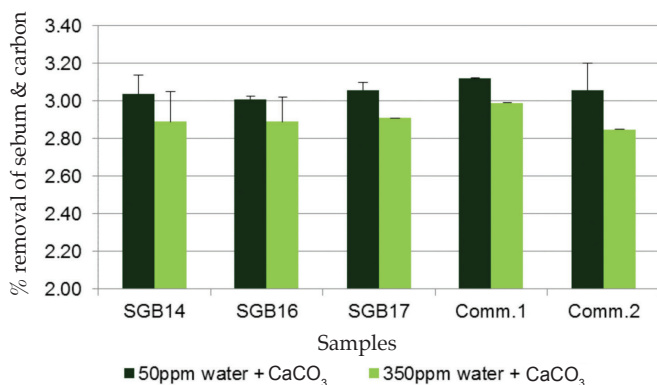


Figure 4. Sebum and carbon removal ability of the formulated and commercial shower gels in two water conditions.

Stability

Exfoliating agents are particles which may get sedimented in shower gels over time. These particles can be suspended in the gels by modifying the quantity of thickening agents. The stability of exfoliating agents in shower gels was measured using a stability analyser (LUMifuge). All samples were centrifuged at 500 and 600 rotations per minute (rpm) for 42 min and 30 s at room temperature. All palm-based shower gels and commercial shower gel 2 were stable at 500 and 600 rpm (Figures 5 and 6). Commercial shower gel 1 was not stable, where some exfoliating agents formed sediments. All the formulated palm-based shower gels were able to suspend the exfoliating agents, indicating adequate thickening agents in the formulations.

Microbial Tests

Aerobic plate counts (APC) and yeast and mold counts (YMC) were carried out to determine the possibility of microbial contaminations from inadequate preservative system of the formulations. Microbial contaminations were measured by estimating the number of viable organisms that grow on a culture medium under test conditions. For APC, the culture medium plates were stored at $35^\circ\text{C}\pm 2^\circ\text{C}$ and colony forming units were observed

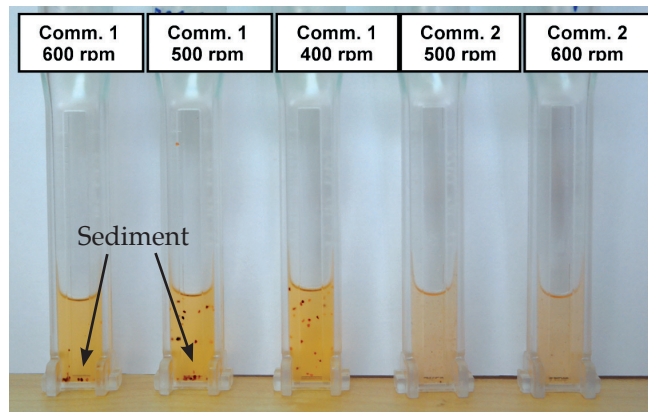


Figure 5. Stability tests of commercial shower gel products.

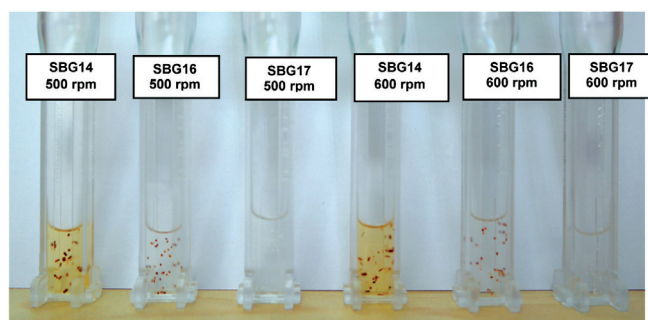


Figure 6. Stability tests of palm-based shower gel products.

after 48 hr. For YMC, the plates were stored at $30^\circ\text{C}\pm 2^\circ\text{C}$ and observed after seven days. The results for APC and YMC showed that no microorganism and yeast growths were observed on the plates indicating a good preservative system of the formulated gels.

MARKET ANALYSIS

According to Mintel Group Ltd (Gabriel, 2013), bath and shower market in USA has shown strong and steady growth from 2007 to 2012. The total sales of bath and shower products grew by USD 1 billion annually and exceeded USD 5 billion in 2012. The market was expected to increase due to integration of moisturising and skin enhancing benefits into the bath and shower products. Consumers now prefer products which not only can enhance skin cleansing, but also able to moisturise, deodorise and exfoliate the skin adequately.

ECONOMIC ANALYSIS

Capital expenditure (CAPEX) = RM 264 000
 (space/building rental, vacuum emulsification machine, filling machine and other assets)
 Operational expenditure (OPEX) = RM 1 783 799
 Internal rate of return (IRR) = 27%
 Net present value (NPV) = RM 331 874
 Payback period = 4 years

CONCLUSION

Palm-based shower gels formulated with natural exfoliating agents offer good creamy foam. The shower gels also suspended the exfoliating agents effectively.

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