MARJORY L. JOSEPH
San Fernando Valley State College

Introductory Textile Science

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Saran in Use

While saran fibers are somewhat dense and therefore may be undesirable for apparel fabric use, they are prized for use in furnishing fabrics such as upholstery and draperies; on outdoor furniture; as automobile upholstery and for similar uses in commercial vehicles. The staple fiber form is preferred for draperies, while filament fiber is more satisfactory for furniture use as it is cleaned quickly and easily and does not provide interstices between fibers for dirt and stains to settle. However, the smooth surface of the fiber enables soil to be removed easily from staple yarns.

The fibers are easily cleaned with detergents and lukewarm water. Stains seldom penetrate.

Other uses for saran fibers include wigs for manikins and dolls, luggage coverings, window and patio screening, dust mops, and a wide variety of industrial fabrics.

VINYON

The first vinyon fibers were made experimentally in 1933. The Carbide and Carbon Corporation made the polymer but it was 1939 before any commercial quantities of the fiber were produced. At that time the American Viscose Corporation began to convert the polymer made by Carbide and Carbon into filament fibers. It is interesting to note that this fiber, a true synthetic, was introduced the same year as nylon.

Since that time, improvements have been made on the original fiber and several foreign fiber manufacturers are producing vinyon. The trade names usually encountered are Vinyon HH, Rhovyl, Pe Ce, PCU, and PVC.

Vinyon fibers are defined by the Federal Trade Commission as:

> a manufactured fiber in which the fiber forming substance is any long chain synthetic polymer composed of at least 85% by weight of vinyl chloride units (—CH_2—CHCl—).

Production

Vinyon fibers are either polymers of vinyl chloride or copolymers of vinyl chloride and a second vinyl compound, usually vinyl acetate. These chemicals are polymerized either under pressure or by means of catalysts; the process is addition polymerization. The polymer is dissolved in a suitable solvent and spun into a coagulating media—water, warm air, or other acceptable environment.

EXHIBIT 2

THE MODERN
Textile Dictionary

FULLY REVISED AND EXPANDED

by

GEORGE E. LINTON, Ph.D.

Duell, Sloan and Pearce
New York

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and I. M. Price

TEXTILE TERMS
Richard S. Cox

LAUNDRY INDUSTRY
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William C. Segal

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A Division of
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Des Moines & New York

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MANUFACTURED IN THE UNITED STATES OF AMERICA FOR MEREDITH PRESS

VAN REES PRESS • NEW YORK

treatment which results in a parallel molecular structure and a yarn which is regenerated cellulose. Properties include extreme strength and dimensional stability.

SAPPHIRE. A color, greenish-blue in hue, of medium saturation and low brilliance.

SAPPY WOOL. Wool which has a high percentage of yolk and suint; the actual yield will be small because of their presence in the grease wool.

SARABAND RUG. Small or medium size Persian rugs made of cotton warp and filling for the base construction with the short pile-effect made of wool tied with Senna knots. Some of the rugs may have wool filling. The design usually shows a pear or some other fruit, while the narrow ornate borders have approximately seven stripes in red, blue, or green. The filling crosses twice beneath each row of tufts. The rugs are often used as runners since they can be made in long, narrow sizes.

SARACENIC TAPESTRY. See BASSE-LISSE.

SARAKHS RUGS. Carpets or rugs made in this northeastern town in Iran (Persia). These heavy, all-wool rugs have the long, close pile tied in Ghiordian knot formation. The yarn is spun from wool obtained in the vicinity.

SARAN AND VELON. Chemicals are the base of these fibers; after processing, the result is vinylidene chloride. Derived from ethylene, a petroleum product, and chlorine from brine.

Saran is known in popular language as a thermoplastic resin; that is, a plastic which is softened by heat and hardened into shape by cooling. It can be quickly and economically molded, and because it can be softened and reshaped again and again, little waste is occasioned. Saran is made by Dow Chemical Co., and is made into filaments and fabrics under both its own name and others.

Velon is a filament made by the Firestone Tire and Rubber Company. At present it is available only as a monofilament.

Properties of these two fibers include resistance to chemicals, stains, abrasion, corrosion, and moisture; they are nonflammable, tough, flexible, as desired. Chief uses are for screen cloth, draperies, luggage, shoes, upholstery.

SARANDAZ RUGS. Trade term for Anatolian- and Persian-knotted wool rugs of various designs. Used for household purposes—floor covering, wall decoration, etc.

SARASHI CARIKO. A 36-inch, bleached cotton fabric used for shirting in Japan.

SARASHI KANAKIN. Japanese term for a plain-weave, bleached cotton shirting.

SARASSES COTTON. An East Indian cotton used locally.

SARAWAMI. An Indian sheep known for its fat tail; its fleece shows both wool fibers and hair. The yield is used chiefly in making rough blankets used by the natives and finds some use as carpet wool.

SARCILIS, SARZIL. During the Middle Ages this very coarse, low-textured woolen cloth was worn chiefly by those who subsisted on charity or were beggars.

SARI, SAREE. Scarf worn by the women in India; a gauzy, long fabric which covers the body and can be used to cover the head. The chief garment of Hindu women, it is, in hot weather, the only article of dress worn by the poorer classes.

SARONG. A shirt-like garment, twice as long as wide. The short ends are sewn together, then
tied around the hips. Th
sarong is broken by the
head)—which is a dou
angular motifs called
feature floral designs.
sembles a backgammon
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India. This garment is th
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cated way, while the tr
(double tie-dyed silk
British India) are worn
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Dodot—depending upon
rules of court etiquette.

The Siendang (shawl
long small cloth of bat
either to carry a baby or
a shawl, over the shoul
DANG.

SAROUK RUG. See
INGS, CLASSIFICATION OF.

SARPLAR. 1. A bal
weighs one ton, 2,240
equal to 80 tods. 2. Toc
term sarplar, is a unit
pounds of wool.

SARPLIER. A stro
cotton fabric made in E
for bagging to hold newl
wool being shipped fro
consignee. See SARPLAR.

SARSANET. Plain o
fabric noted for its so
perseded by more prec

EXHIBIT 3

MAN-MADE TEXTILE ENCYCLOPEDIA

Edited by J. J. PRESS
United States Navy Clothing and Textile Research Laboratory

TEXTILE BOOK PUBLISHERS, INC.
A Division of
INTERSCIENCE PUBLISHERS, INC., NEW YORK
Interscience Publishers Ltd., London

DEDICATION

To my good friend, Dr. Herman F. Mark, who inspired the organization of this Encyclopedia, and to my dear wife, whose impatient patience and cooperation helped me see it through to completion.

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to acrylonitrile. The high moisture regain is reported to minimize or prevent the accumulation of static electricity during mill processing. Verel is fire resistant to the extent that it does not support combustion and is resistant to attack by microorganisms and a wide variety of organic and inorganic chemicals. This fiber can be handled on all spinning systems and blends well with cotton, wool, and other synthetics. The bright and dull staple fiber is available in three types (Regular Verel, Verel-Type I, and Verel-Type II) which differ primarily in heat sensitivity as measured by shrinkage in boiling water and in air at elevated temperatures. Whereas the low shrinkage, regular Verel is used in conventional fabrics, the high shrinkage types I and II are recommended for such applications as backing yarns in pile fabrics and high bulk yarns for sweaters and jerseys. The dyeing properties of Verel are reported to be good with premetalized, disperse, and basic dyes. Best light and wash fastness properties are achieved with the neutral dyeing premetalized dyes. A special dyeing assistant available from the fiber manufacturer is recommended for obtaining deepest shades.

TABLE VII
Properties of Verel

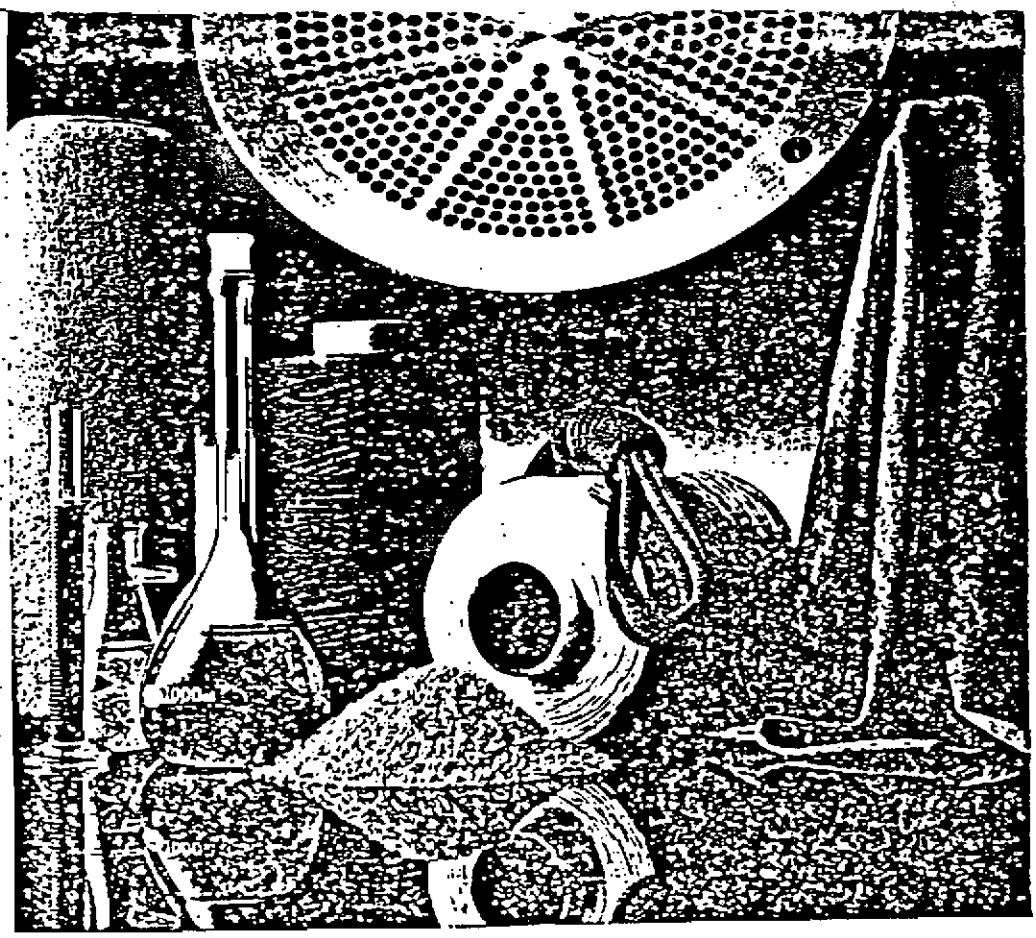
Molecular structure	Partially crystalline
Fiber cross section	Peanut shape
Dry tensile strength, p.s.i.	44,000–49,000
Dry tenacity, g./den.	2.5–2.8
Wet tenacity, g./den.	2.5–2.8
Dry and wet elongation, %	33–35
Initial stiffness, g./cm.	40
Elastic recovery	88% from 4% extension
Specific gravity	1.37
Moisture regain % at 70°F., 65% R.H.	3.5–4.0
Shrinkage, % in boiling water	
Regular Verel in yarn form	1.0–3.0
Type I Verel	9.0–11.0
Type II Verel	19.0–23.0
Shrinkage, % in air at 300°F	
Regular Verel in yarn form	2.0–5.0
Type I Verel	15.0–17.0
Type II Verel	25.0–28.0
Solvents	Warm acetone, adiponitrile, methyl sulfoxide, acetonitrile
Moth and mildew resistance	Not attacked
Effect of high temperatures	Fabrics can withstand temperatures under a dry iron up to 300°F.; no appreciable strength loss after 128 hr. at 230°F.; some discoloration
Effect of chemicals	Good-to-excellent resistance to acids and alkalies up to 50% concentration, and to solutions of various metallic salts at room temperature; excellent resistance to dry cleaning solvents
Fiber identification test	About 0.2 g. of scoured fiber is placed in a test tube containing 5–6 ml. of pyridine; the mixture is heated on a steam bath for 2–3 minutes. If Verel is present, fiber turns a deep reddish brown and the solution becomes pale pink

Vinylidene Chloride-Vinyl Chloride Copolymer. Polyvinylidene chloride was first observed in France as early as 1838, but little was done in studying the properties and in attempting to exploit the commercial value of this material until about 1930. It soon became apparent that the insolubility and poor heat stability of the homopolymer imposed serious limitations on methods for making useful items of commerce such as fibers and films. Intensive work was therefore directed toward the copolymerization of vinylidene chloride with vinyl monomers as a means of overcoming this problem, and in 1939 copolymers of vinylidene chloride and vinyl chloride were disclosed in a series of patents assigned to Dow Chemical Co. Copolymers containing from 10 to 15% of vinyl chloride, known as saran polymers, are now produced commercially by Dow Chemical Co., and are converted to filament yarns and staple fibers by several manufacturers in America, Britain, Europe, and Japan.

Saran fibers show excellent resistance to soiling and staining. They are also resistant to acids and alkalies and to attack by bacteria and insects. When exposed to a flame, saran fibers soften and char, but do not support combustion. When combined with flammable fibers, saran acts as a fire-retardant. Saran can be dyed with disperse (acetate) dyestuffs, but the light fastness of the dye is a problem. Coloration is usually obtained by pigmentation during the manufacture of the fiber, and a complete range of colored yarns is now available. The principal uses for saran are in screens, upholstery, fabrics, carpets, industrial filter fabrics, and, in blends with other fibers for drapery and casement cloth.

Saran yarns are produced in the U.S. by Saran Yarns Co., National Plastic Products Co., Firestone Plastics Co., Dawbarns Bros., Inc., Pierce Plastics, Inc., Southern Lus-Trus Corp., Elmer E. Mills Corp., and Bolta-Saran Inc. Foreign producers of saran yarns include B. X. Plastics Ltd., of England, Kureha Kasei Co., Ltd. of Japan, Bolta-Werk GmbH. of Germany,

EXHIBIT 4



Manufactured Fiber


MADE IN THE
USA

carboxylic acid, including but not restricted to substituted terephthalic units,—

$$p(\text{-R-O-}\overset{\overset{O}{\|}}{\text{C}}\text{-C}_6\text{H}_4\text{-}\overset{\overset{O}{\|}}{\text{C}}\text{-O-})$$

and parasubstituted hydroxy-benzoate units,—

$$p(\text{-R-O-C}_6\text{H}_4\text{-}\overset{\overset{O}{\|}}{\text{C}}\text{-O-}).$$

Basic Principles of Production

Polyester fibers are produced from fiber-forming material made from elements derived from coal, air, water and petroleum. They are melt spun.

Characteristics

- Strong
- Resistant to stretching and shrinking
- Resistant to most chemicals
- Quick drying
- Crisp and resilient when wet or dry
- Wrinkle resistant
- Mildew resistant
- Abrasion resistant
- Able to retain heat-set pleats and creases
- Easily washed

Some Major Uses

Apparel
Every form of clothing

Home Furnishings
Carpets, curtains, draperies, sheets and pillow cases, wall coverings and upholstery

Other
Fiberfill for various products; automobile upholstery, fire hose, power belting, ropes and nets, thread, tire cord, sails, V-belts, floppy disk liners

General Care Tips

1. Most items made from polyester can be machine washed and dried. Use warm water and add a fabric softener to the final rinse cycle. Machine dry at a low temperature and remove articles as soon as the tumbling cycle is completed.
2. If ironing is desired, use a moderately warm iron.
3. Most items made from polyester can be dry-cleaned. (For specific instructions, refer to garment's sewn-in care label.)

SARAN

First U.S. Commercial Production:

1941, Firestone Plastics Company, predecessor of Firestone Synthetic Fibers and Textiles Company.

Federal Trade Commission Definition:

A manufactured fiber in which the fiber-forming substance is any long-chain synthetic polymer composed of at least 80% by weight of vinylidene chloride units.

$$(\text{-CH}_2\text{-CCl}_2\text{-}).$$

Characteristics and Uses

Saran fibers wear well and resist common chemicals, sunlight, staining, fading, mildew and the weather.

Fabrics made from saran fibers can be easily washed with soap and water. They are non-flammable. Saran monofilaments are comparatively stiff and they soften at low temperatures. The fiber is heavy compared with most apparel fibers. Saran fibers are used for upholstery in public conveyances, deck chairs, garden furniture, etc. The weight of saran fibers is too great for wide use as a general textile material.

SPANDEX

First U.S. Commercial Production:

1959, E. I. du Pont de Nemours & Company, Inc.

Federal Trade Commission Definition:

A manufactured fiber in which the fiber-forming substance is a long-chain synthetic polymer comprised of at least 85% of a segmented polyurethane.

EXHIBIT 5

The Condensed Chemical Dictionary

TENTH EDITION

Revised by

GESSNER G. HAWLEY

VNR VAN NOSTRAND REINHOLD COMPANY
New York

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ISBN 0-442-23244-6

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...monium chloride. An ...ter, used to increase the

...inyl acetal.

...n, thermoplastic resin ... acetylene with carbo... has excellent dielectric chemical stability, but ...is used principally as a ...cal equipment and as an ...ators.

...H₂CCHCl—)ₙ. A syn... ...

Properties: White powder or colorless granules. Resistant to weathering and moisture; dimensionally stable; good dielectric properties; resistant to most acids, fats, petroleum hydrocarbons and fungus. Readily compounded into flexible and rigid forms by use of plasticizers, stabilizers, fillers, and other modifiers. Easily colored and processed by blow molding, extrusion, calendering, fluid bed coating, etc. Available as film, sheet, fiber and foam.

Derivation: Polymerization of vinyl chloride (q.v.) by free radicals with peroxide initiator. May be copolymerized with up to 15% of other vinyls.

Hazard: Decomposes at 148°C, evolving toxic fumes of hydrogen chloride. See also vinyl chloride, and note.

Uses: Piping and conduits of all kinds; siding; gutters; window and door frames; officially approved for use in interior piping, plumbing, and other construction uses; raincoats, toys, gaskets, garden hose, electrical insulation, shoes, magnetic tape, film and sheeting; containers for toiletries, cosmetics, household chemicals; fibers for athletic supports; sealant liners for ponds and reservoirs; adhesive and bonding agent; plastisols and organosols; tennis court playing surfaces; flooring; coating for paper and textiles; wire and cable protection; base for synthetic turf, phonograph records.

Note: Use of PVC in rigid and semirigid food containers, such as bottles, boxes, etc., is under restriction by FDA, as well as in coatings for fresh citrus fruits. Its use in thinner items such as films and package coatings is permissible. Possibility of migration of vinyl chloride monomer into food products is the critical factor; this tends to increase with the thickness of the material.

polyvinyl chloride-acetate. A vinyl chloride and vinyl acetate copolymer that is more flexible than polyvinyl chloride. The copolymer usually contains 85 to 97% of the chloride. It is generally similar in properties and uses to polyvinyl chloride.

polyvinyl dichloride (PVDC). A chlorinated polyvinyl chloride. Has high strength and superior chemical resistance over a broad temperature range; self-extinguishing. Used for pipe and fittings for hot corrosive materials up to 100°C. Is immune to solvation or direct attack by inorganic reagents, aliphatic hydrocarbons and alcohols.

polyvinyl ether. See polyvinyl ethyl ether; polyvinyl isobutyl ether; polyvinyl methyl ether; polyvinyl methyl ether-maleic anhydride.

polyvinyl ethyl ether (PVE; polyvinyl ether) [—CH(OC₂H₅)CH₂—]ₙ.

Properties: Viscous gum to rubbery solid, depending on molecular weight. Colorless when pure; sp. gr. 0.97 (20°C); refractive index 1.45 (25°C). Insoluble in water; soluble in nearly all organic solvents. Stable toward dilute and concentrated alkalies and dilute acids. Compatible with a limited number of commercial resins, including rosin derivatives and some phenolics.

Derivation: Polymerization of vinyl ethyl ether.

Uses: Pressure-sensitive tape; to improve adhesion to porous surfaces, cellophane, cellulose acetate and vinyl sheet.

polyvinyl fluoride (—H₂CCHF—)ₙ. Polymer of vinyl fluoride. In film form it is characterized by superior resistance to weather, high strength, high dielectric constant, low permeability to air and water, as well as oil, chemical solvent and stain resistance.

Hazard: Not recommended for food packaging. Evolves toxic fumes on heating.

Uses: Protective material for outdoor use; packaging; electrical equipment.

polyvinyl formal. See polyvinyl acetal.

polyvinylidene chloride (saran). A stereoregular, thermoplastic polymer.

Properties: Tasteless, odorless, nontoxic; abrasion-resistant; low vapor transmission; impermeable to flavor. Highly inert to chemical attack; softened by chlorinated hydrocarbons and soluble in cyclohexanone and dioxane. Combustible but self-extinguishing.

Derivation: Polymerization of vinylidene chloride (q.v.) or copolymerization of vinylidene chloride with lesser amounts of other unsaturated compounds.

Forms: Extruded and molded products; oriented fibers; films.

Uses: Packaging of food products, especially meats and poultry; insecticide-impregnated multiwall paper bags; pipes for chemical processing equipment; seat covers, upholstery fibers, bristles, latex coatings.

See also saran fiber; "Cryovac."

polyvinylidene fluoride $H_2C = CF_2$. A thermoplastic fluorocarbon polymer suitable for compression and injection molding and extrusion.

Properties: Crystalline melting point 171°C. Thermally stable from −62 to +148°C. Self-extinguishing and nondripping. Tensile strength 7000 psi at 25°C; yield stress 5500 psi; elongation 300%, compression strength 10,000 psi; thermal conductivity 1.05 Btu/hr/sq ft/°F/in; water absorption 0.04% in 24 hrs; sp. gr. 1.76; refractive index 1.42. Resistant to oxidative degradation, electricity, acids, alkalies, oxidizers, halogens. Somewhat soluble in dimethylacetamide; attacked by hot conc. sulfuric acid or n-butylamine.

Forms: Powder, pellets, solution, and dispersion.

Uses: Insulation for high-temperature wire, tank linings, chemical tanks and tubing, protective paints and coatings with exceptional resistance (30 years) to weathering and U.V.; valve and impeller parts; shrinkage tubing to encapsulate resistors, diodes, and soldered joints; sealant.

See also fluorocarbon polymer.

FILE # 70-51729 RMH

CONTENTS: LAB WORKSHEET ITEMS

EXHIBIT 6

Matthews'
TEXTILE FIBERS

Their Physical, Microscopic, and Chemical Properties

SIXTH EDITION

Prepared by a Staff of Specialists
under the Editorship of

HERBERT R. MAUERSBERGER

Secretary of Textile Book Publishers, Inc.
Director, Textile Department,
Fairleigh Dickinson College
Textile Consultant

JOHN WILEY & SONS, INC., NEW YORK
CHAPMAN & HALL, LIMITED, LONDON

Utilization. Among the first commercial applications of vinylidene chloride were fishing leaders made of monofilaments and produced by Pierce Plastics, Inc., of Bay City, Mich., under the trade name of Permalon. This company also used Saran for the production of tapes, as well as catheters for surgical purposes. Irvington Varnish & Insulator Company produced filaments in a rattanlike cross-section for use in upholstery fabrics. The success obtained with this material in specialty fields soon led to its adoption for the manufacture of narrow webbing in decorative fabrics such as belts and suspenders, as well as specialty braids and some knitted fabrics. It was found possible to weave the material on metal wire looms through minor loom modifications. A durable insect screen was made for war purposes, which outlasted metal in adverse tropical and humid climates. Among the first extruders producing monofilaments for this use were the Firestone Industrial Products Company, now Firestone Plastics Company, of Pottstown, Pa., under the trade name Velon. Shortly after the work on metal wire looms was started, it was found possible to weave this fabric on slightly modified standard textile looms. The use of vinylidene chloride in insect screens is a typical example of the utility of this material for military applications. Other companies have taken up the manufacture of Saran monofilaments and brush bristles: Lus-Trus Extruded Plastics, Inc.; Bolta-Saran, Inc., and Dawlam Brothers, Inc.

Process. Petroleum and brine are the basic raw materials. Ethylene, made by cracking petroleum, and chlorine, obtained by the electrolysis of brine, combine to form trichloroethane, which is converted to vinylidene chloride as shown in Fig. 23.

Monomeric vinylidene chloride is a clear, colorless liquid having a boiling point of 31.7° C. (89° F.). The structural formula is $CH_2 - CCl_2$. It can be readily polymerized to form a long, linear, straight-chain polymer. By selection of copolymers and control of the polymerization conditions, polymers can be formed which have softening points ranging from 70° C. (156° F.) to at least 180° C. (356° F.). An average commercial polymer has a molecular weight of approximately 20,000 and a softening point of 120 to 140° C. (248 to 284° F.). The basic vinylidene chloride resin is practically odorless and tasteless, and is nontoxic.

The fabrication method of particular interest in the textile field consists of extrusion with subsequent mechanical or heat treatment for improved properties. The extrusion of vinylidene chloride produces a long, continuous-length monofilament, either of circular cross-section

Exhibit 5

01022018 S RQ TN
01029014 S RQ TN

B7C [redacted] Dictation:

The Q46 and Q49 fibers are each composed primarily of "saran". It is noted these fibers do differ slightly from each other in chemical composition which indicates they did not originate from precisely the same manufacturing source or batch of raw materials.

The Q48 and K47 fibers are each classified as a "modacrylic" and do match each other in chemical composition.

The Q43 and Q44 fibers are composed primarily of polyvinyl chloride with a plasticizing (softening) additive present. It is noted that specimen Q43 is more heavily plasticized than specimen Q44. This chemical difference indicates the fibers did not originate from precisely the same manufacturing source or batch of raw materials. Specimens Q43 and Q44 do not match the chemical composition of specimens Q48 and K47.

B7C

C1022018S RQ TAC

Q46 - Glass microscope slide containing debris from item Q46 (K)

Item consists of a glass slide with cover slip containing a relatively lengthy fiber. Some of this fiber extends out from the cover slip and permount. This "unmounted" fiber was sectioned for further analysis.

IR Analysis

The fiber was flattened with the KBr press, suspended across the 1mm aperature and run on micro FTIR.

Result: Saran (polyvinylidene chloride)

Q49 - Glass microscope slide containing debris from item Q49 (K)

Item consists of a glass slide with cover slip containing a relatively lengthy fiber. Some of this fiber extends out from the cover slip and permount. This "unmounted" fiber was sectioned for further analysis.

IR Analysis

The fiber was flattened with the KBr press, suspended across the 1mm aperature and run on micro FTIR.

Result: Saran (polyvinylidene chloride)

Note: The fiber is slightly different from the Q46 sample, but the same type material.

91022019S RQ TA [redacted] b7C

G43 - Glass microscope slide containing debris from item Q43 (J)

Item consists of a glass slide with a cover slip containing one strand of fiber which does exhibit residues of dried ferment. The residues were scraped off with a scalpel.

FTIR Analysis

A section of this fiber was flattened in the KBr press and suspended across a 1 mm aperture for analysis on a micro FTIR.

Result: ~ Vinyon and Modacrylic

Note: This graph does not match the K47 data.

Note: Neither the vinyon nor modacrylic library match very well.

Q44 - Glass microscope slide containing debris from item Q44 (J)

Item consists of a glass slide with a cover slip containing one strand of fiber which does exhibit residues of dried ferment. The residues were scraped off with a scalpel. This color and general physical characteristics are similar to Q43.

FTIR Analysis

A section of this fiber was flattened

in the KBr press and suspended across

01022018= RQ TN [redacted] b7C

Q44 - (cont'd)

~ 1 mm aperature for analysis on micro. FTIR.

Result: ~ Vinyon and Modacrylic

Note: This graph is very similar to the Q43 fiber with only slight compositional differences

Note: This graph does not match the K47 data.

Note: Neither the vinyon nor modacrylic known match very well.

Q48 - Glass microscope slide containing debris from item Q46 (K)

Item consists of a glass slide with a piece of tape over the well containing a strand of fiber which does exhibit residues of dried permount. The residues were scraped off with a scapel. The color and general physical characteristics are similar to K47 (01029014= RQ TN)

FTIR Analysis

A section of this fiber was flattened in the KBr press and suspended across a 1 mm aperature for analysis on micro. FTIR.

Result: Modacrylic (Acrylonitrile and vinyl chloride/vinylidene chloride)

Note: This item matches K47 (01029013 RQ TN)

B7C

7.

[redacted] 10220185 RQ TA

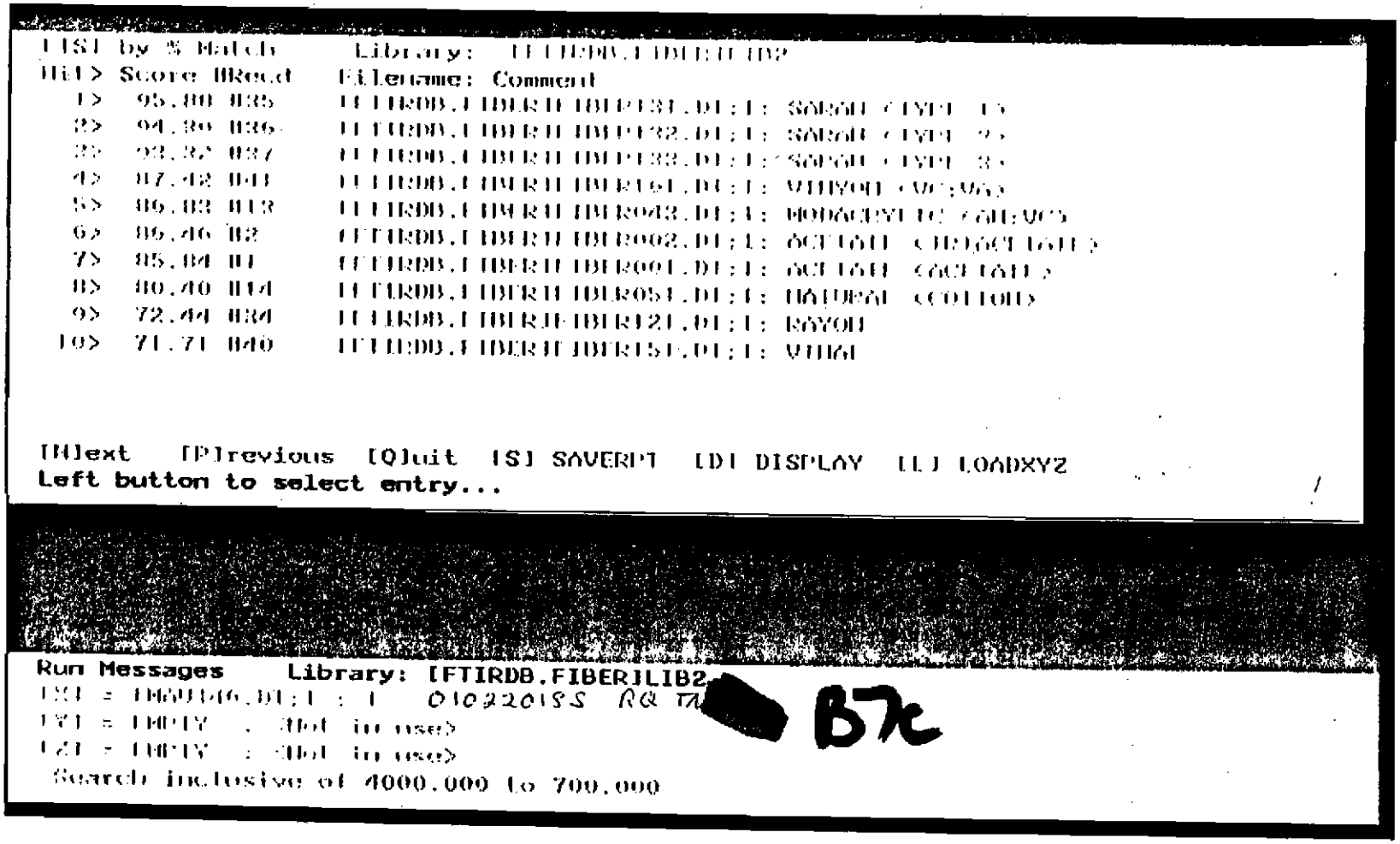
Additional Library search of Q43 + Q44:

Further library search on expanded 4000 → 450 wavenumber reflects the following:

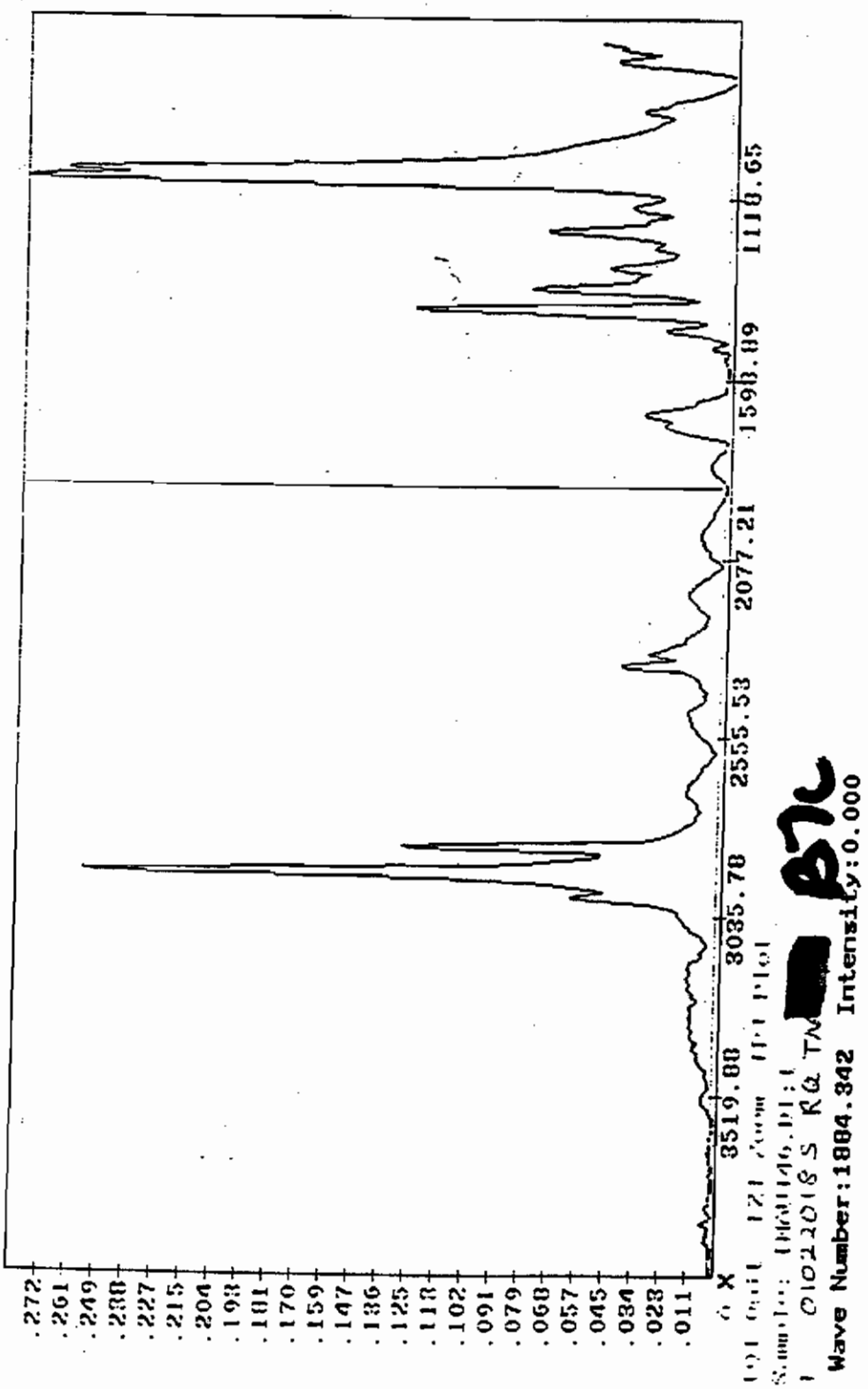
Result:

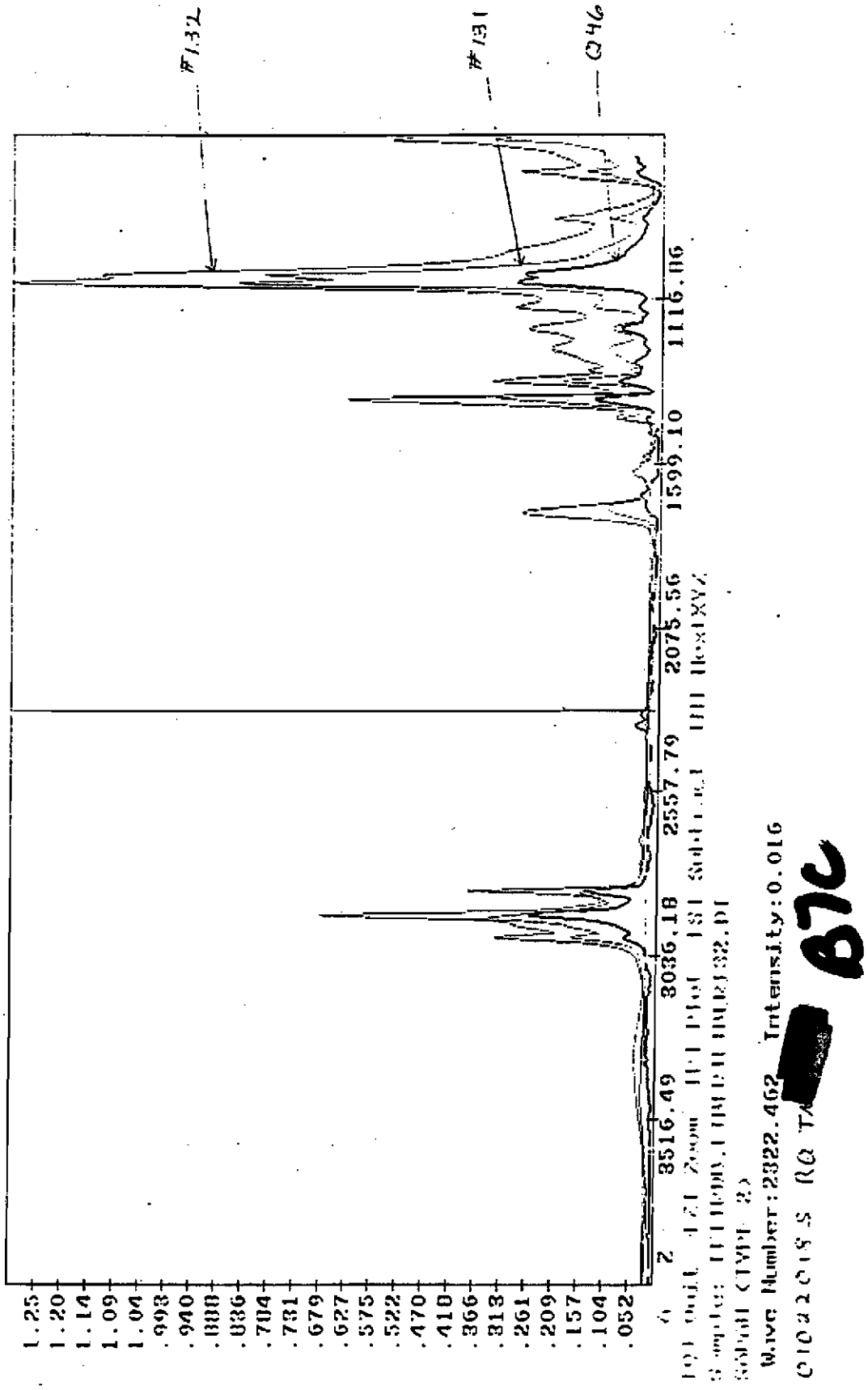
Q43 - Polyvinyl chloride w/ heavy plasticizer

Q44 - Polyvinyl chloride w/ lighter plasticizer

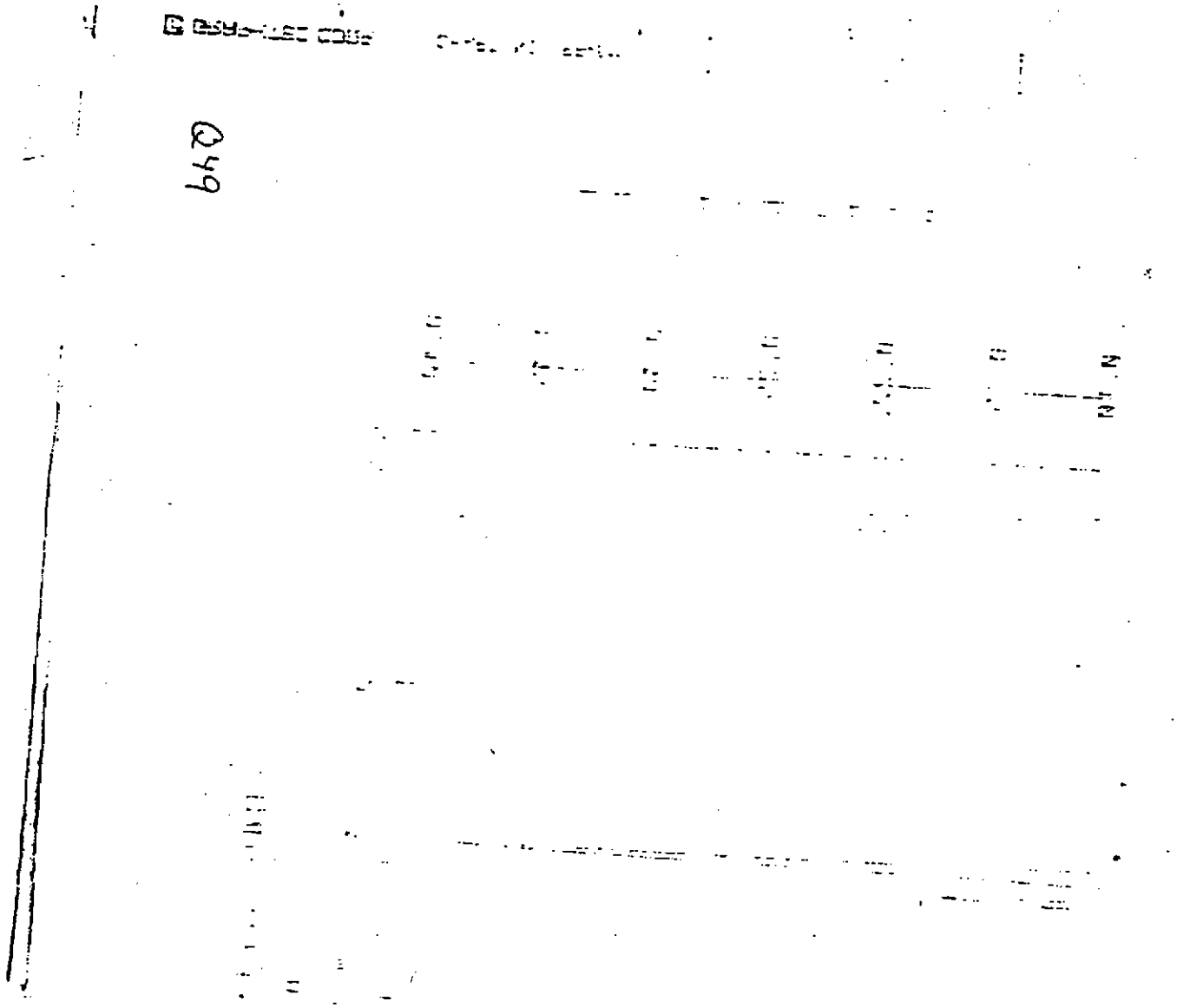


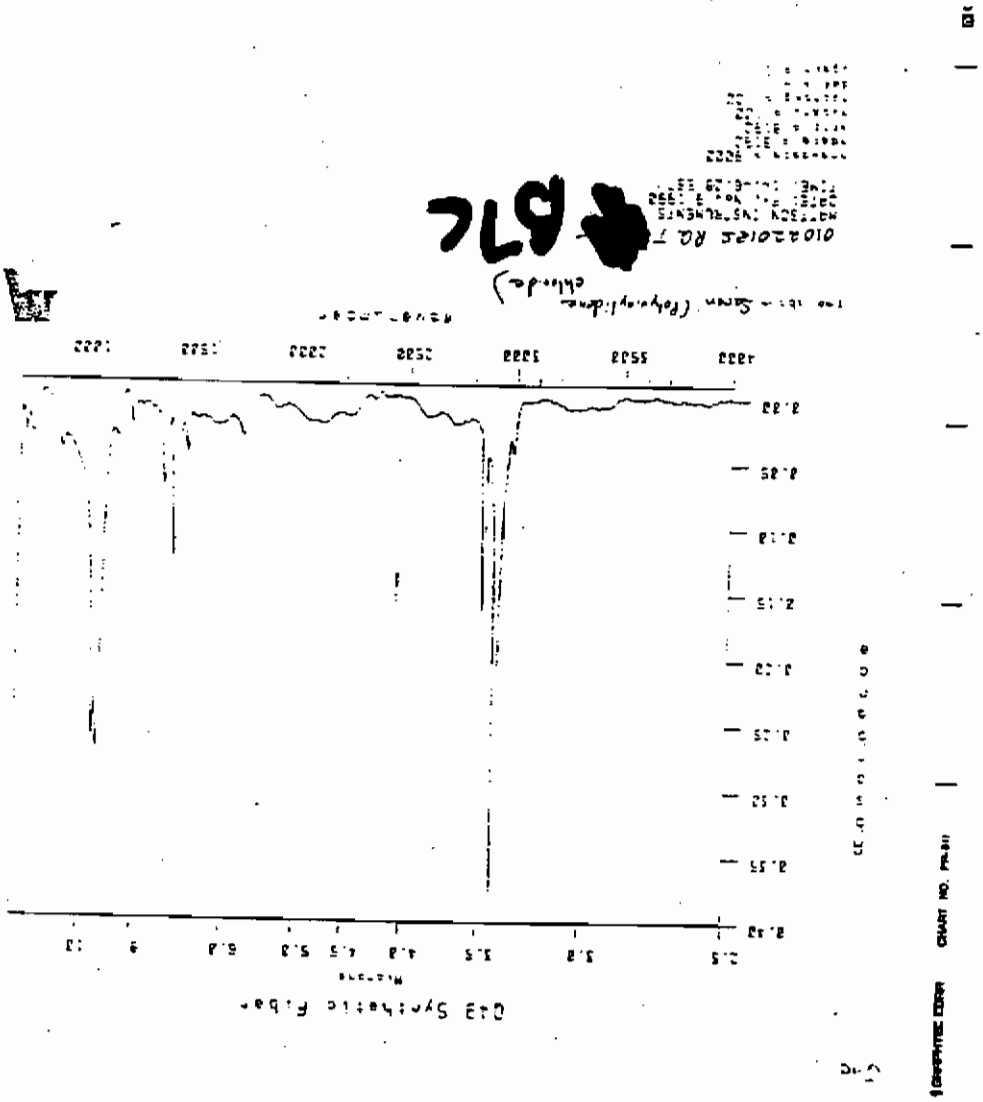
B7c

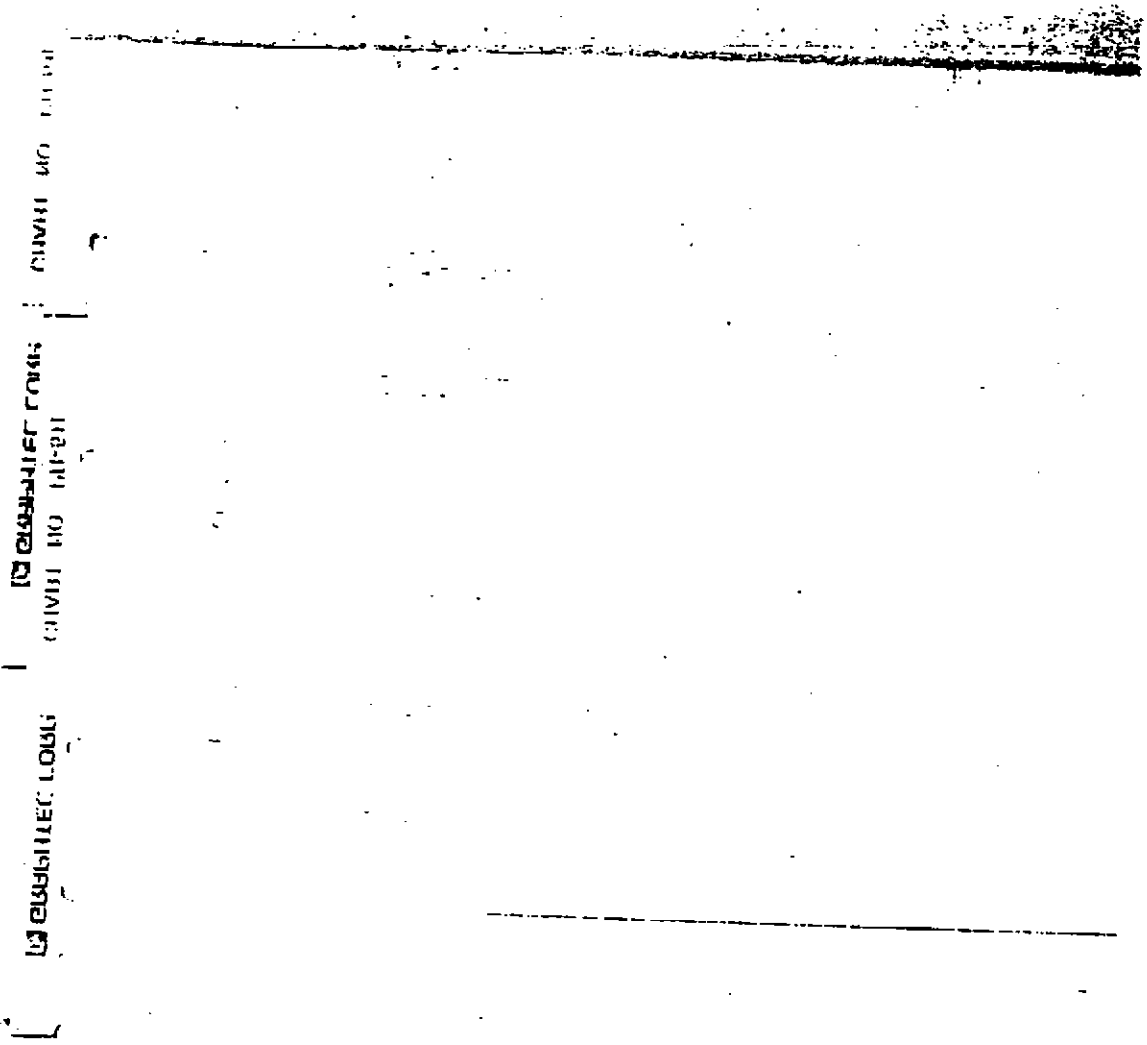

.272
.261
.249
.238
.227
.215
.204
.193
.181
.170
.159
.147
.136
.125
.113
.102
.091
.079
.068
.057
.045
.034
.023
.011
3519.88
3035.78
2555.53
2077.21
1598.89
1118.65
Wave Number:1884.342 Intensity:0.000


#132
#131
Q46
1.25
1.20
1.14
1.09
1.04
.998
.940
.888
.836
.784
.731
.679
.627
.575
.522
.470
.418
.366
.313
.261
.209
.157
.104
.052
0
2
3516.49
3036.18
2557.79
2075.56
1599.10
1116.86
Wave Number: 2322.462 Intensity: 0.016

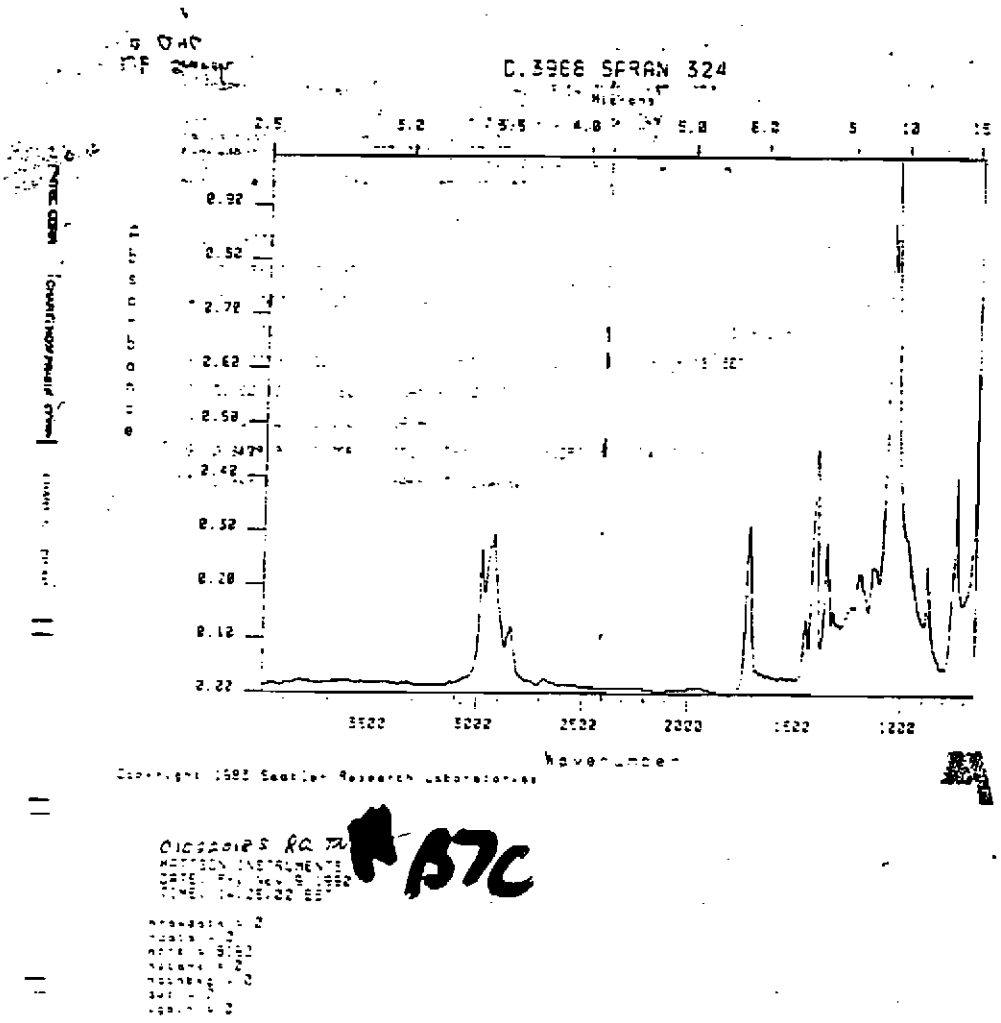
B7C







Lib. Search
of Q46



B7C

IR SEARCH Libraries Fri Nov 9 14:05:29 EST 1990
File Searched Imp.abs 046 Synthetic Fiber
Number of Matches 10 01022018 S RQ TA
Search Algorithm Absolute Difference
Wavenumber Range 4000.00 - 400.00
0 0

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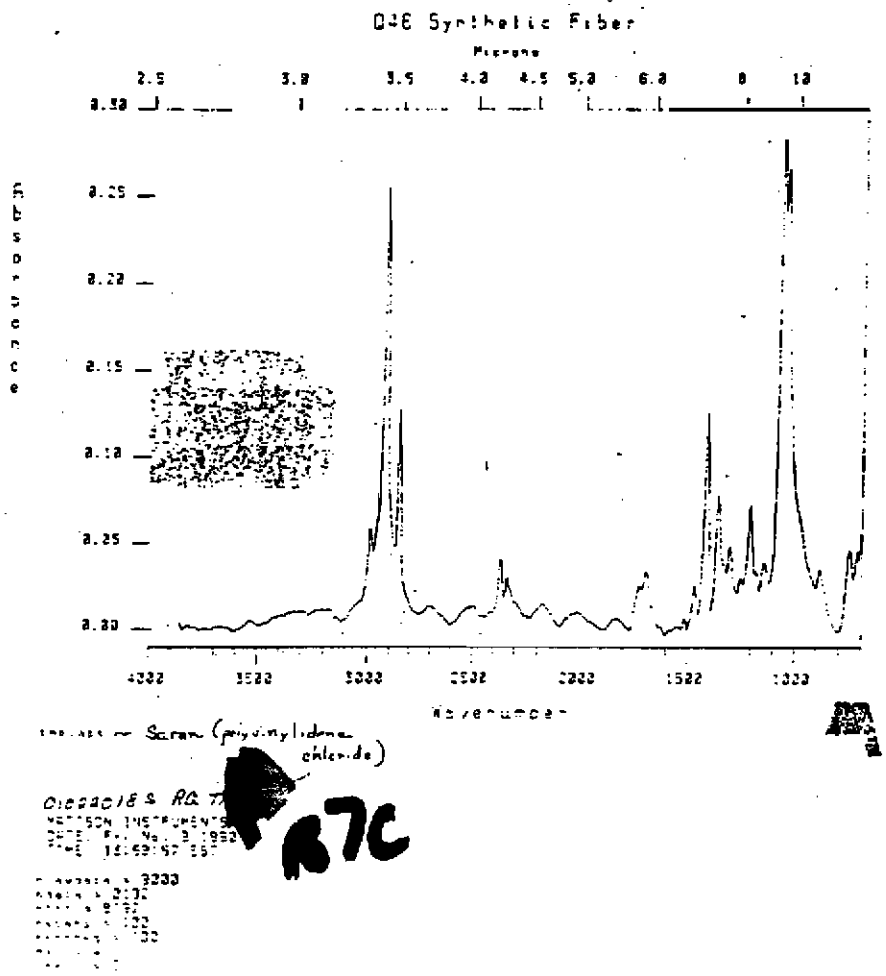
Rank	Match	Id#	Compound Name
1	0.959150	0.5960	SARAN 524
2	0.958025	0.6502	DOW MN 92 81
3	0.955522	0.832	POLYCO 2605
4	0.952360	0.5969	SARAN 409
5	0.951089	0.0466	WESTON 619 DISTEARYL PENTAERYTHRITOL DIPHOSPHITE
6	0.950908	0.566	POLYETHYLENE, CHLORINATED CHLORINE 56%
7	0.950182	0.6505	DOW MN 92 72
8	0.950182	0.5967	SARAN 135 E. NAT. NO. 4
9	0.949818	0.566	POLYETHYLENE, CHLORINATED CHLORINE 42%
10	0.948859	0.6809	BAKELITE EVA-502


D38 Synthetic Fiber
Microns
2.5
3.0
3.5
4.0
4.5
5.0
6.0
8
10
Absorbance
0.30
0.25
0.20
0.15
0.10
0.05
0.00
4000
3500
3000
2500
2000
1500
1000
Wavenumber
Saran (polyvinylidene chloride)
R7C

Note. There are no FOIPA deletions on this page.

00319036 S RQ
01022018 S RQ TN
01025034 S RQ
01029014 S RQ TN
01116013 S RQ
01211003 S RQ
01213054 S RQ XO

Dictation

Q131A (CID # K and E-323)

Specimen [redacted] consists of a clear handled hairbrush. Two light blond saran fiber fragments were removed from this item and have been mounted on a glass microscope slide, [redacted] One light blond saran fiber (Q49) and two blond saran fibers (Q46) were previously removed from specimen Q131A. These fibers are consistent with the type of fibers normally used in the production of doll hair and are not consistent with the type of fibers used in the production of wigs. These fibers are like known samples of saran doll hair from the FBI Lab. reference collection and are not the same as the known wig fiber samples currently in the FBI Lab. reference collection of fibers. The source of these fibers is not known at this time. One grey delustered modacrylic fiber (Q48) was also previously removed from Q131A. [redacted] This fiber is consistent with the type of fiber normally used in the production of haircoods and exhibits the same microscopic and optical properties as the grey delustered modacrylic fibers found in the composition of [redacted] (Colette's fall) specimen K47A [redacted] Accordingly, this Q48 modacrylic fiber is consistent with having originated from the K47 fall. No other hairs and/or fibers of apparent significance were found on specimen Q131A.

(CID # J and E-322)

Specimen Q132A consists of a blue handled hairbrush. One grey delustered modacrylic fiber was removed from this item. This fiber exhibits the same microscopic and optical properties as the grey delustered modacrylic fibers found in the compositon of [redacted] specimen K47A (Colette's fall). [redacted] Accordingly, this fiber is consistent with having originated from the K47 fall. Two black polyvinylchloride (PVC) fibers (Q43 and Q44) were previously removed from specimen Q132A and are mounted on glass microscope slides. These fibers are consistent with

the type of fibers which were once used in the production of wigs. [redacted]

[redacted] The source of these fibers is unknown at this time. No other apparent hairs and/or fibers of significance were found on specimen Q132. (CID # E-303)

Specimen Q79 consists of debris from underneath the body of Colette MacDonald. One brown pubic hair of Caucasian origin, which does not appear to have been forcibly removed, was found in Q79. This hair was previously [redacted] mounted on a glass microscope slide. [redacted] Also found in specimen Q79 were a brown cotton thread and a bluish-black rayon/acrylic yarn. The source of these items is unknown at this time. No other apparent hairs and/or fibers of significance were found in specimen Q79. (CID # 52NB)

Note: There are no FOIPA deletion on this page

Specimen Q87 consists of debris removed from the bedspread in Kristen MacDonald's bedroom. One black dog hair and two brown and white animal hairs (no roots) were found in Q87. No hairs of human origin were found in specimen Q87. (CID # E-209)

Specimen Q88 consists of debris removed from the right biceps area of Colette MacDonald. One bluish-black wool fiber was found in specimen Q88. The source of this fiber is unknown at this time. One white wool fiber was also found in specimen Q88. This fiber exhibits the same microscopic characteristics as the white wool fibers composing the specimen K33 rug, and accordingly, this fiber is consistent with having originated from the specimen K33 rug. No other hairs and/or fibers of significance were found in specimen Q88. (CID # E-209)

Specimen Q89 consists of debris removed from a piece of wood [redacted] This debris was previously mounted on glass microscope slides. One bluish-black wool fiber and one green wool fiber were found in specimen Q89. The source of these fibers is unknown at this time. White

wool fibers were also found in specimen Q89. These fibers exhibit the same microscopic characteristics as the white wool fibers found in the composition of the specimen K33 rug, and accordingly, are consistent with having originated from the K33 rug. White animal hairs (no root) were also found in spec. Q89. No other hairs and/or fibers of apparent significance were found in specimen Q89.

(CID # E-124)

Specimen Q93 consists of debris from the quilt in Kimberly MacDonald's bedroom. One brown limb hair of Caucasian origin was found in specimen Q93. This hair does not possess sufficient characteristics to be of value for [redacted] significant comparison purposes. No other hairs and/or fibers of apparent significance were found in specimen Q93.

(CID # E-3)

Specimen Q100 consists of debris from the mouth area of Colette MacDonald. Two dark purple wool fibers were found in specimen Q100. The source of these fibers is unknown at this time. A blue polyester cotton yarn was also found in specimen Q100. This yarn exhibits the same microscopic and optical properties as ~~and~~ the yarns composing the specimen Q12 pajama top, and accordingly, this yarn is consistent with having originated from the specimen Q12 pajama top.

Note There are no FOIPA deletions on this page

(CID # E-5)

Specimen Q119 consists of hairs from Colette MacDonald's left hand. Four brown limb hairs of Caucasian origin were found in specimen Q119; however, these hairs do not possess sufficient characteristics to be of value [redacted] for significant comparison purposes. No other hairs and/or fibers [redacted] were found in specimen Q119.

(CID # E-211)

Specimen Q125 consists of debris from the blue top sheet found on the floor of the master bedroom of the MacDonald residence. One brown body hair of Caucasian origin, which has been forcibly removed and which appears to have skin tissue attached, was found in specimen Q125; however, this hair does not possess sufficient characteristics to be of value [redacted] for significant comparison purposes. No other hairs and/or fibers of apparent significance were found in specimen Q125.

Specimens K48-K51 consist of hair-like fibers and hairs removed from various dolls and a stuffed toy dog. None of the above-mentioned fibers from the items in this case could be associated with specimens K48-K51.

No other examinations were conducted on the remainder of the submitted items in this case per the conversation with Assistant United States Attorney Eric Evenson on December 17, 1990.

B7C [redacted] -dictation-

[redacted] -dictation-

Specimens Q131A, Q132, K47-K51 and the remainder of the submitted items in this case [redacted] - Not a FOIPA deletion

[redacted] are being temporarily retained in the FBI Laboratory until called for by a rep. of your office.

BENCH NOTE AUTHOR: GLISSON

"WIG FIBERS"

Exhibit			Location/CID Examination	FBI Examination	FOIA #1	FOIA #2
MURPHY	FBI	CID				
1	Q-46	K(E-323)	Clear-handled hairbrush Mailer: "K synthetic hair blond"	Two blond Saran fibers (24" & 9") = known saran doll hair in FBI collection	June 30, 1983 #142	August 7, 1984 #774
1	Q-49	K(E-323)	Clear-handled hairbrush Mailer: "K synthetic hair blond"	One light blond saran fiber (22") consistent with doll hair	June 30, 1983 #142	August 7, 1984 #774
1	Q-131A		Removed from clear handled hairbrush	Two light blond Saran fragments consistent with Q-49 and with doll hair		
1	Q-48	K(E-323)	Clear handled hairbrush Mailer: "grey synthetic" Notes,p.785:"K-synthetic hair grey or blond	Grey delustered modacrylic fiber = K-47 hair	June 30,1983 #142	August 7,1984 # 774,785
1	Q-43, Q-44	J (E-322)	Blue handled hairbrush Mailer: "Black synthetic?" Notes: " J- Black synthetic" Report: Dark strands removed from Exhibit E-322 showed same to be synthetic"	Two black PVC fibers Consistent with fibers once used in wigs	August 7, 1984 #785	May, 1990

Exhibit 6

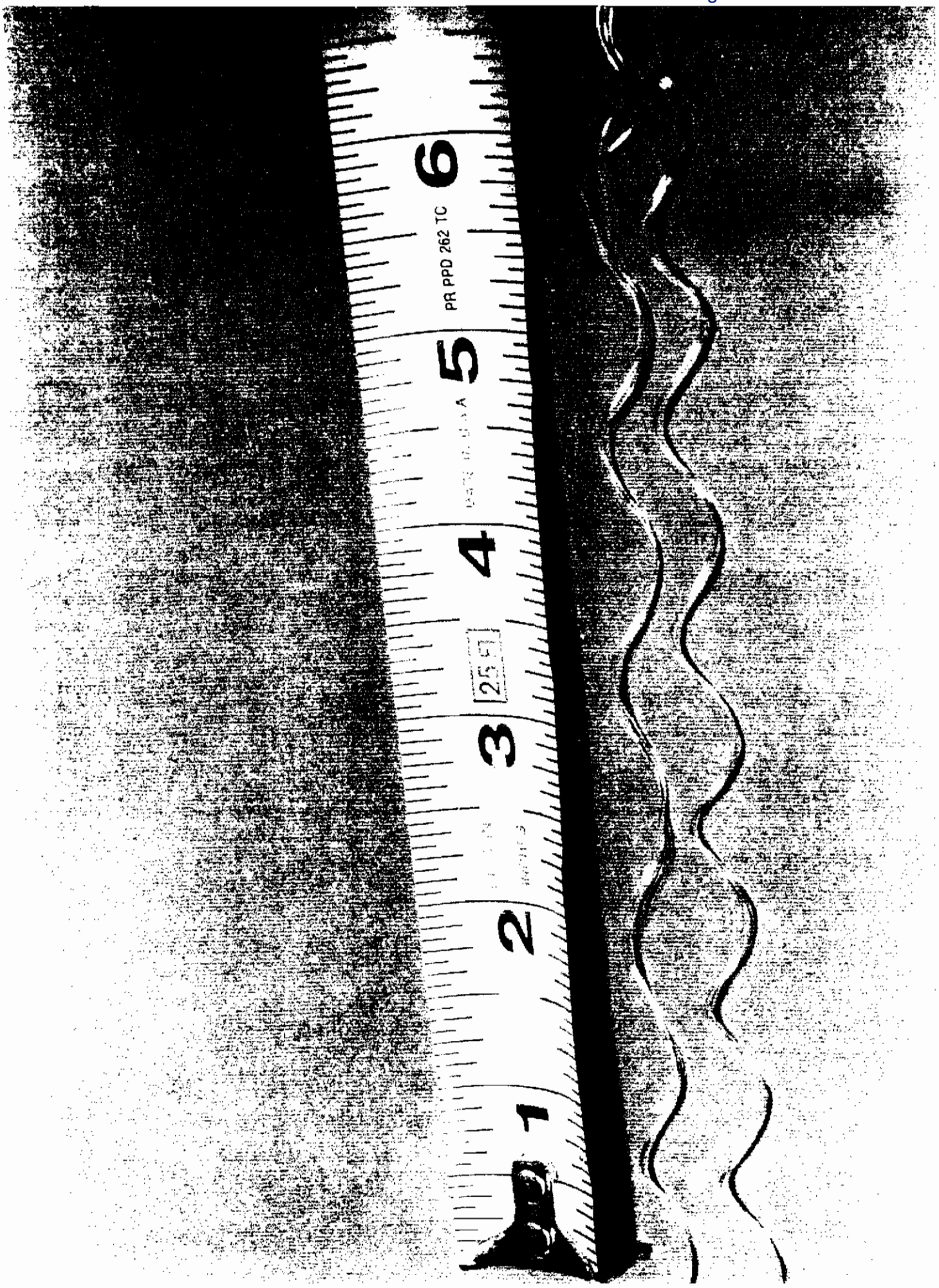

PR PPD 262 TC
1
2
3
4
5
6

Exhibit 7

U.S. Department of Justice

Washington, D.C. 20530

CRM-930432P

APR 30 1993

Anthony P. Bisceglie
William C. Walsh
1130 Seventeenth, N.W.
Suite 400
Washington, DC 20036

Dear Messrs. Bisceglie and Walsh:

This is in response to your request dated January 14, 1993, on behalf of your client, Jeffrey R. MacDonald for all records as described in numbered paragraph 1-3 of your letter relating to the MacDonald petition habeas corpus and synthetic fibers known as "saran".

We have conducted a search of the appropriate index and section of the Criminal Division and located the enclosed publication excerpts which are responsive to your request. Everything else in the possession of the Criminal Division in connection with the 1990 Habeas has been provided in records filed with the court. We assume that you do not want copies of publicly available court records. Also, you may wish, if you have not already done so, to direct a request to the Federal Bureau of Investigation as all laboratory tests and analyses were conducted by that component.

Sincerely,

Marshall R. Williams

Marshall R. Williams, Chief
Freedom of Information/Privacy Act Unit
Office of Enforcement Operations
Criminal Division

GUIDEBOOK

to MAN-MADE TEXTILE FIBERS and TEXTURED YARNS OF THE WORLD

- FILM-to-YARN
- NON-WOVENS

"There will never be another edition" — per publisher 5-31-79

Third Edition | ADELINE A. DEMBECK

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THE UNITED PIECE DYE WORKS
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Bluefield, Va. • Charleston, S.C. • Edenton, N.C.
Los Angeles, Calif. • Middletown, Pa. • York, Pa.

saran . . . A manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 80% by weight of vinylidene chloride units ($-CH_2-CCl_2-$).

trademark	description	source
BOLTA	West German monofil for textile fabrics	Bolta-Werk
CLORÈNE	French monofil	Rhovyl
ENJAY	USA filament yarn and tow for dolls' hair, wigs; 550 dr. monofil for drapenes	Enjay Fibers
KREHALON	Japanese filament yarn, monofil	Kureha
SARAN	USA resin for fil. yarn, tow; monofil, round, flat, oval; sheeting	Dow
	Japanese fil. yarn, staple, tow, monofil	Asahi-Dow
	-N: Saran and nylon mixed; fish nets	
		USA Licensees:
	Monofil	Dew Plastics
	Fil. yarn and tow for dolls' hair, wigs, ENJAY; monofil, SPARK-L-ITE	Enjay Fibers
		Foreign Licensees:
	Argentine monofil TEJIDO	Plasti-Fabril
	Australian monofil	Serlon
	British multifil yarns; round, flat monofil; garden furniture, awnings, filters, auto seat covers	Bakelite
	Canadian monofil	Grace Fibres
	Rep. of China monofil	Lien Yu
	French monofil CLORÈNE	Rhovyl
	West German monofil BOLTA	Bolta-Werk
	Israeli monofil UNITED	United Saran
	Japanese fil. yarn, monofil KREHALON	Kureha
	Mexican monofil; dolls' hair, wigs	Fibras Omni
	Russian polymer SOVIDEN; or SOVINOL/SOWIDEN	USSR
SOVIDEN	Russian vinylidene chloride/vinyl chloride polymer; or SOVINOL SOWIDEN	USSR
SPARK-L-ITE	USA high luster monofil, outdoor furniture webbing	Enjay Fibers
TEJIDO	Argentine monofil	Plasti-Fabril
UNITED	Israeli monofil	United Saran

Exhibit 8

Introduction to

TEXTILES

EVELYN E. STOUT

Professor of Design and Environmental Analysis
New York State College of Human Ecology at Cornell University

THIRD EDITION

TEXTILE BOOK SERVICE
266 LAKE AVE. • P. O. BOX 178
METUCHEN, NEW JERSEY 08840

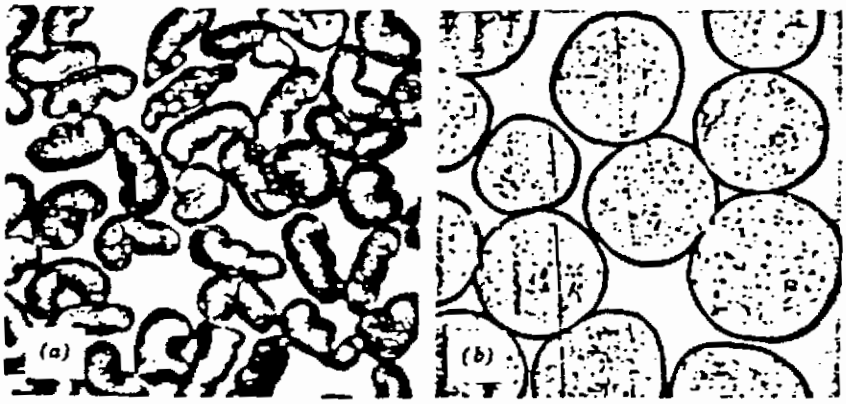


FIGURE 7-21. Photomicrographs of (*a*) Darvan, and (*b*) Saran. (Courtesy E. I. du-Pont de Nemours & Co. Inc.)

USES

Darvan was used largely in pile fabrics for simulated fur coats, but it has potential for washable sweaters and other soft knitted goods, and in blends for many types of fabrics. It, too, offers possibilities in the wash-wear field.

THE SARANS

Anovor[a] Saran by Enjay[b] Rovana[a]

[a] Trade name granted to Dow Badische Company, but not in use at present.
[b] Trade name granted to Enjay Fibers & Laminates Company.

Saran, the generic name for a class of fibers, is defined for the Textile Fiber Products Identification Act as ". . . a manufactured fiber in which the fiber-forming substance is any long chain synthetic polymer composed of at least 80% by weight of vinylidene chloride units (—CH_2—CCl_2—)."

Saran patents are owned by the Dow Badische Company and have been licensed under different trademarked names to a few other companies but it is being produced at present by only the Enjay Company. Saran is produced in both fiber and film form; no doubt you are familiar with the film.

Vinylidene chloride has been known since about 1840, and its ability to polymerize since the early 1920's. The first commercial vinylidene chloride polymer was introduced as saran monofilament, a plastic, by the Dow Company about 1940.

PROCESSES

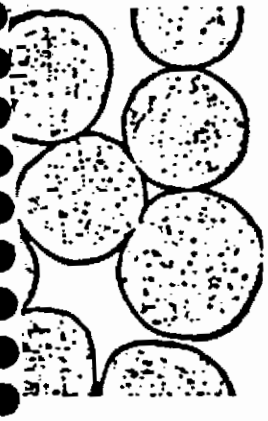
Ethylene, obta
tained by electrol
materials for vinyli
as copolymers, bu
Handbook of Text
copolymer, which i
of the two materia
vinylidene chloride

Vinylidene chlor
kettles and heated
melted by applicati
coagulated in a wate
can occur. The latte
saran fiber is immed
to orient the molecu
toughness, and to g
filament or staple le
possess several of th
controlled by the de
fected by the amount
are added to the mel
of the fiber is desired.

PROPERTIES

Saran is a smooth
heavy, with specific g
controlled by the stre
per denier. Elongation
wet and dry strength
good. Saran is stain an
It is weather and sunl
exposure. Saran will sc
not support combustic

Saran is unreactive
ammonium hydroxide,



aran. (Courtesy E. I. du-

ıted fur coats, but it
nitted goods, and in
ibilities in the wash-

na*

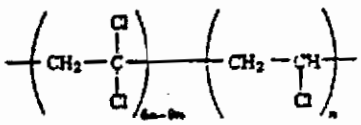
at present.

ined for the Textile
ured fiber in which
polymer composed
—CH_2—CCl_2—)."
pany and have been
ther companies but
Company. Saran is
e familiar with the

340, and its ability
mercial vinylidene
, a plastic, by the

PROCESSES

Ethylene, obtained in the cracking of petroleum, and chlorine, obtained by electrolysis of sea water, are the basic and inexpensive raw materials for vinylidene chloride. Any one of several materials can be used as copolymers, but vinyl chloride is the best for a textile fiber. *Harris' Handbook of Textile Fibers* gives the following chemical structure for the copolymer, which is an addition polymer, but not an alternate arrangement of the two materials since smaller numbers of vinyl chloride units than of vinylidene chloride units are combined.



Vinylidene chloride, vinyl chloride, and a catalyst are mixed in reactor kettles and heated to obtain the basic resin powder. The resin is then melted by application of heat, extruded through heated spinnerets, and coagulated in a water bath in such a way as to cool it before crystallization can occur. The latter step is termed *quenching*. From the quenching bath, saran fiber is immediately stretched to about four times its original length to orient the molecular chains within the fiber, to increase strength and toughness, and to give fibers the desired fineness. Saran is produced in filament or staple lengths—staple fibers have crimp similar to wool and possess several of the properties of wool. Properties of the fiber can be controlled by the degree of crystallization permitted; crystallization is affected by the amount of heat supplied during or after stretching. Pigments are added to the melt before extrusion if color other than the pale yellow of the fiber is desired.

PROPERTIES

Saran is a smooth fiber with round cross sections (Figure 7-11*b*). It is heavy, with specific gravity of 1.70. Strength, toughness, and elasticity are controlled by the stretching process. Breaking tenacity is 1.2 to 2.3 grams per denier. Elongation is 15 to 25 percent. Saran does not absorb at all, so wet and dry strength and elongation are the same. Abrasion resistance is good. Saran is stain and soil resistant and can be easily cleaned by washing. It is weather and sunlight resistant, although it may darken in color with exposure. Saran will soften and char when exposed to a flame, but it will not support combustion; its softening temperature, however, is low.

Saran is unreactive toward all common chemicals except concentrated ammonium hydroxide; it cannot be dyed.

USES

Saran is utilized for rain apparel, accessories, furnishings, and industrial items. In its various forms it is used for auto upholstery and seat covers, luggage, filter cloths, carpets and rugs, wigs and doll hair, outdoor furniture, upholstery and drapery fabrics, rope, braid, dust mops, handbags, grille fabrics for radios, television sets, and phonographs, paint rollers, insect screening, shade cloth, brushes, and numerous other things. In monofilament form, especially in coarse diameters, saran is considered by most consumers to be a plastic. In Japan, artificial turf is being produced from saran face yarns in a polypropylene backing. Although artificial turfs are becoming very common for football fields in the United States, the companies who produce the turfs tend to evade identifying the fibers used. One grasslike carpeting, named "Sassygrass" has a saran pile attached to a woven olefin backing with a secondary backing of rubber. Difficulties have been reported with some of the turfs—some color change and some breaking of fiber are said to have been observed. Installing and keeping up the artificial turfs is said to be less expensive than upkeep of a normal grass turf.

THE OLEFINS

Amco[a]	DLP[b]	Nypel[j]	Polytwine[l]
Amcostrap[a]	Floterope[a]	Patlon[j]	Poly-Weve[m]
American[a]	GC[c]	Poly Bac[j]	Pro Pex[j]
Beamette[b]	Herculon[f]	Polycrest[k]	Radiant Twine[l]
Chevron[c]	Lambeth[g]	Polyex[j]	Vectra[n]
Crowelon[d]	Loktuft[h]	Polyloom[e]	Voplex[o]
Dawbac[b]	Marvess[h]	Poly Needl Bac[j]	

[a] Trade name granted to American Manufacturing Co., Inc.
[b] Trade name granted to Dawbarn Division, W. R. Grace & Co.
[c] Trade name granted to Chevron Chemical Co.
[d] Trade name granted to Crowe Rope Co.
[e] Trade name granted to Golden Crescent Manufacturing Co., Inc.
[f] Trade name granted to Hercules, Inc., Fibers and Film Department.
[g] Trade name granted to Lambeth Rope Co.
[h] Trade name granted to Phillips Fiber Corp., Subsidiary of Phillips Petroleum Co.
[j] Trade name granted to Allied Chemical Corp., Fibers Division.
[k] Trade name granted to Patchogue-Plymouth Division.
[l] Trade name granted to Uniroyal Fibers & Textiles.
[m] Trade name granted to Columbian Rope Co.
[n] Trade name granted to Langston Bag Co.
[o] Trade name granted to Enjay Fibers & Laminates Co.
[p] Trade name granted to Vogt Plastics.

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NORTH CAROLINA
FAYETTEVILLE DIVISION

UNITED STATES OF AMERICA,	)	
	)	Nos. 75-26-CR-3
v.	)	90-104-CIV-3-D
	)	
JEFFREY R. MacDONALD	)	
	)	

AFFIDAVIT OF MARIE SCHEMBRI

I, Marie Schembri, being first duly sworn, state under oath the following:

1. I am a private investigator licensed in New York State. I am a principal in Schembri and Associates, 158 Dean Street, Brooklyn, New York, 11217, a private investigative services firm.

2. In February 1996, I was contacted by Philip G. Cormier, an associate in the Boston law firm of Silverglate & Good, and retained to perform investigative work in connection with the Jeffrey R. MacDonald criminal case.

3. On February 22, 1996, I conducted an interview of Norman Reich at his apartment located in Manhattan at 300 East 75th Street, Apartment K, New York, NY, 10021. Mr. Reich is a former principal of A & B Wig Company, herein referred to as "A & B Wig," which also conducted business under the name A & B Artistic Wig. The purpose of this interview was to gain knowledge of the manufacturing history of human cosmetic wigs made from saran fibers.

4. During the interview, Mr. Reich told me the following:

a. Reich was President and a director of A & B Wig from 1956 to 1987.

b. During the 1960s and into the 1970s, A & B manufactured thousands of human cosmetic wigs using saran fibers.

c. A & B Wig purchased saran manufactured by either Dow Chemical or Union Carbide of Odenton, Maryland, from a supplier named Albert Weiner. The saran was packaged on spools. Saran was also known as "Polymer."

d. The saran wigs manufactured by A & B Wig were made in a variety of styles and lengths, including those which were made with saran fibers measuring 22 inches or longer. The wigs were available in blond and black.

e. A & B Wig sold human cosmetic wigs made from saran fibers to a variety of wholesalers in the United States, including Franco-American Novelty Co. and Gordon Novelty Company.

f. Cosmetic wigs made with saran fibers were inexpensive, rather unattractive in appearance, and quite heavy due to the weight of the saran fibers.

g. All records from A & B Wig were destroyed when the company was liquidated during the 1980s.

5. Approximately one month after the February 22, 1996 interview, I met with Mr. Reich again at his apartment and showed him drafts of an affidavit and a declaration that I had drafted based on our February 22, 1996 interview. Both the affidavit and the declaration were worded identically. (A copy of the affidavit is attached hereto as Exhibit 1, and a copy of the declaration is Exhibit 2.).

6. Mr. Reich reviewed both the affidavit and the declaration and told me that the statements contained in them were accurate and true. Reich agreed to sign the affidavit or declaration, but told me that he wanted to show the documents to his lawyer before getting involved in a criminal proceeding.

7. On April 18th, 1996, after several unsuccessful attempts to contact him, I telephoned Mr. Reich at home, and he informed me that he did not want to sign the affidavit nor the declaration because his lawyer had advised him not to do so. I have not spoken to Mr. Reich since this telephone conversation.

8. It is my view that Mr. Reich will no longer cooperate and give sworn evidence voluntarily, without legal process.

Marie Schembri

Signed and sworn to me before this 20th day of June, 1996, at New York, New York.

Notary Public, State of New York

My commission expires May 7, 1998.

[illegible] New York

[illegible] County

[illegible] 7, 1998

DECLARATION OF NORMAN REICH

I, Norman Reich, hereby states as follows:

1. I currently reside at 300 East 75th Street, Apartment K, New York, New York 10021.

2. Between 1956 and 1987, I was President and a Director of A & B Artistic Wig Corporation, and successors, herein referred to as "A & B Wig."

3. A & B Wig manufactured wigs worn by humans.

4. A & B Wig used saran fibers to manufacture wigs worn by humans during the 1960's and into the 1970's. A & B Wig manufactured these wigs in a variety of colors, including blond. These wigs were also manufactured in a variety of styles and lengths, including shoulder length styles which were made with saran fibers 22 inches or longer in length.

5. A & B Wig sold over _____ of these wigs made with saran fibers during the 1960's and into the 1970's to a variety of wholesalers in the United States.

6. I can attest that A & B Wig manufactured wigs made with saran fibers which were worn by humans.

Signed on the 21st of March, 1996.

_____
Norman Reich

AFFIDAVIT OF NORMAN REICH

I, Norman Reich, being duly first sworn, state under oath the following:

1. I currently reside at 300 East 75th Street, Apartment K, New York, New York 10021.

2. Between 1956 and 1987, I was President and a Director of A & B Artistic Wig Corporation, and successors, herein referred to as "A & B Wig."

3. A & B Wig manufactured wigs worn by humans.

4. A & B Wig used saran fibers to manufacture wigs worn by humans during the 1960's and into the 1970's. A & B Wig manufactured these wigs in a variety of colors, including blond. These wigs were also manufactured in a variety of styles and lengths, including shoulder length styles which were made with saran fibers 22 inches or longer in length.

5. 5. A & B Wig sold over _____ of these wigs made with saran fibers during the 1960's and into the 1970's to a variety of wholesalers in the United States.

6. I can attest that A & B Wig manufactured wigs made with saran fibers which were worn by humans.

Signed on the 21sth of March, 1996:

_____
Norman Reich

Subscribed and Sworn to before me this 21st Day of March:

_____

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NORTH CAROLINA
FAYETTEVILLE DIVISION

UNITED STATES OF AMERICA, v. JEFFREY R. MacDONALD	Nos. 75-26-CR-3 90-104-CIV-3-D

AFFIDAVIT OF JERRY POLLAK

I, Jerry Pollak, being first duly sworn, state under oath the following:

1. I currently reside at 73 Finch Drive, Roslyn, NY, 11576.

2. From approximately 1964 to early 1970, I was employed by a company named Artistic Wig and Novelty Co., located at 9 White Street, Brooklyn, NY. This business was owned by my father until his death, at which time I took over the business. From April 1970 to 1987, I was employed as Vice President and a director of A & B Artistic Wig, located in Long Island City, New York.

3. During the periods I was employed by Artistic Wig and Novelty Co. and A & B Artistic Wig, each of these entities manufactured hundreds of thousands of masquerade and costume wigs to be worn by humans.

4. During the 1960s and into the 1970s, while I was employed by the above-named companies, a small percentage of the wigs manufactured by them for human use were made with Saran fibers.

5. The wigs manufactured with Saran fibers were made in

a variety of styles and lengths. Some of these Saran wigs were shoulder-length or longer, and had "straight" hair. They were produced in a variety of colors including blond.

6. The wigs made by the above-named companies, including the wigs made with Saran fibers, were sold to wholesalers and distributors, who in turn sold them to costume, masquerade and novelty shops, and occasionally to department stores. In addition, the above-named companies also sold the wigs directly to costume, masquerade and novelty shops.

Jerry Pollak

Signed and sworn to me before this 19th day of July, 1996, at _____, New York.

Notary Public, State of New York

RUSSELL T. MOSKOWITZ
NOTARY PUBLIC, State of New York
No. 31-4870750
Qualified in New York County
Commission Expires May 11, 1997

My commission expires _____

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NORTH CAROLINA
FAYETTEVILLE DIVISION

UNITED STATES OF AMERICA, v. JEFFREY R. MacDONALD	Nos. 75-26-CR-3 90-104-CIV-3-D

AFFIDAVIT OF ROBERT OUMANO

I, Robert Oumano, being first duly sworn, state under oath the following:

1. I am currently employed as the President of Franco-American Novelty Co., Inc. ("Franco-American Novelty"), 84-00 73rd Avenue, Glendale, New York, 11385.

2. Franco-American Novelty is a wholesaler that sells all types of novelty items, including masks, disguises, and wigs. The company has been in business since 1912. I have worked at Franco-American Novelty since 1946, and have held the positions of Secretary and President.

3. During the time that I have worked at Franco-American Novelty, I have had the opportunity to learn about the various product lines and merchandise that we buy and sell, including wigs that we have sold to be worn by humans. We have sold wigs in all manner of styles and sizes since I began working there in 1946. During my employment at Franco-American Novelty, I have become familiar with the various materials and fibers used to manufacture wigs over the years.

4. During the early 1960s into the 1970s, Franco-American Novelty bought wigs manufactured with saran fibers for human cosmetic use from wig manufacturing companies such as A & B Wig Company ("A & B Wig"). Franco-American Novelty distributed these wigs by selling them to retailers such as novelty and joke shops.

5. During the 1960s into the 1970s, Franco-American Novelty sold, on an annual basis, 5,000 to 10,000 of these saran fiber wigs that were manufactured for human cosmetic use.

6. The saran wigs purchased from A & B Wig were made in a variety of styles such as a "Beatles page-boy" style, a "beatnik" style, and a "witch" style. Both the "page-boy" and the "beatnik" wigs were manufactured in black, blond, and red. The "witch" wig was grey.

7. The majority of the saran wigs sold by Franco-American Novelty were manufactured with saran fibers measuring between 18- and 22-inches. However, Franco-American Novelty also sold saran wigs that were manufactured with saran fibers as long as 26-inches. Both the "beatnik" and the "witch" style wigs ranged in length from shoulder-length to lengths that reached the middle of the back. The "page-boy" wigs were shorter in length, falling above the shoulder. To the best of my recollection, the saran wigs purchased by Franco-American Novelty were made of straight fibers or "hair", as opposed to having curled fibers.

8. Franco-American Novelty sold these wigs at all times throughout the year, although the period around Halloween was, and is, typically the busiest time of the year in terms of sales volume for wigs.

9. The saran wigs we sold were relatively inexpensive and of rather low quality. Because saran is a heavy fiber, the "hairs" in saran wigs tended to clump together, giving the wig a stringy appearance.

Robert Oumano

Signed and sworn to before me this 6th day of May, 1996, at Glendale, New York.

Notary Public, State of New York

RUSSELL T. MOSKOWITZ
NOTARY PUBLIC, State of New York
No. 31-4875790
Qualified in Queens County
Certificate filed in Queens County
Commission Expires May 31, 1997.

My commission expires _____

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF NORTH CAROLINA
FAYETTEVILLE DIVISION

UNITED STATES OF AMERICA,	)	
	)	Nos. 75-26-CR-3
v.	)	90-104-CIV-3-D
	)	
JEFFREY R. MacDONALD	)	

AFFIDAVIT OF LUCIA BARTOLI

I, Lucia Bartoli, being first duly sworn, state under oath the following:

1. I currently reside at 24176 Hollyoak, Apt. G, Laguna Hills, California, 92656.

2. Since 1992, I have coordinated the MacDonald Defense Committee. From 1992 to 1996, I undertook an extensive investigation into the question of whether wigs worn by humans were manufactured using saran fibers.

3. As part of my investigation, I reviewed a number of textile reference works that documented various uses for saran fibers, including Adeline A. Dembeck's Guidebook to Man-Made Textile Fibers and Textured Yarns of the World, 3rd. Ed. United Piece Dye Works: New York, 1979. (A copy of the relevant section from this reference book is attached hereto as Exhibit 1.)

4. Dembeck's book lists on page 210 a number of foreign companies that were licensed by Dow Chemical to manufacture saran, including a Mexican company by the name of FibrasOmni. The entry reads as follows: "Trademark: Saran. Mexican

monofil; dolls' hair, wigs. FIBRAS OMNI [sic]." (See Exhibit 1 attached hereto.)

5. During October 1993, I attempted to telephone FibrasOmni in Mexico City, Mexico. After learning that FibrasOmni was no longer in business, I telephoned another Mexican fiber manufacturing company, Proveedora Mexicana de Monofilamentos, S.A. de C.V., and spoke to the company's Director General, Mr. Mejia. After I explained that I was researching whether human cosmetic wigs had been manufactured with saran fibers, Mr. Mejia recommended that I contact a man named Jaume Ribas. Mr. Mejia provided me with Mr. Ribas' home telephone number, 554-1153.

6. I immediately telephoned Mr. Ribas and spoke to him for approximately 30 minutes. Mr. Ribas told me that he was the former Chief Executive Officer of FibrasOmni, and he explained that it was no longer in business because it was part of a consortium of fiber manufacturers that had disbanded a few years earlier. Ribas told me that he had since been working as a consultant.

7. Ribas told me that FibrasOmni had been part of a consortium of fiber manufacturing companies and had been a foreign licensee of Dow Chemical Company. Ribas stated that FibrasOmni made saran fibers and then sold the fibers to a variety of concerns, including artisans who made wigs for human use, and also to toy and doll manufacturers.

8. Ribas further explained that the saran wigs made by these artisans were made for actors in various pageants, known as "pastorelas." Ribas told me that the saran wigs were made in a variety of colors, including blond, and he specifically recalled that blond saran wigs had been made for actors who played the parts of angels in Christmas pageants.

9. Ribas told me that he had arranged for saran wigs to be made for the "Hall of Man" diorama in the Museum of Anthropology and History ("Museum") in Chapultepec Park, Mexico City, Mexico. Ribas stated that, in 1968, he was contacted by several of the staff at the Museum who had seen some of the human wigs he had made, and were interested in obtaining black saran wigs for the lifesize human figures in the museum's "Hall of Man" diorama. Ribas told me that he contacted an artisan who had worked for him in the past, and provided the artisan with a quantity of saran fiber that was used by the artisan to make wigs for the exhibit's lifesize human figures. Ribas further explained that the wigs made for the diorama figures were similar to the saran wigs made for the actors in the pageants.

10. I asked Mr. Ribas if it would be possible for him to obtain or borrow one of these saran wigs from the Museum if they were still in existence. Ribas told me that he would go to the Museum to see if they would be willing to give him one of the wigs, or at least let him borrow it.

11. During a telephone conversation in late October or early November 1993, Ribas told me that he had obtained a saran wig from the Museum, and would be sending it to me in the near future.

12. On November 8, 1993, Ribas sent me a letter explaining that he was having difficulty finding a low-cost way to ship the wig to California. (A copy of the letter and its English translation are attached hereto as Exhibit 2.) Ribas enclosed a few strands of hair from the wig in his letter.

13. On November 11, 1993, Ribas sent the saran wig to my home in Laguna Hills, California, via Federal Express. I received the wig on November 12, 1993. The wig is black in color and approximately 25 inches long from the top of the scalp to the end of each braid.

14. Upon receiving the wig, I photographed it. (A copy of the photo is attached hereto as Exhibit 3.) On November 15, 1993, I sent the wig via Federal Express to Jason Gull, a paralegal at the office of Silverglate & Good, which was at that time located at 89 Broad Street, Boston, MA 02110.

15. In the beginning of January, 1994, I telephoned Mr. Ribas to obtain further information from him, and I was

informed by his housekeeper that he had died of a cerebral aneurysm on December 28, 1993.

Lucia Bartoli
Lucia Bartoli

Signed and sworn to before me this 2ND day of July, 1996, at Aliso Viejo, California.

Ronald S Levine
Notary Public, State of California

My commission expires AUGUST 10, 1998
[seal]

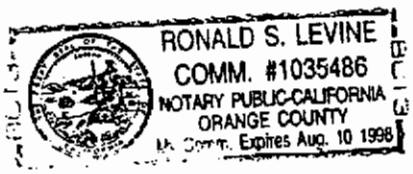


Exhibit 1