The Value of Perfume Raw Materials in Soap

A 50 Year Perspective (1933-1983)

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IN 1983, approximately sixty million dollars were expended for more than eight million pounds of perfume for toilet soap in the United States. Was this money spent wisely? Did the manufacturers who produce toliet soap, such as Procter & Gamble, Lever Brothers, Armour-Dial, Colgate-Palmolive and Andrew Jergens get full value from the perfumes used in their soap products? Probably not.

Our research has shown that many perfume raw materials used in soap perfumery today are of little technical value related either to odor performance or odor stability or both. In fact, 27% of the commonly used perfume raw materials evaluated in this research was found to either exhibit poor odor performance in toilet soap or was found to have poor odor stability. Leaving aside aesthetics for the moment, the technical value of these materials in soap perfumery is definitely questionable.

In addition, another 44% of these materials exhibited only fair performance or stability, again raising some question as to their real technical value in soap perfumery. A quick arithmetic calculation will tell you that only 29% of the materials tested in this research has unquestionably good or better odor performance and odor stability.

In order to explain and qualify the foregoing statements, I will proceed by first examining the research undertaken by my department. My intent in the presentation is not to convince you that our research represents the best methodology available, or that our data is irrefutable. My intent, instead, is to foster interest in soap perfume research.

The more data available to the perfumer, the better that person will be able to make the decisions required daily.

After examining our program, I will compare some of our specific data to that published over the last 50 years. Finally, I will provide some statistics for toilet soap brand share in the U.S. market.

In early 1980, the perfume department at Armour-Dial (ADI) undertook an ambitious and aggressive research program to answer the question proposed earlier, that is, "was Armour-Dial getting full value from the perfumes being utilized in our soap products—Dial and Tone soaps and the experimental soap products being evaluated at that time?" To get the answer, we assessed the technical value of individual per-

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fume raw materials in our soap base. In order to do this we developed testing procedures and research methodology and initiated the program.

Small soap bars were made incorporating 1% of the individual perfume ingredient. One bar was kept at ambient temperature and a second bar was placed in an incubator (an accurate temperature controlled oven) at 60°C. (140°F) for seven days. This thermal stress test is crudely equivalent to one year of ambient shelf storage. Thermal stress represents the first potential problem with this kind of research. It is an approximation of what would happen on long term ambient storage. It is not an absolute guarantee of accuracy. However, my experience has shown that it is an effective predictor of odor stability and odor change.

Unperfumed soap bars were also made and

Table I. Initial Odor Performance in Soap for 430 Materials

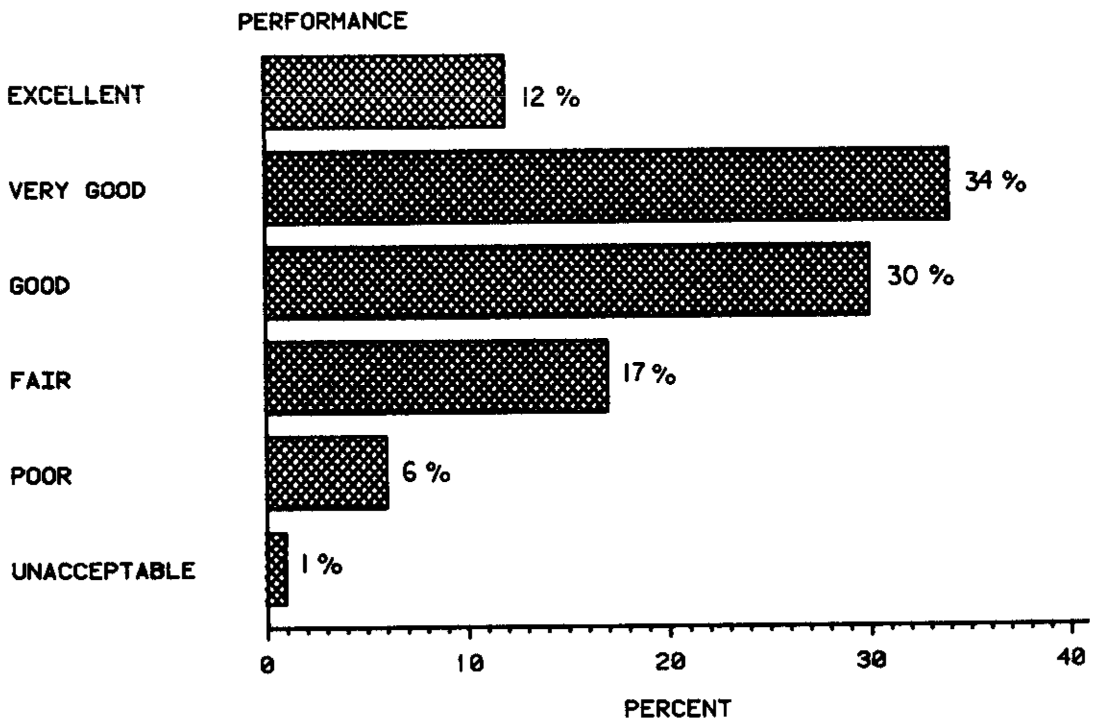
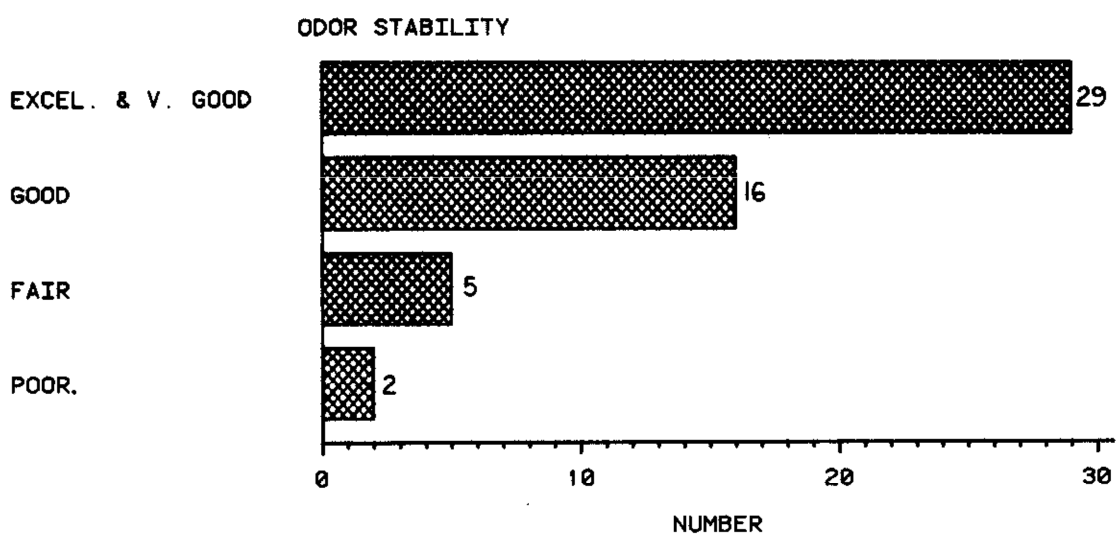


Table II. Odor Stability of Materials with Excellent Odor Performance in Soap—Total Excellent Odor Performance in Soap: 52



evaluated to provide the base line odor and color for these experiments.

The initial research tested 430 materials over a two year period.

Soap bars were evaluated subjectively for initial odor, that is, performance of each individual raw material, in our soap base on a six point odor grading scale ranging from excellent to unacceptable. The odor stability of each material was also determined subjectively on the same scale by comparing the ambient soap bar to the bar placed on the thermal stress test.

Odor stability was measured by the degree of difference between these bars and included:

—degree of odor character change
—degree of odor intensity change
—formation of off-odors

Also measured and recorded were:

—visual discoloration
—degree of coloration in the ambient bars
—aesthetic comments

We paid particular attention to the performance and stability of like materials. Bars were evaluated in groups of five, generally materials of the same odor type, to obtain more precise relative differences between materials a perfumer might have a choice of using to obtain similar effects in a formulation. This aspect of our research was found to be particularly useful.

Table III. Examples of Materials with Excellent Odor Performance in Soap

	Odor Stability	Discoloration
Cinnamalva (IFF)	Excellent	None
Citronellyl propionate	Excellent	None
Benzyl acetate	Fair	None

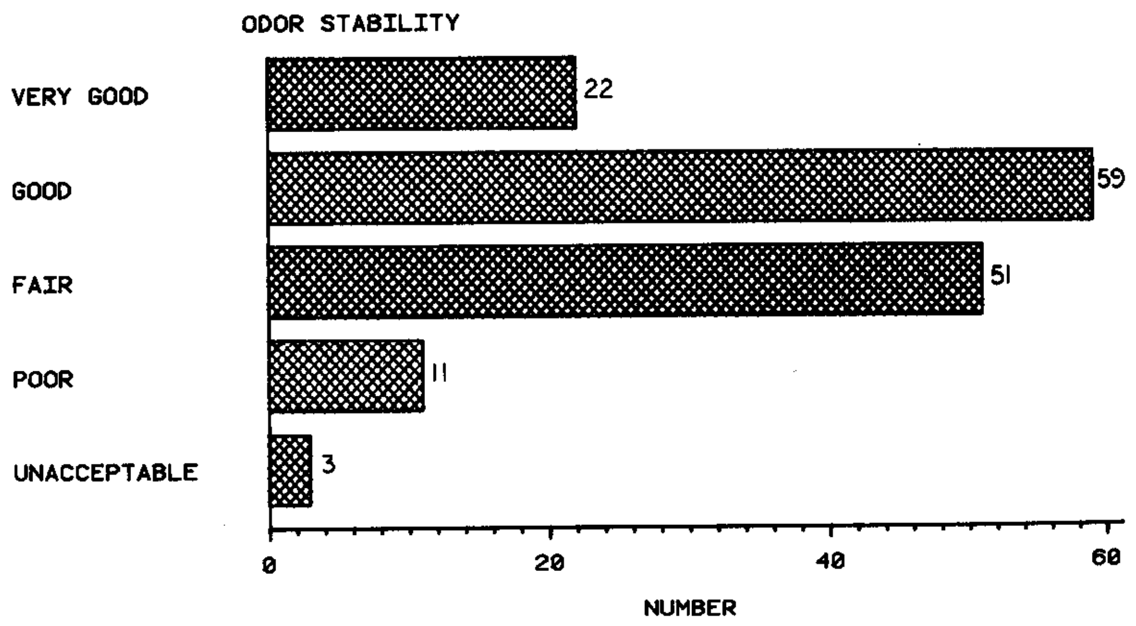
Due to time and personnel constraints, these soap bars were *not* evaluated under "in use" conditions but were evaluated as dry soap bars only, stored in standard soap boxes. Ideally research would provide odor data obtained under controlled "in use" conditions and on the performance of packaging actually used for the marketplace.

As you may have guessed by now, we consider the data generated as proprietary and hence, I will provide only some examples of the data collected.

Table I presents our classification of the initial odor performance determined subjectively of the original 430 materials evaluated. As you can see from this data, 76% of the materials evaluated for initial odor performance in soap bars performed at a level of good or better according to our odor grading parameters.

Of the original 430 materials evaluated, 191 were commodity chemicals, that is, aroma chemicals available from more than one source generally under chemical nomenclature; 59 natural products, such as essential oils, resins, or

Table IV. Odor Stability of Materials with Very Good Odor Performance in Soap—Total Very Good Odor Performance in Soap: 146



folded oils; and 180 specialties, which I define as captive materials available generally from one source sometimes under patent protection.

Table II provides some statistics on the technical odor stability of those materials which were perceived to have excellent initial odor performance in soap. Odor performance and odor stability are two separate and distinct measurements on each material. Odor performance is the subjective initial odor evaluation. Odor stability is the long term odor character and odor strength measurement.

Only two materials in this group exhibited poor odor stability and would probably not be technically useful in soap perfume formulations. Five materials were deemed to have fair odor stability indicating that their usefulness in soap perfume formulations could be questionable. The perfumer would then have to decide if an alternate material of better odor stability might be more useful in the formulation taking into consideration aesthetics and possible combination effects with other materials. The remaining forty-five materials would technically be very useful and valuable materials in soap perfumery. Thus, the choice of which materials in this category to use is left to the perfumer's discretion based on aesthetics and economics.

A few examples of materials in this group are listed in Table III. Cinnamalva (cinnamyl nitrile) from IFF and citronellyl propionate both exhibit excellent initial odor performance and odor stability. Both materials would be considered to be excellent materials for use in soap perfumery from a technical standpoint.

Table V. Examples of Materials with Very Good Odor Performance in Soap

	Odor Stability	Discoloration
Citronellyl acetate	Very Good	Slight
Diphenyl methane	Very Good	None
Lemongrass oil redist.	Very Good	Severe Yellow
Terpinyl acetate	Very Good	Slight Grey
Iso eugenol	Poor	Severe Brown

Benzyl acetate, on the other hand, although it exhibits excellent initial odor performance, was found to have only fair odor stability due primarily to a considerable loss of intensity. The perfumer must now make a decision as to whether or not to use benzyl acetate in a soap perfume formulation, knowing that the fresh fruity jasmin odor provided by benzyl acetate will fade rather quickly and dramatically in the perfume. The options are numerous. Considering aesthetics and cost, should the perfumer leave it out of the formula, replace it with a similar material or fortify it with perhaps benzyl propionate which is more odor stable but somewhat different in odor character and effect?

Table IV provides data on materials which had "very good" initial odor performance. As you can see, fourteen materials were found to have poor or unacceptable odor stability and fifty-one had only fair odor stability.

Eighty-one materials were found to have good or very good odor stability. Examples from this group are: citronellyl acetate, diphenyl methane, lemongrass oil redistilled and terpinyl acetate, all of which exhibit very good odor stability (Table V). Lemongrass causes severe yellow discolora-

Table VI. Odor Stability of Materials with Good Odor Performance in Soap—Total Good Odor Performance in Soap: 131

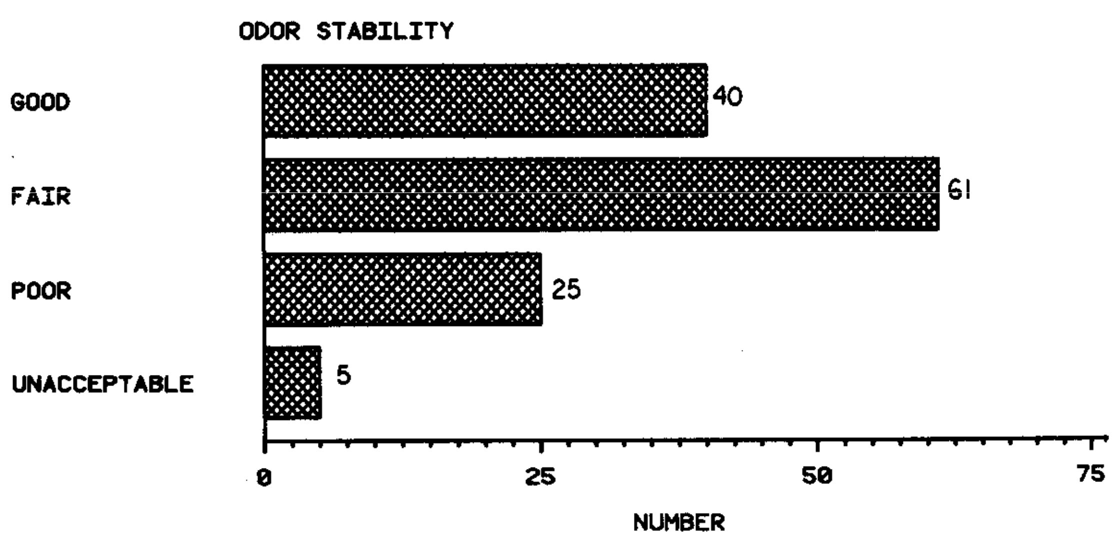


Table VII. Examples of Materials with Good Odor Performance in Soap

	Odor Stability	Discoloration
Anisic aldehyde	Good	Consid. Yellow
Coumarin	Good	Slight
Linalool	Good	None
Linalyl acetate	Good	Slight
Citral	Poor	Severe Yellow
Ethyl methyl phenyl glycidate	Unacceptable	Severe Yellow
Petitgrain oil S.A.	Poor	Slight

tion at 1% in the soap base, but this just means that the perfumer must use lemongrass somewhat sparingly to avoid discoloration problems.

Iso eugenol, on the other hand, exhibited poor odor stability, losing its spicy, smoky odor to become more intensely sweet. Eugenol and iso eugenol are difficult problems for the soap perfumer. Eugenol is more odor stable than iso eugenol, according to our research. Substitutes such as eugenyl acetate, methyl eugenol and methyl iso eugenol are not adequate replacements, either aesthetically or for odor stability. There is the additional problem of discoloration to plague the perfumer.

Table VI reviews those materials with good initial odor performance in soap. Only forty materials also have good odor stability. The remaining ninty-one materials exhibit questionable value in soap perfumery. Obviously, as the initial odor performance of materials becomes less acceptable, the usefulness of these materials upon aging is also less acceptable.

Examples of materials in this group are seen in Table VII: anisic aldehyde, coumarin, linalool and linalyl acetate, all of which exhibit good odor stability. Citral and petitgrain oil have poor odor stability. Citral loses its intensity and petitgrain loses its fresh citrusy topnote to become flat and weak. Petitgrain terpeneless is a more odor stable material. Ethyl methyl phenyl glycidate (aldehyde C-16 pure) undergoes a complete odor character change, losing its strawberry fruity character to become acetophenone-like. Ethyl phenyl glycidate is a much better material for odor stability, but the odor is different from ethyl methyl phenyl glycidate.

Of the materials with fair initial odor performance shown in table VIII, twenty-nine also have fair odor stability. The materials with poor or unacceptable odor stability are of questionable value.

Table VIII. Odor Stability of Materials with Fair Odor Performance in Soap—Total Fair Odor Performance in Soap: 74

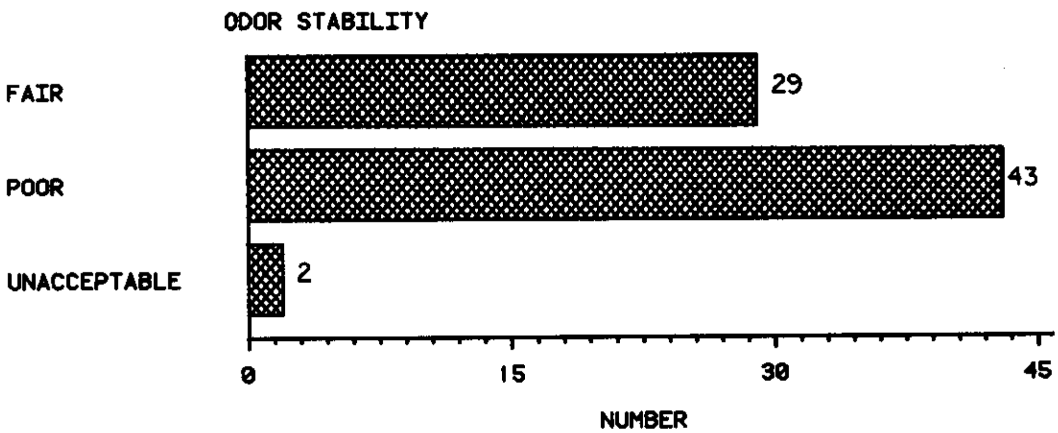


Table IX gives examples of materials with fair odor stability from this group: amyl salicylate, lilial, cedarwood Texas and ethylene brassylate. Ethylene brassylate poses a difficult question in this kind of research. It is used more for effect in a soap perfume than actual odor contribution, making it a difficult material to evaluate.

Examples of two materials in this group which exhibit poor odor stability are benzyl salicylate and hydroxycitronellal. As you can see from the table, our research found amyl salicylate to be more odor stable than benzyl salicylate and the same is true of lilial versus hydroxycitronellal.

Finally, examples of materials with poor initial odor performance (Table X) include beta ionone, methyl eugenol, musk ketone and musk xylol.

Beta ionone forms an off-odor upon aging and more value can be obtained with alpha ionone or ionone AB. Methyl eugenol forms an unpleasant mildew type odor and more value can be obtained from eugenol. Musk ketone and xylol pose the problem observed with ethylene brassylate. The effect of these materials is as important as their perceived odor value.

Table IX. Examples of Materials with Fair Odor Performance in Soap

	Odor Stability	Discoloration
Amyl salicylate	Fair	None
p-t-BAMHCA (Lilial)	Fair	Moderate Yellow
Cedarwood Texas	Fair	None
Ethylene brassylate	Fair	None
Benzyl salicylate	Poor	None
Hydroxycitronellal	Poor	Consid. Yellow

Table X. Examples of Materials with Poor Odor Performance in Soap

Total materials with poor odor performance in soap - 24

	Discoloration
beta-Ionone	Severe Yellow
Methyl eugenol	Slight Yellow
Musk ketone	Severe Brown
Musk xylol	None

The real value of this kind of research data, therefore, can only be fully used by a well versed, experienced perfumer who can properly interpret the data. This interpretation is as important as the data itself.

How does Armour-Dial's research data compare to previously published data on soap perfume raw materials? In general, it compares more favorably than I had anticipated.

The most comprehensive and useful published data I have found was written by Philip Chaleyer under the title "Soap Perfumery." This article was originally published in the periodical *Soap* in 1933 and reprinted in the 1934 edition of the *Soap Blue Book*. Updated versions of this article were published in the *Soap Blue Book* in 1940 and 1941.[1] Mr. Chaleyer, a native of Lyon, France, came to the U.S. in 1922 as a special representative for Givaudan. He became director of the perfume labs at Givaudan in the U.S., when they were organized in 1926. In 1928, he founded his own company, Philip Chaleyer, Inc. which he sold in 1953 and became a consultant to Hoffmann LaRoche and Rhodia until his death in 1961.[9]

Mr. Chaleyer's published data includes odor values and odor lasting indexes for sixty-one essential oils, one-hundred aroma chemicals, sixteen soluble resins and ten distilled essential oils from resins.

A comparison of Mr. Chaleyer's data to ours is very interesting but not entirely valid due to the natural sources of many aroma chemicals in the 1930s and 1940s compared to synthetic sources today. Also, the soap base used by Mr. Chaleyer for his research was probably kettle soap, which is very different in odor characteristics from today's neutral soaps.

The next two tables compare Mr. Chaleyer's data to ours for selected essential oils (Table XI) and aroma chemicals (Table XII).

In Table XI on essential oils, there is general agreement between the two sets of data. This is surprising considering the differences in the research methodology, the soap base and probably differences in the essential oils themselves during the fifty year time span.

Obviously, the best performers in this group of ten essential oils are geranium Bourbon, patchouli, peppermint, and spearmint.

For aroma chemicals, the story is a little different. Agreement here between the two studies is much less universal. Mr. Chaleyer reported amyl cinnamic aldehyde to be odor stable, but our findings indicate that it turns sour and fatty.

Citronellal is another example of disagreement between the two sets of data. Mr. Chaleyer found citronellal to polymerize rather quickly to an isopulegol type odor. Our data has shown that citronellal loses some intensity but maintains good odor stability.

Other disagreements included citronellyl acetate, geranyl acetate, heliotropine, methyl anthranilate, musk ketone, musk xylol and terpinyl acetate.

In addition to his raw material data, Mr. Chaleyer also provided a few soap perfuming

Table XI. Essential Oils—Comparative Data

		ADI Data	
Material	Chaleyer Data	Performance	Stability
Cedarwood	Odor fades, weak	Fair	Fair
Geranium bourbon	Execellent	Excellent	Very Good
Lavender	Fades gradually but very useful	Very Good	Fair
Orange	Turns terpenic not recommended	Fair	Poor
Patchouli	Excellent	Excellent	Very Good
Peppermint	Very strong and stable	Excellent	Very Good
Petitgrain	Fairly stable character change	Good	Poor
Rosemary Spanish	Fairly stable	Very Good	Fair
Spearmint	Very stable	Excellent	Very Good

Table XII. Aroma Chemicals—Comparative Data

Material	Chaleyer Data	ADI Data Performance	ADI Data Stability
Amyl cinnamic aldehyde	Stable	Good	Poor
Amyl salicylate	Stable, loses intensity	Fair	Fair
Benzyl acetate	Fades, not long lasting	Excellent	Fair
Benzyl cinnamate	Weak	Good	Good
Benzyl propionate	Fades, loses intensity	Excellent	Good
Cinnamic alcohol	Not very strong	Fair	Fair
Citral	Turns resinous, value in soap doubtful	Good	Poor
Citronellal	Polymerizes quickly	Very Good	Good
Citronellol	Odor fades gradually	Good	Good
Citronellyl acetate	Fades, loses intensity	Very Good	Very Good
Coumarin	Gradual character change	Good	Good
Eugenol	Unstable	Very Good	Fair
Geraniol	Fairly stable, not intense	Very Good	Fair
Geranyl acetate	Not very lasting, but good	Excellent	Very Good
Heliotropine	Stable, loses intensity	Fair	Poor
Hydroxycitronellal	Not recommended, polymerizes and fades	Fair	Poor
Linalool	Fairly stable, needs support	Good	Good
Linalyl acetate	Same as linalool	Good	Good
Methyl anthranilate	Turns bad	Good	Fair
Methyl salicylate	Stable	Excellent	Very Good
Musk ambrette	Very stable	Good	Good
Musk ketone	Stable, moderate intensity	Poor	-
Musk xylol	Stable, weak	Poor	-
Phenyl ethyl alcohol	Good, loses strength	Very Good	Good
Terpineol	Fairly stable, weak	Very Good	Good
Terpinyl acetate	Turns slightly, weak	Very Good	Very Good

rules which he stated "remaining as true today as they were yesterday and that every soap perfumer should keep in mind in order to make good soap perfume."

I would like to repeat a few of the rules and also emphasize that they remain as true today as when Mr. Chaleyer expressed them in 1933.

—Generally, one gets only what one pays for.
—Buying cheaply is not necessarily buying wisely.
—Expensive but powerful aroma chemicals and essential oils are very useful and when diluted at the proper concentration are not more expensive than regular products.
—Every soap perfume is in itself a different problem, and a perfume blend which is good for a soap of a certain composition is not necessarily good in other soaps.
—Testing of the finished perfume mixture in the soap in which it is going to be used is the only way to judge the performance and stability of that perfume.
—The study of antioxidants and stabilizers in soap is extremely important.
—Before incriminating the perfumer when a perfumed soap gives trouble, careful investigation of the soap itself and its process of manufacture should be made.
—"Certain perfume ingredients behave very differently when used alone or used in a mixture."

The last rule is very applicable to our raw material research program. For instance, Firmenich's Hedione (methyl dihydro jasmonate) has only fair odor performance and fair odor stability as determined by our research methodology. From experience, however, it is known that Hedione's performance is actually very good in combination with other materials, particularly floral notes, such as jasmin.

The same can also be said for musk ketone and musk xylol. Our data indicated poor performance; yet in combination with other materials, the effect these two musks give is certainly better than poor odor performance.

Again, the perfumer's judgment, experience and knowledge play an important part in interpreting such data.

The next two tables provide comparative odor performance/stability data for ten essential oils (Table XIII) and fourteen aroma chemicals (Table XIV). Five sets of data were extracted from the literature and compared to our research. In Table XIII for the first four essential oils, the only major disagreement was with lemongrass oil. This was due to analysis of redistilled lemongrass by our research. The other reported data probably did not evaluate a redistilled oil.

Almost universal agreement concludes that geranium Bourbon, patchouli, peppermint and spearmint are very valuable materials for soap perfumery. Cedarwood, lavender, lemongrass, petitgrain and rosemary are less valuable in terms of odor performance and stability but are still very useful materials. Of this group of essential oils, only orange oil presents a real problem for the soap perfumer.

Aroma chemical data in Table XIV is much more difficult to interpret for the first five chemicals. Our research indicated that citronellyl acetate, geranyl acetate, and terpinyl acetate all have very good to excellent odor performance and very good odor stability. General disagreement was found in the literature for these three acetates. This is probably due to the feedstock used for the production of these esters.

The reverse odor value judgment is also found. Our data indicates that amyl cinnamic aldehyde, amyl salicylate, and heliotropine are not as useful in soap perfumery, yet the literature states that these materials are good soap perfume ingredients.

Table XIII. Odor Stability Comparison (1933-1983)—Essential Oils

	"Soap Perfuming" Chaleyer 1933	"Perfumes for Soaps" Morel 1947	"The Practice of Modern Perfumery" Jellinek 1949	"Perfumes, Cosmetics & Soaps" Poucher 1974 (1923)	Armour-Dial Research 1983	
					Performance	Stability
Cedarwood	Odor fades, weak	Tends to fade	Stable, little effect	Good	Fair	Fair
Geranium bourbon	Excellent	Good	Stable	-	Excellent	Very Good
Lavender	Fades gradually	Fair to good	Usable	Good with fixation	Very Good	Fair
Lemongrass	-	Fair	Not stable	Weak	Very Good	Very Good
Orange	Turns terpenic	Turns terpenic	Not stable	Weak	Fair	Poor
Patchouli	Excellent	Very Good	Stable	Very Good	Excellent	Very Good
Peppermint	Excellent	Good	Usable	Very Good	Excellent	Very Good
Petitgrain	Fair, character change	Fair to good	Usable	Good	Good	Poor
Rosemary	Fair	Good	Usable	Very Good	Very Good	Fair
Spearmint	Stable	Very Good	Stable	Weak	Excellent	Very Good

Table XIV. Odor Stability Comparison (1933-1983)

Aroma Chemicals	"Soap Perfuming" Chaleyer 1933	"Perfumes for Soaps" Morel 1947	"The Practice of Modern Perfumery" Jellinek 1949	"Behavior of Perfumery Ingredients in Products" Burrell 1973	"Perfumes, Cosmetics & Soaps" Poucher 1974 (1923)	Armour-Dial Research 1983	
						Performance	Stability
Amyl cinnamic aldehyde	Stable	Good	Stable	Stable	Good	Good	Poor
Amyl salicylate	Loses intensity	Good	Stable	-	Very Good	Fair	Fair
Citral	Turns resin	Fair	Not Stable	Loses intensity	Good	Good	Poor
Citronellol	Fades	Good	Stable	-	Good	Good	Good
Coumarin	Changes	Good	Stable	-	Very Good	Good	Good
Geranyl acetate	Fades	Fades	Usable	-	Weak	Excellent	Very Good
Heliotropine	Loses intensity	Good	Stable	-	Very Good	Fair	Poor
Hydroxycitronellal	Poor	-	Not Stable	Stable	Weak	Fair	Poor
Linalool	Fair	Good	Stable	Loses intensity	Very Good	Good	Good
Linalyl acetate	Fair	Good	Stable	-	Good	Good	Good
Methyl salicylate	Stable	Good	Stable	-	Good	Excellent	Very Good
Phenyl ethyl alcohol	Loses intensity	Very Good	Stable	-	Very Good	Very Good	Good
Terpinyl acetate	Weak	Fair	Avoid	Sl loss	Good	Very Good	Very Good

Some data, however, is in general agreement. Citral and hydroxycitronellal are not very useful soap perfume materials. Good soap perfume materials are citronellol, coumarin, linalool, linalyl acetate, methyl salicylate and phenyl ethyl alcohol. One could find at least five of these six materials in virtually every soap perfume.

The perfumer's task in creating perfumes for soap is not an easy one. Soap is a difficult medium to work with. The variables involved can be exasperating. Composition of the soap base is particularly important. Tallow/coconut oil ratio, superfatting, hydrogenation, additives, and synthetic detergent formulas can all dramatically affect the odor of a soap base, creating havoc for the perfumer.

Packaging is also an important variable in evaluating soap perfumes. Many times packaging materials are changed without consulting the perfumer. This can sometimes be a disastrous situation. Generally, the most expensive ingredient used in a soap bar is the perfume. Most marketers seem willing to spend a lot of money for a perfume for their product, so to provide no packaging protection for the perfume seems to me to be a waste of money.

Bar shape, carton versus overwrap package, and packaging material can all affect the performance and stability of a soap perfume.

Many changes have transpired in soap perfumery during the last fifty years. Some interesting statistics reflect changes in brand shares for the U.S. toilet soap market, during this same time period.

First, let's go back to 1934 to Milwaukee, Wisconsin. I don't know how representative Milwaukee was in comparison to the rest of the country in terms of bar soap habits and usage, but this was the only historical brand share data I could find. The top three brands were Lifebuoy, Palmolive and Lux (Table XV) as determined by the number of households using each brand.[6]

By 1942, the soap market had changed considerably with Lux being used by more families than any other soap brand in Milwaukee (Table XVI).[7] Sweetheart, Camay, Ivory and Palmolive round out the top five brands. According to this data, Lifebuoy had taken a nose dive.

The next table gives brand share data by dollar volume for 1974 for the entire U.S. market, not just Milwaukee. The top five selling soap brands in 1974 were Dial, which was introduced in 1948, followed by Ivory, Zest, Dove and Safeguard (Table XVII). Procter & Gamble dominated the soap market with three of the top five brands, while Colgate and Lever had lost considerable

Table XV. 1934 "Milwaukee" Soap Market Major Brand Shares (% Families using each brand)

	%
Lifebuoy (Lever)	29.5
Palmolive (Colgate)	22.5
Lux (Lever)	21.6
Ivory (P&G)	12.7
Camay (P&G)	9.2
Other (81 Brands)	15.7
	111.2

Source - "Soap", May 1936.

Table XVI. 1942 "Milwaukee" Soap Market Major Brand Shares (% Families using each brand)

	%
Lux (Lever)	23.3
Sweetheart (Purex)	19.7
Camay (P&G)	13.8
Ivory (P&G)	13.7
Palmolive (Colgate)	12.5
Lifebuoy (Lever)	6.2
Swan (Lever)	6.0
Other (82 Brands)	-
	95.2

Source - "Soap", May 1942.

Table XVII. 1974 U.S. Soap Market Major Brand Shares

(Dollar Volume)	%
Dial (ADI)	19.5
Ivory (P&G)	14.0
Zest (P&G)	7.8
Dove (Lever)	7.1
Safeguard (P&G)	6.5
Irish Spring (Colgate)	5.9
Camay (P&G)	5.0
Lux (Lever)	3.5
Lifebuoy (Lever)	3.5
Sweetheart (Purex)	2.9
Phase III (Lever)	2.6
Palmolive (Colgate)	2.4
Tone (ADI)	2.0
Cashmere Bouquet (Colgate)	2.0
Caress (Lever)	1.8
Palmolive Plus (Colgate)	1.5
Other Bar Soaps	12.0
	100.0

brand share.[8] By manufacturers' share of the soap market, again measured by dollar volume P&G had about one third of the 500 million dollar soap market in 1974 (see Table XVIII). Armour-Dial, Lever and Colgate accounted for more than 50% of the market. All other companies accounted for less than 15%.

Today the soap market in the U.S. is dynamic and aggressive although it is growing less than 5% a year.

Table XIX gives approximate brand share data in ounces sold for 1983. Ivory, Dial, Zest, Dove and Safeguard were the top five soap brands measured by volume. On a dollar sales basis, the top five brands would be Dial, Dove, Ivory, Zest and Safeguard.

Table XVIII. 1974 U.S. Soap Market Manufacturers Share of Market

(Dollar Volume)	%
Procter & Gamble	33.6
Armour-Dial	21.5
Lever Brothers	18.5
Colgate-Palmolive	11.8
Purex	2.9
Other	11.7
	100.0

Table XIX. 1983 U.S. Soap Market Major Brand Shares

(Ounces Sold)	%
Ivory (P&G)	17.5
Dial (ADI)	13.0
Zest (P&G)	9.0
Dove (Lever)	7.5
Safeguard (P&G)	6.5
Coast (P&G)	6.0
Irish Spring (Colgate)	4.5
Shield (Lever)	4.0
Caress (Lever)	3.5
Camay (P&G)	3.5
Tone (ADI)	2.5
Lifebuoy (Lever)	1.5
Jergens (Jergens)	1.5
Fiesta (Jergens)	1.5
Lux (Lever)	1.0
Palmolive (Colgate)	1.0
Cashmere Bouquet (Colgate)	1.0
Gentle Touch (Jergens)	1.0
Lava (P&G)	1.0
Other bar soaps	7.5
Liquid soap	5.5
	100.0

Source - Armour-Dial, Inc.

Table XX. U.S. Soap Market 1983 Manufacturers Share of Market

	Approximate Dollar Volume %	Approximate Ounces Sold %
Procter & Gamble	38.5	43.5
Lever Brothers	24.0	18.0
Armour-Dial	17.5	15.5
Colgate-Palmolive	7.5	6.5
Andrew Jergens (Amer. Brands)	5.0	3.5
Others	7.5	13.0
	100.0	100.0

Source - Armour-Dial, Inc.

Liquid soaps also made their presence known in 1983 obtaining about 5.5% of the soap market.

The 1983 manufacturers' share of the market, measured by either dollars or ounces, shows P&G to be the largest seller of soap in the U.S. (Table XX). P&G is followed by Lever, Armour-Dial, Colgate and Jergens. These five companies account for over 90% of the dollar value of soap sold during 1983 in the U.S.

It still amazes me, after working seventeen years for soapers, that so few companies control such a massive consumer product market, estimated in 1983 to be 1.1 billion dollars.

In conclusion, this kind of research can be useful to the perfumer in creating better, more odor stable perfumes. It also can help a company better utilize the millions of dollars spent annually on soap perfumes and receive full value for that money.

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