



## RESEARCH ARTICLE

## EVALUATION OF SOME BRANDS OF SHAMPOOS ACCORDING TO THE LIBYAN STANDARD SPECIFICATION

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## ABSTRACT

There are many brands of shampoos in Tripoli markets-Libya, available from different sources, locally and imported from other different countries. The aim of this work was to investigate whether such brands comply with the Libyan standard specifications number 280 for shampoos issued by the national center for specifications and standards and to what extent these specifications are applied and restricted with. 14 shampoo brands were randomly collected from Tripoli markets and evaluated for their physicochemical properties including organoleptic characterization, pH measurement, determination of the percent of anionic and nonionic surfactant and the percent of preservative added, also the absence of any alkyl-aryl-sulfonate and the label information were checked. As a result of this work it was found that all investigated shampoo samples had a thick consistency with different colors and odors. Regarding the pH measurement, two shampoo samples were out of the specified range. Five shampoo samples had a total percent of the ionic and nonionic surfactants out of the specified limit. The percent of the preservative for all shampoo samples was within the specified limit. All shampoo samples were free from any alkyl-aryl-sulfonate. Only two shampoo samples were completely comply with the specifications regarding the label information. From such results it is clear that not all shampoo brands available in Tripoli markets comply with the Libyan standard specifications. Therefore the goods should prove their compliance with such standards before releasing them to the market.

**Key words:** compliance, comply, standards, conform, conformity.

## INTRODUCTION:

The hair of the head has historically been associated with beauty and social distinction but the technology of hair and scalp was recently developed by distribution of soap and sanitary facilities.<sup>1</sup> Synthetic detergents have been claimed to be the most important factor in the growth of shampoo market.<sup>2</sup> Shampoos can be defined as preparations used to remove surface grease, dirt and skin debris from the hair shaft and scalp. Shampoos can be present in many different forms such as liquid, lotion, cream, paste, gel, dry shampoo ...etc.<sup>3,4,5</sup> Normal shampoos are used to clean the hair and scalp leaving the hair soft, lustrous and manageable but also there are some specialty shampoos which contain particular component for unusual performance property such as antidandruff, nutrition ...etc.<sup>6,7</sup> Evaluation of shampoos comprises the quality control tests including visual assessment and physicochemical controls such as pH, density and

viscosity.<sup>8,9</sup> Sodium lauryl sulfate based detergents are the most common but the concentration will vary considerably from brand to brand and even within a manufacturer's product range.<sup>10,11</sup>

Cheap shampoos may contain a high detergent concentration while expensive shampoos may contain very little of a cheap detergent.

Many different shampoo brands are available in Tripoli markets, some of them are locally made and others are imported from foreign countries. To control the properties of such item, the national center for specifications and standards issued the Libyan standard specifications number 280 for shampoos.<sup>12</sup> The aim of this work was to investigate how far shampoo brands from Tripoli markets conform the Libyan standard specifications and to what extent these specifications are applied and restricted with.

**MATERIAL AND METHODS:**

14 shampoo brands were collected randomly from Tripoli markets, as shown in table 1

**Materials:**

Table 1: Shampoo brands

Shampoo	Manufacturer	Country
Dove	Unilever	France
Fa	Shwarzkopf and Henkel	Germany
Fructis	Garnier	U.K
Glemo	Shwarzkopf and Henkel	Germany
Head and Shoulder	Head and Shoulder	France
Herbal spa	Chil wood	U.K
Johnson	Johnson and Johnson	Greece
Noor	National company for soaps and detrgents	Libya
Pantene	Procter and Gample	France
Personal Emedia	Lana cosmetics	S.A.E
Snonas	Arom	Spain
Souplesse	Jasminal laboratories	Tunisia
Sunshower	.....	Turkey
Sunsilk	Elida	Tunisia

The collected shampoo brands were numbered and evaluated (regardless of the names and sources) according to the Libyan standard specifications for their physicochemical properties including organoleptic characterization, pH measurement, determination of the percent of anionic and nonionic surfactant and the percent of preservative added, also the absence of any alkyl-arryl-sulfonate and the label information were checked.<sup>13</sup>

**Methods:****1- Organoleptic characterization:**

Consistency and color were investigated visually and odor is tested by smelling

**2- pH measurement:**

One gram of shampoo was weighed and transferred to a 100 ml volumetric flask which was partially filled with distilled water and agitated with magnetic stirrer until complete mixing. The flask was then completed to the mark with distilled water and allowed to stand at a temperature of 25°C prior to pH measurement with a pH meter.<sup>14</sup>

The average of 3 readings was taken.

**3- Determination of the percent of anionic surfactant:**

Five grams of shampoo were weighed and transferred to a 250 ml volumetric flask which was then completed to the mark with distilled water and agitated with magnetic stirrer until complete mixing. 5 ml from the mixture were transferred to a separating funnel to which 5 ml of mixed indicator (mixture of diamidium bromide and disulphine blue) and 10 ml of chloroform were added and the funnel was shaken well.

Titration with 0.004 molar hymen solution (Benzethonium chloride) was carried out till the pink color turned to gray blue. The percent of anionic surfactant was calculated using the following equation:<sup>15</sup>

$$\% = 100(M \cdot V \cdot E \cdot D) / (W \cdot A)$$

Where M is the molarity of hymen solution, V is the volume consumed from the hymen solution, E is the equivalent weight of the surfactant, D is the sample dilution, W is the sample weight and A is the volume taken from the diluted solution to be titrated. The average of 3 readings was taken.

**4- Determination of the percent of nonionic surfactant:**

Five grams of shampoo were weighed; 30 grams of cation-anion exchanger and 100 ml of ethanol were added to them. All were mixed for 30 minutes using a magnetic stirrer, filtered using vacuum pump and ethanol was evaporated to complete dryness, then the residue was weighed. The percent of nonionic surfactant was calculated using the following equation:<sup>16</sup>

$$\% = 100(\text{weight of residue}) / (\text{weight of sample})$$

The average of 3 readings was taken.

**5- Determination of the percent of preservative:**

Five grams of shampoo were weighed and transferred to a 250 ml volumetric flask which was then completed to the mark with saturated solution of sodium chloride. The mixture was left for 2 hours and then filtered using vacuum pump. 100 ml from the filtrate were transferred to a separating funnel to which 500 ml of chloroform were added in three portions with continuous shaking; each time discharge the lower layer and then allow the separated solution to dry in the oven and 30 ml of alcohol were

added to it then titrated with 0.01 M sodium hydroxide using phenolphthaline as indicator until a pink color was appeared. The percent of preservative was calculated using the following equation:<sup>17</sup>

$$\% = 100(M \cdot V \cdot E \cdot D) / (W \cdot A)$$

Where M is the molarity of sodium hydroxide, V is the volume consumed from the sodium hydroxide, E is the equivalent weight of the sodium benzoate, D is the sample dilution, W is the sample weight and A is the volume taken from the diluted solution to be titrated. The average of 3 readings was taken.

**6- Checking the absence of any alkyl-arryl-sulfonate:**

In a test tube one ml from the shampoo was mixed with 5 ml of distilled water and 3 drops of rose aniline hydrochloride were added. Change in color was observed. The test was repeated for 3 times.<sup>13</sup>

No change in color means the sample is free from any alkyl-arryl-sulfonate.

**7- Checking the label information:**

The label information was checked for the presence of the name of the product, the volume, the producer, the country, the ingredients, instructions for use and storage, batch number, manufacturing and expiry dates.

**RESULTS AND DISCUSSION:**

**Results:**

Regarding the test for checking the absence of any alkyl-arryl-sulfonate, the result for all investigated shampoo brands was no change in color which means that all brands were free from any alkyl-arryl-sulfonate.

Other results of this work were presented through the tables 2-6.

**Table 2: Organoliptic Properties of Shampoo Brands**

Shampoo No.	Consistency	Color	Odor
1	Thick product	White	Fruit odor
2	Thick product	Light blue	Characteristic odor
3	Thick product	Light blue	Limon odor
4	Thick product	Rose	Rose odor
5	Thick product	Colorless	Characteristic odor
6	Thick product	yellow	Limon odor
7	Thick product	yellow	Characteristic odor
8	Thick product	Gold	Honey odor
9	Thick product	Blue	Characteristic odor
10	Thick product	Blue	Characteristic odor
11	Thick product	Green	Olive odor
12	Thick product	Rose	Rose odor
13	Thick product	Green	Apple odor
14	Thick product	Crème	Characteristic odor

**Table 3: pH values of shampoo brands**

Shampoo No.	Type	pH	Limit	Remarks
1	For Adults	7.25	5.5-8.5	Comply with the specifications
2	For Adults	8.50	5.5-8.5	Comply with the specifications
3	For Adults	6.86	5.5-8.5	Comply with the specifications
4	For Adults	6.27	5.5-8.5	Comply with the specifications
5	For Adults	5.49	5.5-8.5	Comply with the specifications
6	For Adults	6.60	5.5-8.5	Comply with the specifications
7	For Children	6.72	6.5-7.5	Comply with the specifications
8	For Adults	6.62	5.5-8.5	Comply with the specifications
9	For Adults	7.00	5.5-8.5	Comply with the specifications
10	For Adults	4.70	5.5-8.5	Do not comply
11	For Adults	6.50	5.5-8.5	Comply with the specifications
12	For Adults	7.10	5.5-8.5	Comply with the specifications
13	For Adults	6.10	5.5-8.5	Comply with the specifications
14	For Adults	4.90	5.5-8.5	Do not comply

Table 4: The Percentage of Surfactants in the Shampoo Brands

Shampoo No.	% of Ionic Surfactant	% of Nonionic Surfactant	Total %	Limits	Remarks
1	12.20	4.30	16.50	≥ 8 %	Comply
2	15.10	0.80	15.90	≥ 8 %	Comply
3	10.50	0.84	11.34	≥ 8 %	Comply
4	6.97	0.81	7.78	≥ 8 %	Do not comply
5	22.26	0.77	23.03	≥ 8 %	Comply
6	11.33	2.16	13.49	≥ 8 %	Comply
7	2.21	3.69	5.90	≥ 8 %	Comply
8	5.99	1.06	7.05	≥ 8 %	Do not comply
9	12.11	0.88	12.99	≥ 8 %	Comply
10	5.18	0.29	5.47	≥ 8 %	Do not comply
11	6.43	0.92	7.35	≥ 8 %	Do not comply
12	15.45	2.90	18.35	≥ 8 %	Comply
13	5.86	1.82	7.68	≥ 8 %	Do not comply
14	11.36	3.68	14.04	≥ 8 %	Comply

Table 5: Percentage of Preservative in the Shampoo Brands

Shampoo No.	% of preservative	Limit	Remarks
1	0.10	≤ 0.20 %	Conform the specifications
2	0.11	≤ 0.20 %	Conform the specifications
3	0.06	≤ 0.20 %	Conform the specifications
4	0.10	≤ 0.20 %	Conform the specifications
5	0.10	≤ 0.20 %	Conform the specifications
6	0.09	≤ 0.20 %	Conform the specifications
7	0.20	≤ 0.20 %	Conform the specifications
8	0.08	≤ 0.20 %	Conform the specifications
9	0.01	≤ 0.20 %	Conform the specifications
10	0.09	≤ 0.20 %	Conform the specifications
11	0.04	≤ 0.20 %	Conform the specifications
12	0.08	≤ 0.20 %	Conform the specifications
13	0.10	≤ 0.20 %	Conform the specifications
14	0.08	≤ 0.20 %	Conform the specifications

Table 6: Availability of Information on the Label of the Shampoo Brands

No.	Name	Volume	Producer	Contents	Uses	Instructions	Batch	Dates
1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
2	Yes	Yes	Yes	Yes	Yes	Yes	No	No
3	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
4	Yes	Yes	Yes	Yes	Yes	Yes	No	No
5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
6	Yes	Yes	Yes	No	No	No	No	No
7	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
8	Yes	Yes	No	Yes	Yes	Yes	No	No
9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10	Yes	Yes	Yes	Yes	Yes	No	No	No
11	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
12	Yes	Yes	Yes	Yes	No	Yes	No	No
13	Yes	Yes	Yes	Yes	No	No	Yes	No
14	Yes	Yes	Yes	Yes	Yes	No	No	No

**DISCUSSION:**

From the results it is clear that there are many shampoo brands available in Tripoli markets from different sources having different organoleptic properties as shown in table 2. Libyan standard specifications for shampoos states that the pH of such item must be at the range of 5.5 to 8.5 for adults and 6.5 to 7.5 for children shampoos, as it can be seen from table 3, 2 out of 14 investigated shampoo brands were out of the range and conformity to the standard specifications is not fulfilled. These 2 brands showed lower pH values towards the acidic pH which causes the hair to be contracted and more hard while more alkaline pH causes expansion and more softening of the hair and both extremes acidic or alkaline pH cause the hair to be weak and easy to be broken and lost.<sup>18</sup>

Shampoos depend on detergents for their cleaning function, anionic and nonionic surfactants are the widely used detergents due to their superiority in terms of foaming and cleaning. Libyan standard specifications for shampoos states that the total % of active ingredient (surfactant) must be not less than 8 % . by looking to table 4 it can noticed that 5 out of 14 investigated shampoo brands were out of the limit and compliance to the standard specifications is not fulfilled where all these 5 shampoo brands had an active ingredient (surfactant) less than 8 %. From the results, all investigated shampoo brands were free from alkyl-aryl-sulfonate as needed by the standard specifications also regarding the percent of preservative, all brands contained less than 0.20 % required by the Libyan standard specifications as shown in table 5.

Table 6 explains that only 2 out of 14 investigated shampoo brands were found conforming the information on the label recommended by the standard specifications while other shampoo brands were found missing one or more of the recommendations.

**CONCLUSION:**

From the results of this work, it can be concluded that not all shampoo brands available in Tripoli markets comply with the Libyan standard specifications. Therefore the goods should prove their compliance with such standards before releasing them to the market where it is good to have standard specifications but it is more necessary to apply and keep restricted to such specifications. Further work will be carried out to investigate such brands regarding microbiology, rheological evaluations, surface tension measurement, skin sensitization test, eye irritation test and toxicity.

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