

THE INVESTIGATION FOR THE EFFECT OF THE SOLUBILITY PARAMETER BETWEEN OIL BINDER AND SOLVENT TO THE PRODUCT QUALITY IN THE WET TYPE BACK INJECTION PRESS PROCESS.

Y TAE -YOUNG, K JONG-KUY, L JOO-WAN

*Peeres Cosmetics, Ltd. R & D Center.
131, Nueup-Dong, 447-160 Osan-Si, Gyeonggi-Do, Republic of Korea.*

Key words : Wet type back injection press process, Oil binder, Solubility, Make-up

SUMMARY

In the make-up product, Eye-shadow products have several purposes of enhancing product quality such as providing the beauty (variation of shape, clean appearance), feeling, continuity and adhesion. In this paper, newly developed wet type back injection press process is introduced so as to increase higher value products which providing various the beauty.

The solvent takes an essential role to provide the fluidity of the powder bulk during the pressed-process of wet type pressed product. In this study, the effect of solvent in the oil binder was investigated. And the higher quality condition of the wet type pressed product was built to apply cosmetic preparation.

Firstly, the system was designed powder phase as non treated pigment. The oil binder phase is categorized as hydrocarbons(Mineral oil, Squalane), Silicones(Methicone, Dimethicone), esters (Octyldodecanol, Octyl Dodecyl Myristate). The solvent phase used was C 7-8 isoparaffin and Isopropyl Alcohol. The interaction of oil binder and solvent is investigated by measuring mass of final oil binder and the each solubility parameter.

It was found that the higher the solubility the higher the degree of change in the final composition of the oil binder. In order to maintain the quality of the final product, the solvent used in pressed-process should be hydrophobic with oil binder.

INTRODUCTION

In the make-up products, standard of quality of pressed type point make-up product like eye-shadow and blusher is classified into internal factors such as expression of color, feel of applying, continuity and adhesion, and external factors such as harmony of color, the variation of shape design.

The increasing demand from consumers give rise to the technical progress in the field of external factors as well as internal factors.



In the technical improvements, the wet type back injection press process could produced of high value added products by doing the variation of shape design which providing the beauty.

Wet type back injection press process of present studies had been proceeded as following ;

- 1) The fluidity has been given in the contents of powder bulk by the volatile solvent.
- 2) Slurry paste was injected on the plastic plate by the pressure of plunger pump.
- 3) At the same time, the volatile solvent was extracted in the vacuum by pumping the upside of plastic plate.
- 4) After press, the additional drying was proceeded so as to extract the remained volatile solvent .

By following the step 1 to 4 described above, it was found that the oil binder as well as the small amount of pigment and solvent were also extracted simultaneously to the vacuum line in the process of volatile solvent extraction. From this phenomenon described above, it was found that the maintain constant quality seems very difficult.

Therefore, in the study, it was investigated that the solubility between solvent(to give fluidity to powder bulk) and oil binder (to give stability, adhesion, revelation of color) on the wet type back injection press process, and the higher quality condition of the wet type press product was built to apply cosmetic preparation.

MATERIALS AND METHODS

1.EVALUATION OF SOLUBILITY

1-1. MATERIALS

1-1-1. SOLVENT

- Isopropyl Alcohol (YAKURI PURE CHEMICAL CO. LTD)
- C 7-8 Isopraffin (EXXON CHEMICAL)

1-1-2. OIL BINDER

- Ester Oil :
 - Octyldodecanol (Henkel)
 - Octyl dodecyl Myristate (Cas Chemical)
- Silicone Oil :
 - Dimethicone (Dow Corning)
 - Methicone (Shin Etsu)
- Hydrocarbon Oil :
 - Light Mineral Oil (Witco)
 - Squalane (Kishimoto)

1-2. TEST METHOD

We investigated the solubility after homogeneous mixing of the solvents (10ml) and oils (5ml) at 25 C.

QUANTITATIVE ANALYSIS

2-1. MATERIALS

2-1-1. SOLVENT

- Isopropyl Alcohol (YAKURI PURE CHEMICAL CO. LTD)
- C 7-8 Isopraffin (EXXON CHEMICAL)

2-1-2. OIL BINDER

- Ester Oil : Octyldodecanol (Henkel)
 Octyl dodecyl Myristate (Gas Chemical)
- Silicone Oil : Dimethicone (Dow Corning)
 Methicone (Shin Etsu)
- Hydrocarbon Oil : Light Mineral Oil (Witco)
 Squalane (Kishimoto)
 Heavy Mineral Oil (Witco)
 Petrolatum (Arzo)

2-2. FORMULAR

Ingredient	Content
Powder Phase	79.00
Colorant	6.00
Oil Phase	15.00

2-3. TEST METHOD

After preparation of samples by changing the oil binder on the powder phase of general eye - shadow, the quantitative analysis of the oil binder in the final products from the wet type back injection press process was performed three times using the ether extraction method by SOXHLET apparatus.

RESULT

1. EVALUATION OF SOLUBILITY

As shown in [Table - 1], it was found that the most of oil was completely soluble in a volatile solvent like as Isopropyl alcohol, C 7-8 Isopraffin with hydrophilic property.

But hydrocarbon oil, like light mineral oil and squalane were not in isopropyl alcohol which has some hydrophilic property

In addition, oils which is silicone, fats, alcohol and ether, were completely melted into volatile solvent(Isopropyl Alcohol, C7-8 Isopraffin). However, we were able to confirm that hydrocarbon oil did not melt to Isopropyl Alcohol of hydrophilic property.

[Table - 1] Evaluation of solubility

SOLVENT	Isopropyl Alcohol	C 7-8 Isopraffin
OIL		
Octyldodecanol	S	S
Octyl dodecyl Myristate	S	S
Dimethicone	S	S
Methicone	S	S
Light Mineral Oil	I	S
Squalane	I	S

(S : Soluble , I : Insoluble, 25 C)

2. QUANTITATIVE ANALYSIS

[Table - 2] shows the result of quantitative analysis.

The results found were as follows :

- 1) In the case of using the Isopropyl Alcohol which has hydrophilic property in composition of C 7-8 Isoparaffin with hydrophobic property.
- 2) In the case of using the light mineral oil and squalane as binder which classified as hydrocarbons which has bad solubility in Isopropyl Alcohol.

In both cases, it was able to obtain classified the final products with small loss of oil binder, and consequently, have the uniform quality in the wet type back injection press process.

Therefore it was able to conclude that the hydrophilic solvent, Isopropyl Alcohol mixed with insoluble hydrocarbon oil, minimizes the quality change of the final product in the back injection press process.



[Table -2] The results of quantitative analysis (Standard : 1.500 Gram)

Solvent Oil Binder	Isopropyl Alcohol			C 7-8 Isoparaffin		
	Octyldodecanol	1.068	1.102	1.093	1.004	1.015
	AVERAGE		1.088	AVERAGE		1.013
Octyl dodecyl Myristate	1.007	1.010	1.004	0.998	1.010	1.005
	AVERAGE		1.007	AVERAGE		1.004
Light Mineral Oil	1.234	1.260	1.224	1.185	1.104	1.122
	AVERAGE		1.239	AVERAGE		1.137
Squalane	1.256	1.241	1.214	1.175	1.114	1.128
	AVERAGE		1.237	AVERAGE		1.139
Dimethicone	1.104	1.084	1.088	1.082	1.074	1.076
	AVERAGE		1.092	AVERAGE		1.139
Methicone	1.068	1.075	1.074	1.061	1.067	1.054
	AVERAGE		1.072	AVERAGE		1.061

With the fixed content of Isopropyl Alcohol, by changing the heavy mineral oil to petrolatum ratio as shown in [Table - 3], so as to change the viscosity of the mixture, the final composition of products were analyzed.

As the results show in [table-3], the higher the viscosity, it was able to obtain higher quality of final products in the process of wet type back injection press.

[Table - 3] The results of quantitative analysis (Standard : 1.500GRAM)

Solvent	Isopropyl Alcohol		
Oil binder			
Heavy Mineral Oil	1.297	1.286	1.302
	AVERAGE		1.295
Heavy Mineral Oil : Petrolatum (80 : 20)	1.326	1.334	1.304
	AVERAGE		
Heavy Mineral Oil : Petrolatum (60 : 40)	1.398	1.401	1.408
	AVERAGE		1.405
Heavy Mineral Oil : Petrolatum (40 : 60)	1.426	1.428	1.419
	AVERAGE		1.424

DISCUSSION

In the wet type back injection press process the solvent used for better fluidity was found the most important and basic factor.

However, those solvents has been affected by the factors that arise from the unbalance in the solubility between oil phase and solvent to maintain the uniform quality in the composition.

Therefore it is essential to formulate by considering the mutual effect between solvent and oil binder so as to obtain uniform quality in the process of wet type back injection press.

At present study, in order to minimize the mutual effects between solvent and oil binder , it was concluded as follows ;

- 1) Insoluble solvent with oil binder
- 2) The oil binder of the high viscosity in the condition of insoluble solvent.

REFERENCE

1. MAISON G. The Chemistry and Manufacture of Cosmetics Vol .4 719- 725
2. The Society of Japan Pharmacy. The Experiment Method of Sanitation 177 (1980)
3. Society of Cosmetic Science. SAISHIN KESHOHIN KAGAKU (Japan). 81 (1980)