

# Sensorial Evaluation of Fragrance in Palm- and Tallow-based Soaps

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## INTRODUCTION

The traditional, universally -accepted soaps have been those based on tallow and coconut oil. However with advanced technology, soaps based on palm and palm kernel oils are found to be suitable for toiletry use too. The soap chips or noodles produced from palm-based fatty acids are of high quality and have less base odour.

However good the quality of soap chips or noodles are, a slight, inherent fatty odour will develop in the soap upon ageing. The consumers' demand for a pleasant bathing soap has to be fulfilled, so the incorporation of perfume into the soap base is a necessity for selling the product. However, perfumes or fragrances contain materials which will give rise to some interactions when added to the soap base. These interactions can cause changes in the odour characteristics of the perfume as well as discoloration in white soaps.

## SENSORY ANALYSIS

In order to detect any changes in the odour characteristics of the perfume, soap samples camouflaged with a brown colour were subjected to sensory analysis. There are various types of sensory analyses, but the triangle test is the best method for comparing the odour changes in two different perfumed soap bases during three months' storage at ambient temperature.

With the assistance of expert panel members from the Odour Evaluation Board of International Flavours and Fragrances of Holland, and also of the PORIM sensory panel, the triangle test was performed on soap samples containing 0.8%, 1.0% and 1.2% sandalwood perfume.

*Tables 1 to 4* summarize the opinions of the panel members on the soap samples which were presented to them at 30-day intervals. The majority of the members

TABLE 1. INITIAL SENSORY EVALUATION BY THE TRIANGLE TEST OF PERFUME IN PALM- AND TALLOW-BASED SOAPS

No. of Triangles (#)	No. of Test Subjects	No. of Correct Results	No. of Incorrect Results	Preference for the		% Correct Results	Odour Description of Sample
				T-Sample*	P-Sample*		
1 TTP T=P=0.8%	6	5	1	1	5	83.3	P-Sample: positive, more perfume, sweeter, pleasant, woody T-Sample: negative, fatty note
2 TPP T=P=0.8%	6	6	0	0	6	100.0	T-Sample: negative, less perfume, soap-base note, weaker P-Sample: stronger perfume odour
3 TTP T=1.2% P=1.0%	6	5	1	1	5	83.3	P-Sample: more pleasant, vertivert woody, more perfume, more sandalwood. T-Sample: fatty odour
4 PPT T=1.2% P=1.0%	6	4	1	1	4	66.7	T-Sample: negative, more soapy, base note, less strength P-Sample: more fresh One member could not detect any real difference
5 PTP T=P=1.2%	6	6	0	0	6	100.0	T-Sample: weak, less perfume, soapy, fatty P-Sample: more citrusy, fresh
6 TPT T=P=1.2%	6	5	1	1	5	83.3	P-Sample: stronger and more perfume, better T-Sample: soapy, less perfume

\* T = Tallow-based soap P = Palm-based soap  
# Percentages indicate perfume content.

**TABLE 2. TRIANGLE TEST OF PERFUMED PALM- AND TALLOW-BASED SOAPS AFTER 30 DAYS STORAGE**

No. of Triangles (#)	No. of Test Subjects	No. of Correct Results	No. of Incorrect Results	Preference for the		% Correct Results	Odour Description of Sample
				T-Sample*	P-Sample*		
1 PTT T=P=0.8%	5	3	2	1	4	60.0	T-Sample: sour odour P-Sample: less sour odour, different, woody.
2 TPP T=P=0.8%	5	5	0	0	5	100.0	T-Sample: sour, not pleasant. perfume not strong, lemony P-Sample: better odour, stronger perfume
3 TTP T=1.2% P=1.0%	5	4	1	0	5	80.0	P-Sample: fresh, strong, nice T-Sample: not pleasant, sour
4 PTP T=1.2% P=1.0%	5	3	2	1	4	60.0	T-Sample: weak, old soap odour mild P-Sample: nice and pleasant
5 TPP T=P=1.2%	5	3	2	1	4	60.0	T-Sample: less strong odour P-Sample: nice
6 PTP T=P=1.2%	5	4	1	0	5	80.0	T-Sample: dull, less strong, no perfume P-Sample: stronger

**TABLE 3. TRIANGLE TEST OF PERFUMED PALM-AND TALLOW-BASED SOAPS AFTER 60 DAYS OF STORAGE**

No. of Triangles (#)	No. of Test Subjects	No. of Correct Results	No. of Incorrect Results	Preference for the		% Correct Results	Odour Description of Sample
				T-Sample*	P-Sample*		
1 TPT T=P=0.8%	6	4	2	0	6	66.7	T-Sample: not pleasant odour P-Sample: strong and nice odour
2 PPT T=P=0.8%	6	5	1	0	6	83.3	T-Sample: nice odour P-Sample: strong and nice odour
3 TTP T=1.2% P=1.0%	6	4	2	1	5	66.7	T-Sample: sour and sharp odour P-Sample: woody and pleasant odour
4 PTP T=1.2% P=1.0%	5	4	1	1	4	80.0	T-Sample: sharp, sour odour P-Sample: nice and pleasant
5 TPP T=P=1.2%	4	3	1	1	3	75.0	T-Sample: mild perfume P-Sample: stronger perfume odour
6 PTP T=P=1.2%	5	5	0	0	5	100.0	T-Sample: tallowy and soapy odour P-Sample: nice odour

TABLE 4. TRIANGLE TEST OF PERFUMED PALM- AND TALLOW-BASED SOAP AFTER 90 DAYS OF STORAGE

No. of Triangles (#)	No. of Test Subjects	No. of Correct Results	No. of Incorrect Results	Preference for the		% Correct Results	Odour Description of Sample
				T-Sample*	P-Sample*		
1 TTP T=P=0.8%	5	3	2	0	5	60.0	T-Sample: perfume odour rather mild P-Sample: strong and nice odour
2 PTT T=P=0.8%	5	4	1	1	4	80.0	T-Sample: perfume odour mild P-Sample: pleasant odour of perfume, stronger
3 TTP T=1.2% P=1.0%	5	2	3	1	4	40.0	T-Sample: no perfume P-Sample: strong odour of perfume and nice
4 PTP T=1.2% P=1.0%	5	5	0	0	5	100.0	T-Sample: perfume mild odour, not strong or good, unpleasant P-Sample: good odour of perfume
5 TPP T=P=1.2%	5	3	2	2	3	60.0	T-Sample: base odour, tallowy P-Sample: pleasant odour and better
6 PTP T=P=1.2%	5	3	2	1	4	60.0	T-Sample: sharp, soapy odour, no odour of perfume P-Sample: strong odour of perfume, better odour



were able to differentiate the two soap bases through sniffing. Any discrimination due to discoloration was camouflaged by the brown colouring. In all cases the panel members preferred the odour of the perfume in the palm base rather than that in the tallow base. They could detect the sharp, fatty, sourish smell of the tallow soap base even at the 1.2% dosage of perfume.

*Table 1* gives the initial sensory evaluation of the perfume in both palm- and tallow-based soaps. The triangle 1 and 2 samples were tallow- and palm-based soaps with 0.8% perfume. The panel members showed their dislike for the odour of the perfume in tallow base and found that it was weak with a slight fatty note. The perfume in palm-based soap was found to be positive, stronger ('more perfume'), sweeter and more pleasant. The soap samples in triangles 3 and 4 were palm-based with 1.0% perfume, and tallow-based with 1.2% perfume. The panel members indicated their preference for the perfume in the palm-based soap as being pleasant, with a more woody note and fresher, when compared with the same perfume in the tallow-based soap. They also noted that the perfume in tallow-based soap was weaker and less woody. In the 5th and 6th triangles the amount of perfume was 1.2% for both palm base and tallow base. In these two triangles the panel members found that the perfume in tallow-based soap was less and weak, while the perfume in the palm-based soap was stronger and better.

In soaps stored for 30 days the panel members found that the perfume had diminished slightly (*Table 2*). The tallow base had a slight sour, unpleasant odour and the perfume was weak compared with that in the palm base.

The same trend was observed after 60 days' storage. The members found that the tallow base had a beefy odour and that the perfume was rather mild. They found that the perfume was comparatively stronger in the palm base and they indicated their preference for this (*Table 3*).

With soaps stored for 90 days the panel members still showed their preference for the palm-based samples as they still had the perfume odour and no base odour was detected. It was also found that the perfume still retained its woody characteristic and pleasantness even after three months of storage. The panel members found that the odour of perfume in the tallow-based soap was much less and they detected the base odour (*Table 4*).

The results of this preliminary investigation are encouraging for palm-based soaps, indicating that they have a better retention of the sandalwood perfume than tallow-based soaps, even at a low concentration (0.8% perfume). At higher concentrations of perfume in the two soap bases the palm base was still preferred for its odour performance. Further studies need to be carried out with a larger number of panel members in order to obtain good statistical support for the results.