



POLYMERS USED IN BEARD STYLING SPRAY

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ABSTRACT

Polymers has been used in professional cosmetic product for their large variety of functions. Polymers are used in personal care product and hair care products as a film former, hair fixative, thickeners, emulsifier and stability. In the present Paper, beard spray with different polymers i.e. PVP (K30) Polyvinyl pyrrolidone and Acudyne 180 was formulated and to analyze the setting and holding effect of the product on the beard. Curl retention test and drying time of the product, subjective evaluation and stability testing of the product was carried Out.

Keywords: Polymers, PVP K30, Acudyne 180, Curl retention, Hair fixatives.

1. Introduction

Polymers are used in cosmetics and personal care product. A diverse range of polymers are applied in this segment as a film former, fixatives, rheology modifiers, thickeners and emulsifiers, conditioners, foam stabilizers and skin feel beneficial ingredients. Polymers used in hair care preparation have low densities and are largely used as a film formers and fixatives giving hold property. (Randy Schueller. & Perry Romanowski. 2017)

Hair dressing product for men and women are used to improve the control and manageability of hair, to impart luster and to maintain hair style in spite of the movement involved in daily activities and various environment conditions. Now a day's men have become aware of their grooming and appearance plays an important role in their life. Hair dressing products used by men is to keep their beard hair in order and enhance its luster. Adequate control of beard hair is important for men's grooming, Require two proportion from a product i.e. initial settings and long term control. Various types of men's hair dressing for men are available in the market like Brilliantine's, Non oily fixatives,

Aerosols, Emulsion, Gels etc. (Wilkinson J B. 1982) Beard spray comes under aerosol types of objective of beard sprays to deposit on to the dry hair and invisible film to protect it against all external agents that are likely to change its desirable features. Beard spray should possess properties like spray must be fine, force of spray on a wide area in a short period and dry quickly. The film should be relatively flexible to follow movement of the beard hair without breaking. The film should not be sticky or tacky to the touch and should hold the beard hair but at the same time leave it free to move. A good beard spray should be compromise between adhesion and elimination, tightness and lightness. (Balsam M. & Sagarin E. 1957)

Beard styling product are applied to dry hair and hold it in a place by a combination of thin deposit of stiff polymer by coating each hair, and giving hair together at point where they cross, such product evaporates rapidly and effect is instant i.e. product is applied to finished hairstyle to hold it in place. The precise formulas will vary from light hold to very strong, humidity resistant sprays. They are designed to hold without stiff and sticky and well make beard rigid and water Proof. (NIIR Board.)

Polyvinylpyrrolidone (PVP K30), also commonly called Polyvidone or Povidone is a water soluble. It is used as a hair fixative and film former.

Acudyne 180 is anhydrous acrylic emulsion polymer that upon neutralization yields to clear styling products and a crystal clear films on beard hair. Due to low hygroscopic nature of Acudyne 180 is non tacky while applying. After procurement of actives, evaluation of actives was carried out and it passes the test.

2. Experimental

Polymers i.e. actives Polyvinylpyrrolidone K30 and Acudyne 180 were procured from Vaibhav Organics and Dow chemicals.

2.1. Formulation of Base and Incorporation of Active in Base

Beard spray is a cosmetic product that is sprayed on to beard hair to keep it stiff or in a certain style. Beard spray is an aqueous solution which is sprayed to hold styles for long period. Beard spray product are a blend of simple industrial polymers that provide structural support to beard hair. (Wilkinson J.B and Moore R J. 1982)

Table 1 –Formulation of base

Sr. No	Ingredients	Quantity for 100%	Uses
1.	Ethylenediamidetetraacetic acid	0.10	Sequestering agent
2.	Isopropyl Alcohol	55	Solvent
3.	Propylene glycol	1	Humectant
4.	Distilled water	Up to 100 ml	Solvent
5.	Perfume	1	Fragrance

2.2. Incorporation of Polyvinylpyrrolidone K30 in a base formulation

After selection of base, Polyvinylpyrrolidone K30 and Acudyne 180 was incorporated in a various concentration i.e. from 0.5 to 7 % depending upon the holding and setting of the product. Formulation containing 6.5% of Polyvinylpyrrolidone K30 and 6% of Acudyne 180 was selected as a final formulation which was found be satisfactory.so it was selected for further studies. (Marc Paye. 2009)

Table 2- Incorporation of actives in Base formulation

SR No	Ingredients	Quantity for 100%	Uses
1.	Ethylenediamidetetraacetic acid	0.10	Suspending agent
2.	Isopropyl Alcohol	55	Solvent
3.	Propylene glycol	1	Humectant
4.	Distilled Water	Upto 100 ml	Fragrance
5.	Perfume	100 ml	
6.	Polyvinylpyrrolidone K30	1	
7.	Acudyne 180	6.5%	

2.3. Qualitative Analysis of Finished Products

2.3.1. Curl retention test

The curl retention test is used to determine the weather resistance of beard hairstyling products. To do this beard hair tress are treated under standard conditions with products to be tested and curled using suitable hair rollers. The curls are then put in a warm, humid climate and the elongation of the curl is measured at the start as well as after various measuring times. (Journal of the society of cosmetic chemists.Dec.9, 1968)

Preparation & Exposure of test samples

Wet beard hair and comb through to remove snarls. Squeeze out excess water by running the strands between thumbs and index finger roll the hair on rollers secure hair on rollers with plastic clip. Dry hair when hair is dry remove clips and hairs from rollers, carefully suspend the dry curls in random fashion on graduated, clear, transparent curl retention board. Take initial curl height reading(L0) remove curls from the board and suspend the curl from bound end in vented area. Apply control amount of beard hair spray as follows: -

Pumps: - four pumps are used- two in front of curl and two in the back -each from a distance of 8” Lay the freshly spread curl on horizontal surface and air dry for 1hr. at room temperature. Suspended the dry curls from the curl retention boards making sure the curls are attached at the bond end in the same position. Record curl height (Lt) at 0, 30, 60, 90 min interval.

Calculations

Calculate percentage curl retention using:

$$\text{curl retention} = \frac{L - Lt}{L - Lo} * 100$$

Where,

L= length of beard hair fully extended

Lo= length of beard hair before spray & exposure

Lt= length of beard hair after spray & exposure

2.3.1.1. Result

Table 3 – curl retention test

SR. NO.	Test Product	L	Lo	Lt	— *100
1.	PVP K30 Spray	8”	2.3”	3,7”	75.53%
2.	Acudyne 180 spray	8”	2.3”	3.5”	79.07%

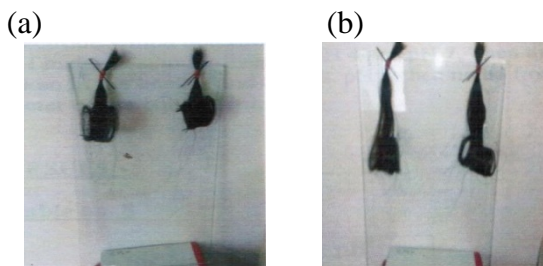


Fig. 1 - (a) Strands before spraying; (b) Strands after spraying and sand exposures.

2.3.2. Drying Time

Drying is the mass transfer process consisting of the removal of water or another solvent by evaporation from a solid, semisolid, or liquid or object. Three types of hair strands (wet, dry and oily) was used to observe the drying time of the product on the hair.

Procedure: - Hair strands were prepared and washed. Product was sprayed on wet hair, dry hair, and oily hair simultaneously and strands were observed and drying time was noted.

Table 4- Drying time of the product on wet, dry, oily hairs.

SR.NO.	Test Product	Wet hairs	Dry hairs	Oily hairs
1.	PVP K 30 spray	2 min 13 sec	1 min 30 sec	1 min 8 sec
2.	Acudyne 180 spray	1 min 55 sec	1 min 12 sec	1 min 35 sec

2.3.4. Accelerated stability testing

Before any product is placed in market there must exist evidence that during the time between its manufacture and its use by the consumer or cause it to represent a risk to the user, so it should have adequate shelf life.

Accelerated stability testing predicts shelf life of the product. Shelf life of the product can be predicted within limits based on accelerated stability reports. Predictions are subjected to high stresses during stability testing. Product is kept under different temperature. It includes Room temperature 27°C ± 2°C, Oven Temperature 45°C ± 2°C and Fridge temperature 4°C ± 2°C.

Color, appearance, odor and pH was observed under the above temperature and product was found to be stable at above temperature and it found within limits. (Butler H. 1993)

2.3.5. Determination of pH

The pH of spray was measured using pH meter. The spray is taken in the beaker and the rod is directly dipped into it. pH is then noted from the digital meter of the equipment. (Poucher’s Perfume, Cosmetics and Soaps.pg.no.451)

Table 5- pH value

SR.NO.	Test Product	pH
1.	PVP K30 Spray	6
2.	Acudyne 180 Spray	6.5

2.3.6. Subjective Evaluation

To access the effect of the developed products (i.e. 6 % & 6.5%) 50 clients were chosen having long beard for the evaluation of the product.

3. Result and Discussion

The main aim of the study was to formulate the beard spray with different polymers and to analyse the setting and holding effect of the product on the beard. For the preparation of beard spray, ingredients like Ethylenediamidetetraacetic acid, Polyvinyl Pyrrolidone K30, Isopropyl Alcohol, Propylene Glycol, Glycerine and Acudyne 180 were used. After procurement of actives evaluation of active was carried out. Base of beard spray was formulated on the basis of trial and error. According to its drying time, formulation 4 was selected as a base. The spray was formulated with two different polymers Polyvinyl Pyrrolidone K30 and Acudyne 180. After selection of base, Polyvinyl Pyrrolidone K30 and Acudyne 180 were incorporated in beard spray base separately. The spray with 0.5%, 1%, 1.5%, 2%, 2.5%, 3%, 3.5%, 4%, 4.5%, 5%, 5.5%, 6%, 6.5% and 7% Polyvinyl Pyrrolidone k30 and Acudyne 180 was prepared separately. Depending upon the holding and setting property of the product, formulation containing 6.5% of Polyvinyl Pyrrolidone k30 and 6% of

Acudyne 180 was selected as final formulation and further studies were carried out.

To check the stability of both the developed products, various physical parameters like colour, odour and pH were checked for a month and from the result of this accelerated stability testing it was found that there were no significant changes in the colour, odour, pH and both the products were found to be stable.

Different tests were carried out on the Polyvinyl Pyrrolidone K30 spray and Acudyne 180 spray. For Polyvinyl Pyrrolidone k30 spray pH was found to be 6, curl retention was found to be 75.53%, drying time was found to be 1min 20 sec. For Acudyne180 spray, pH was found to be 6.5, curl retention was found to be 79.07%, and drying time was found to be 50 secs.

Subjective evaluation was carried out in order to access the effect of the developed products. 50 clients having long beard were selected and beard styling product (A & B) were given for their effect.

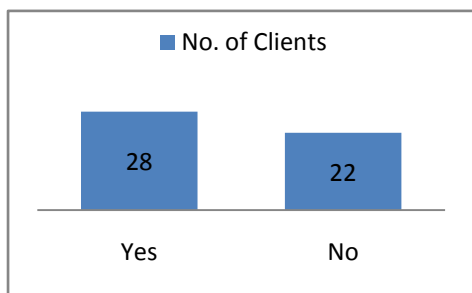


Fig.1

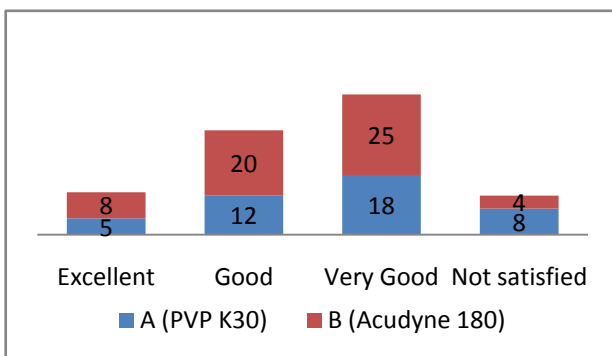


Fig.2

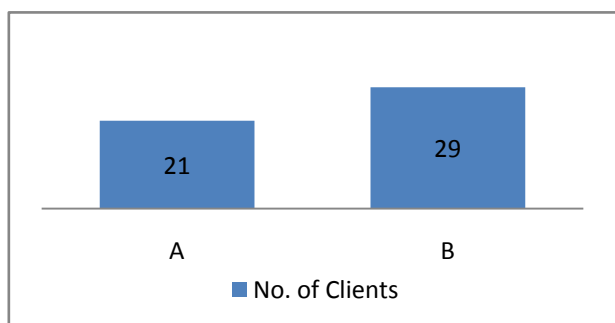


Fig.3

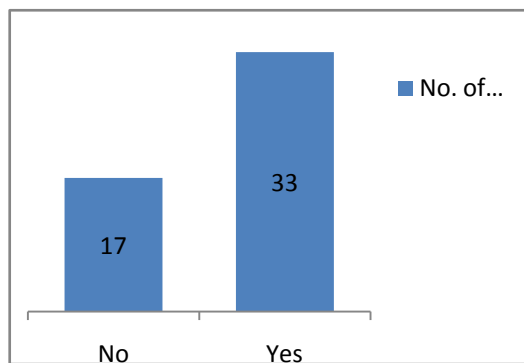


Fig.4

The clients were given both products (i.e. A & B) and the responses of the client was noted. As shown in fig.1 out of 50, 28 clients were using beard styling product and 22 were not aware. asked about the effect of the product. For formulation A, 5 clients reported product to be excellent, 12 reported good, 18 reported satisfactory and 8 were not satisfied (fig.2). For formulation for B, 8 client reported product reported good, 25 reported satisfied and 4 reported not satisfied. 21 clients prefer sample A and 29 prefer sample B (as shown in fig.3). Amongst 50 clients 17 clients preferred sample A and 33 prefer sample B.(fig.4)

Acknowledgement

The authors want to thanks DOW Chemical’s pvt. Ltd. For gift sample of Acudyne 180.

Conclusion

From the result of the tests it was found that Acudyne 180 spray was more preferred than the PVP K30 which is traditionally used.

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