

"FREON" PRODUCTS LABORATORYE. I. du Pont de Nemours & CompanyTECHNICAL REPORTReport Number:

KSS-4560

Subject:The Stability of Vinyl Chloride in
PVP/VA Hair Spray AerosolsCompany:Aerosol Techniques, Inc.
Bridgeport, ConnecticutBy:

E. J. Bennett

Date: November 19, 1963

Object:

1. To determine the stability of uninhibited vinyl chloride in a PVP/VA hair spray.
2. To determine if "Freon-11" or "Freon-11" S will adversely affect vinyl chloride in PVP/VA hair sprays.
3. To determine what type of inhibitors may be used to inhibit any instability of vinyl chloride.

Conclusions:

1. There are no gross detrimental effects on the stability of a PVP/VA hair spray when uninhibited vinyl chloride is used as a part of the propellant system. The same is true if the vinyl chloride is inhibited with phenol or p-methoxy phenol or "Freon-11" and "Freon-11" S.

2. Crown (unlined, 6-ounce, three-piece, 1/2# tin plate) containers developed a minimum of corrosion in all vinyl chloride hair spray formulations tested. In a few cases just a few spots were noticed at the side seam.

3. The use of vinyl chloride, inhibited or uninhibited with either "Freon-11" or "Freon-11" S had a noticeable, but small, effect on the odor of the hair spray formulation tested. Controls without vinyl chloride did not show this odor effect.

EID10465

Recommendations:

1. Because of the small adverse effect of vinyl chloride on odor, as obtained in this study, we do not recommend the direct substitution of propellant blends containing vinyl chloride for presently used Propellant 12/Propellant 11 blends. Careful shelf testing should be conducted first to determine whether or not this odor problem will be better or worse with the particular hair spray concentrate being considered.

2. Because of the adverse publicity on toxicity which hair sprays have received in the past few years, we believe it would be premature to use vinyl chloride until more is known about its toxicity in this application. The literature indicates vinyl chloride would probably be acceptable from this standpoint, but there is no data of which we are aware that would show complete safety for brief, but large, exposures to vinyl chloride as occurs in the typical use of a hair spray.

3. Because of its good solvency, vinyl chloride may be irritating to some people, either as a vapor or as liquid droplets. This point should be explored before using it in a blend. When a product is sprayed around the head, irritants are much more noticeable because of the heavy concentrations of spray exposed to the eyes and nose.

Experimental:

Samples were prepared of a PVP/VA hair spray aerosol and stored at room temperature and at 100°F for one year with periodic inspections being made for detection of sediment, corrosion, odor, and spray characteristics. Samples were stored in both glass and metal. All samples functioned properly after storage for one year.

Hair Spray Concentrate

The following concentrate was used:

PVP/VA E-735	8.0 Wt %
Lanolin Oil	0.2 Wt %
Myristyl Alcohol	0.2 Wt %
Isopropyl Myristate	0.2 Wt %
Perfume	0.7 Wt %
Ethanol, 39C	90.7 Wt %

This concentrate was used at the rate of 35 Wt % to 65 Wt % of combined propellents.

Containers:

Crown, 6-ounce, unlined, three-piece, 1/2# tin plate, with 150 gram total fill.
Wheaton bottles, 4-ounce, with 100 gram total fill
Both containers equipped with Standard Precision valves.

EID10466

KA004859

TABLE I

STABILITY OF PVP/VA HAIR SPRAY FORMULATIONS MADE WITH VARIOUS
TYPES OF VINYL CHLORIDE AND STORED FOR ONE YEAR AT ROOM
TEMPERATURE AND AT 100°F

PROPELLENT	CONTAINER	TEMPERATURE	RESULTS		
			Sediment	Odor	Comments
1-100%	Glass	Room	1	1	2, 4
2-75%, 3-25%	"	"	1	1	2, 4
1-75%, 3-25%	"	"	1	1	2, 4
2-75%, 4-25%	"	"	1	1	2, 4
1-100%	"	"	1	1	2
2-75%, 3-25%	"	"	1	2	2
1-75%, 3-25%	"	"	1	3	2
2-75%, 4-25%	"	"	1	2	2
1-75%, 5-25%	"	"	2	2	1
1-100%	"	100°F	1	1	2, 3
2-75%, 3-25%	"	"	1	1	2, 3
1-75%, 3-25%	"	"	1	1	2, 3
2-75%, 4-25%	"	"	1	2	2, 3
1-75%, 5-25%	"	"	2	3	1, 3
1-100%	Crown Can	"	---	1	2, 3
2-75%, 3-25%	" "	"	---	1	2, 3
1-75%, 3-25%	" "	"	---	1	2, 3
2-75%, 4-25%	" "	"	---	1	2, 3
1-75%, 5-25%	" "	"	---	1	1, 3

EID10467

KA004859

TABLE I (CONTINUED)

Legend: Propellant

1. "Freon-12"/"Freon-11" S, 40/60 wt %
2. "Freon-12"/"Freon-11" 40/60
3. Vinyl chloride, uninhibited, Dow
4. Vinyl chloride, 0.025 wt % phenol, Matheson
5. Vinyl chloride, uninhibited Dow with 0.025 wt % added p-methoxy phenol
*Better known as-
hydroquinone mono-
methyl Ethe.*

Sediment

1. Very light and does not interfere with spray
2. Slightly more than other samples but still does not interfere with spray

Odor

1. Normal and fresh
2. Slightly different from #1 and trace pungent
3. Not disagreeable but definite pungency noted

Comments

1. 11 months storage only
2. 12 months storage
3. 12 days at room temperature due to oven shut down
4. Propellant only, no PVP/VA concentrate

EID10468

Information and suggestions in this report are based upon our tests and experience, and are offered without charge as part of our service to customers. They are intended to be used by persons having technical skill at their own discretion and risk. Since conditions of use are outside our control, we cannot guarantee for our results, and we assume no liability in connection with use of our report. Our suggestions are not intended as a license to operate under, or a recommendation to infringe, any existing patents.

(FREON and combinations of FREON or Freon with numerals are Du Pont's registered trademarks for fluorinated hydrocarbons.)