Union Carbide Corporation - Chemicals Division
Research and Development Department
Tarrytown, New York

MEMORANDUM

TO: Mr. R. J. Scott

FROM: R. W. Greiner

DATE: May 23, 1966

SUBJECT: Mohawk Furniture Finishing Company, Amsterdam, New York - Examination of a Filter Deposit

The filter submitted with this problem had been used with a propellant mixture consisting of 22 per cent vinyl chloride and 78 per cent mixed fluorocarbons 12 and 11. Mohawk had attributed the deposit on the filter to the polymerization of vinyl chloride.

This filter was very heavily loaded with a dry, powdery material that could be readily dislodged by tapping the filter element. Our examination of this deposit indicated that the major component is rust. Eleven per cent of the sample consists of water-soluble material and the water solution contained ferric, cupric, and chloride ions. The water solution (from 0.75 g of sample in 50 ml of water) was slightly acidic, having a pH in the range of 5 to 6.

Approximately 1.5 per cent of the sample was isolated as a substance which was indicated to be largely poly(vinyl chloride). About three per cent of the deposit, indicated to be largely inorganic, was insoluble in several organic solvents and in dilute acid and remains unidentified.

R.W. Greiner

RWGreiner/da

Sample Reference: Anal. No. G-6-42; Memorandum to Mr. R. W. Greiner from Mr. R. J. Scott, April 15, 1966.

Account Number: 289 E 95

Distribution:
Dr. J. R. Anderson
Dr. J. H. Fager
Dr. S. M. Livengood

661 289

Chemicals Division
Research and Development Department
Tarrytown, New York

MEMORANDUM

TO: Dr. S. M. Livengood

FROM: R. J. Scott

DATE: November 1, 1966

SUBJECT: Report of Call - La Maur, Incorporated, Minneapolis, Minnesota

On October 25, Mr. J. A. Holz and the writer called on the subject company to explore their interest in halogenated solvents in hairsprays. There has been a change in laboratory personnel, however, which has held up La Maur's evaluation of these solvents. Mr. Robert Baillie is now in charge of La Maur's laboratory replacing Mr. Frank Uhlemann who has been moved into quality control.

Mr. Baillie is still getting oriented and stated that he had not put much effort into evaluating halogenated solvents as yet. Like Rayette, however, he thought that 10% would be as far as he would want to go with methylene chloride. Mr. Baillie was more interested in propellant blends, particularly those based on vinyl chloride and isobutane. He found that 8% vinyl chloride is all that his perfumes can tolerate in a blend, and asked us to work out a mixture where isobutane took up the balance of the allowable concentration of flammable component. He will send us a sample of his concentrate to work with.

RJScott/nal

Distribution

A. B. Chivvis
J. A. Holz
R. Lavach

727 284

BUSINESS CONFIDENTIAL

SUMMARY REPORT

AEROSOL PAINTS

COMPATIBILITY OF UCON® PROPELLANTS IN VINYL BASED VEHICLES

Author: R. G. Werner

Supervisor: R. J. Scott

Date: November 18, 1966
Project No. 289E95
File No.

SUMMARY

Compatibility of UCON propellants in solutions of vinyl resins was studied. The results indicate that in most cases vinyl based aerosol paint formulations may be feasible utilizing 50% propellant with the following UCON propellants: propellant P, vinyl chloride blend, dimethyl ether, vinyl chloride. Economics favor dimethyl ether and vinyl chloride, and are recommended because they would tend to cause fewer precipitation problems.

Union Carbide Corporation - Chemicals Division
Research and Development Department
Tarrytown, New York

AEROSOL PAINTS
COMPATIBILITY OF UCON® PROPELLANTS IN VINYL BASED VEHICLES

INTRODUCTION

Vinyl paints are very useful in marine and outdoor coating applications, because of their high chemical resistance, durability, and flexibility. Despite the advantages of these coatings, they have continually eluded the aerosol market because the vinyl resins are incompatible with fluorocarbon 12.

Several attempts have been made to formulate vinyl coatings for use in aerosols, but for the most part, this work has been futile [1, 2]. As far as we know, there are two companies which are presently marketing an aerosol coating based on vinyl resins [3]. Since the compatibility problem must have been overcome to some extent in these products a project was undertaken in order to reinvestigate other possibilities for workable formulations.

DISCUSSION

Two similar vinyl resins of differing molecular weights were chosen for purposes of comparison. The resins used were VMCC and VMCH having molecular weights approximately 25,000 and 50,000 respectively. Stock solutions of VMCC and VMCH were prepared in concentrations of 10 and 20 per cent by weight with the following solvents: acetone, methyl ethyl ketone (MEK), methyl isobutyl ketone (MIBK). Samples of each solution (20 g.) were packaged in compatibility tubes and titrated to a cloud point with various propellants. The cloud point in this experiment was taken as either the point at which the solution of the vinyl vehicle and propellant became very translucent (close to opaque) or the point at which precipitated resin could not be redissolved. It should be noted that the end point is not distinct and that most of the solutions become progressively more cloudy as the titration proceeded. Only titrations with dimethyl ether and vinyl chloride exhibited no cloudiness. Cloudiness is not desirable in an aerosol paint formulation because eventual precipitation of the resin can result in valve clogging and leakage.

The data obtained with VMCC (BL54) is presented in Table 1. It can be seen that large amounts of UCON 11 can be tolerated by solutions of VMCC, as compared to the other fluorocarbons, and that solution tolerance of UCON 11 increases as the solution is made more dilute in vinyl resin, as might be generally expected. Titration with the propellants indicates that the solvent strength follows the order: acetone $>$ methyl ethyl ketone $>$ methyl isobutyl ketone. Exceptions are prevalent in the data of this report but most of the cases tend toward the above pattern.

The results indicate propellant P, vinyl chloride blend, dimethyl ether, and vinyl chloride will give compatible solutions with 50% propellant or above without having a residual resin precipitate.

The data for the VMCH (BL1736) solutions are given in Table 2. The statements made for the VMCC solutions are essentially the same for the VMCH solutions. Comparing Tables 1 and 2 it can be seen that the high molecular weight VMCH has approximately the same tolerance for propellants as the low molecular weight species at the same concentrations by weight.

CONCLUSIONS

Since, in most aerosol paint formulations the amount of propellant usually does not exce d 50% by weight, the propellants that would be useful in a vinyl based system would be propellant P, vinyl chloride blend, vinyl chloride, and dimethyl ether.

Economics would certainly favor the latter two, while propellant flammability would be eliminated by using the former two, but since hydrocarbons such as propane and isobutane are currently being used in aerosol paints, dimethyl ether and vinyl chloride are the obvious choices for this application.

The propellants recommended have yet another advantage as far as production line filling is concerned. They will not cause local precipitation of the resin whereas the blends will to some extent, and may cause valve clogging and leakage.

The vinyl resins are bound to vary in propellant tolerance from batch to batch and this is a critical factor [2]; therefore, the tolerance values given herein are reliable only for the batch numbers indicated.

No work was done with any other resins in the vinyl family (i.e., VAGH, VYHH,, etc.). However, since these compounds are very similar to each other, we might expect similar data as that obtained with VMCC and VMCH.

RG Werner

cao

ACKNOWLEDGMENT

Thanks go to Mr. R. N. Miller, Jr. for performing most of the laboratory work necessary for this report.

REFERENCES

1. Clayton, M. E., Final Report, "Aerosol Vinyl Resins and Paints Pressurized with UCON Propellant P", February 1, 1962.

2. Clayton, M. E., Final Report, "Aerosol Vinyl Paints: Withdrawal of Prior Recommendations", September 6, 1962.

3. Werner, R. G., Final Report, "Aerosol Paints - Vinyl Resin Based Vehicles", October 14, 1966.

TABLE 1

COMPATIBILITY OF UCON® PROPELLANTS IN STANDARD VMCC SOLUTIONS

	g. of Propellant/20 g. of Resin Solution					
UCON Propellants	20% VMCC in Acetone	10% VMCC in Acetone	20% VMCC in MEK	10% VMCC in MEK	20% VMCC in MIBK	10% VMCC in MIBK
11	62.0	--	54.7	65.2	>36.2	49.5
12	15.9	19.7	14.8	21.4	8.3	15.4
114	7.9	13.8	5.5	14.5	4.5	7.9
Propellant A	19.8	32.4	17.5	28.9	13.8	>15.9
Propellant P	25.4	28.0	23.0	28.2	18.5	22.5
Vinyl Chloride Blend	32.0	42.1	31.5	37.1	29.1	>28.8
Dimethyl Ether	>26.5	>29.5	>26.0	>29.3	>26.7	>20.4
Vinyl Chloride	>52.6	>42.9	>29.1	>29.9	>27.9	>30.9

TABLE 2

COMPATIBILITY OF UCON® PROPELLANTS IN STANDARD VMCH SOLUTIONS

	g. of Propellant/20 g. of Resin Solution					
UCON Propellants	20% VMCH in Acetone	10% VMCH in Acetone	20% VMCH in MEK	10% VMCH in MEK	20% VMCH in MIBK	10% VMCH in MIBK
11	62.9	75.5	54.6	60.8	36.1	41.3
12	16.9	19.4	18.1	18.0	13.5	15.4
114	10.1	>8.2	12.8	13.9	9.8	11.4
Propellant A	>17.3	>22.9	>19.1	>18.8	>16.2	>19.4
Propellant P	22.1	26.3	22.1	26.7	17.2	21.2
Vinyl Chloride Blend	>27.7	48.3	29.7	>22.7	>20.8	>21.4
Dimethyl Ether	>34.7	>28.9	>22.4	>27.0	>20.8	>21.8
Vinyl Chloride	>37.3	>47.2	>17.4	>18.7	>22.4	>22.7

Notebook Reference: Book 589, Pages 130-136, 141-144, 146-148
Book 436, Pages 5, 8, 9, 12

Period: October 7 - November 3, 1966

Distribution

Mr. A. B. Chivvis
Mr. R. H. Duzy
Mr. J. E. Weigel

Index List

Aerosol Paints
Vinyl Resins
Compatibility