STUDY ON EVALUATION OF COLOUR FASTNESS ON DIFFERENT DYED SILK FABRIC

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this project report "**STUDY ON EVALUATION OF COLOUR FASTNESS TO PERFUME ON DIFFERENT DYED SILK FABRIC**" is the bonafide work of **G.PADMAVATHI,N.UMA MAHESWARI,V.VIJI VALLINAYAGAM** who carried out project work under my supervision.

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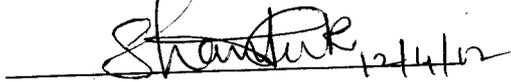Kumaraguru College of Technology,

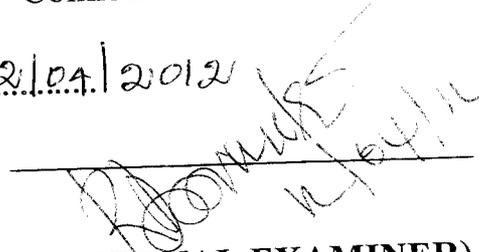Coimbatore-641006

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Hereby declare that the project entitled **"STUDY ON EVALUATION OF COLOR FASTNESS TO PERFUME ON DIFFERENT DYED SILK FABRICS"** is done by us and to the best of our knowledge a similar work has not been submitted to any other institution , for the fulfillment of the required course of study.

This report is submitted as the partial fulfillment of the requirements for all awards of the Degree of Bachelor of Fashion Technology of Kumaraguru College of Technology, Coimbatore.

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ABSTRACT :

Perfume is known from long for its smell. Using a perfume adds another dimension to the personality. It is worn on the skin to give off a particular fragrance, masking body odours.As we all know very well that usage of perfume is a very common thing on special occasions, it becomes an obstruction and a mere worry while people tend to use perfumes on silk materials. The reason is a very common problem of staining of silk fabrics. Staining of silk fabrics while using perfumes has to be considered as a drawback as perfumes does not stain other fabrics.

In textile industries silk is been tested for the colour fastness to washing, rubbing, light, perspiration, but it is also important to evaluate colour fastness of fabrics on application of perfume, which is not yet available and practiced in industries. Any single perfume also cannot be used for testing as perfume composition is different and vary according to manufacturer. But to test in the laboratory, there is need to have standard test solution instead of commercial perfumes. So, the objective of this project is to study the characteristics of dyed silk fabrics on application of selected three perfumes and along with perspiration and formulate a basic test solution. Perfumes are analysed through Gas Chromatography and relevant literature were collected to prepare a reference solution. The results of 100% dyed silk fabric(light,medium,dark colours),specially finished silk fabric (water oil repellent),commercial silk cotton(30:70) and knitted cotton fabric tested with commercial perfume, perspiration and combination of both and formulated test solution were recorded.

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1. INTRODUCTION

Silk is one of the most important and luxuries natural fiber in textile. It is considered as the "Queen of Textiles". Many people have tried to duplicate silk but it has always retained its uniqueness. Silk garment are always used for special occasions, it is a symbol of luxury. and it has always been the favourite for eves. Silk which is always considered as special fabric and it requires special handling techniques for washing, ironing, drying etc

Perfumes are the mixture of fragrance essential oils and the solvent used to give human body, animals, objects and living spaces a "pleasant smell". Perfumes are been used in every cycle of life, let it be sweet sixties or the old seventies. Perfumes adds dimension to their personality. It is worn on the skin to give off a pleasant fragrance, mask body odour, make a personal statement.

Perfumes are unavoidable but unfortunately silk has the tendency to retain the perfume sprayed on it as a stain. The alcohols in the perfumes can seriously damage the silk, it fades the color of the fabric resulting as a "reverse stain". There are many dry cleaning methods to remove such stains and bring back the original colors but it doesn't gives satisfaction to the wearer. Perfumes have always been a threat to silk fabrics

In silk industries there are many standard methods to find the color fastness to washing, rubbing, light, perspiration for silk fabrics, but no method is available to test the perfume fastness of silk fabric. The resistance of the silk fabric towards perfume to avoid stains is known as perfume fastness. A method for testing perfume fastness for silk fabric is now required in the industries.

In this project we mainly aim at developing a standard test method to evaluate perfume fastness for silk fabric, which could be used in the industries for testing the silk fabric for perfume fastness and grade the fabrics.

1.1 OBJECTIVES

> To select and source three commercial perfumes and different type of silk fabrics

> To do quantitative and qualitative analysis of the chemical composition of commercial perfumes through Gas chromatography

> To prepare reference test solution representing Perfumes to use in the lab.

> To evaluate colorfastness of different silk fabrics on application of perfumes and reference test solution.

2. REVIEW OF LITERATURE:

The review of literature is discussed under the following heads.

- ➢ Silk
- ➢ Perfume
- ➢ Gas chromatography-Mass spectrum.
- ➢ Problem Analysis

2.1 SILK

2.1.1 INTRODUCTION

Silk is a natural protein fiber, some forms of which can be woven into textiles. The best-known type of silk is obtained from cocoons made by the larvae of the mulberry silkworm *Bombyx mori* reared in captivity (sericulture). The shimmering appearance of silk is due to the triangular prism-like structure of the silk fiber which allows silk cloth to refract incoming light at different angles thus producing different colors.

Silks are produced by several other insects, but only the silk of moth caterpillars has been used for textile manufacture. There has been some research into other silks, which differ at the molecular level. Silks are mainly produced by the larvae of insects that complete metamorphosis, but also by some adult insects such as web spinners. Silk production is especially common in the Hymenoptera (bees, wasps, and ants), and is sometimes used in nest construction. Other types of arthropod produce silk, most notably various arachnids such as spiders

2.1.2 HISTORY OF SILK:

The Chinese has used silk since the 27th century B.C. Silk is mentioned by Aristotle and became a valuable commodity both in Greece and Rome. During the Roman Empire, silk was sold for its weight in gold. The Chinese domesticated silk worms and fed them with mulberry leaves. They unwound the silkworms' cocoons to produce long strands of silk fiber.

Christian monks finally broke China's monopoly of the silk production by smuggling silkworm eggs out of the country, and soon other countries started to produce their own silk.

2.1.3 PROPERTIES

2.1.3.1 PHYSICAL PROPERTIES

Silk fibers from the *Bombyx mori* silkworm have a triangular cross section with rounded corners, 5-10 μm wide. The fibroin-heavy chain is composed mostly of beta-sheets, due to a 59-mer amino acid repeat sequence GAGAGSGAAG[SGAGAG]$_8$Y with some variations. The flat surfaces of the fibrils reflect light at many angles, giving silk a natural shine. The cross-section from other silkworms can vary in shape and diameter: crescent-like for *Anaphe* and elongated wedge for *tussah*. Silkworm fibers are naturally extruded from two silkworm glands as a pair of primary filaments (brin) which are stuck together, with sericin proteins acting like glue, to form a bave. Bave diameters for tussah silk can reach 65 μm.Silk has a smooth, soft texture that is not slippery, unlike many synthetic fibers. Its denier is 4.5 g/d when dry and 2.8-4.0 g/d when moist.Silk is one of the strongest natural fibers but loses up to 20% of its strength when wet. It has a good moisture regain of 11%. Its elasticity is moderate to poor: if elongated even a small amount, it remains stretched. It can be weakened if exposed to too much sunlight. It may also be attacked by insects, especially if left dirty.Silk is a poor conductor of electricity and thus susceptible to static cling.

Unwashed silk chiffon may shrink up to 8% due to a relaxation of the fiber macrostructure. So silk should either be pre-washed prior to garment construction, or dry cleaned. Dry cleaning may still shrink the chiffon up to 4%. Occasionally, this shrinkage can be reversed by a gentle steaming with a press cloth. There is almost no gradual shrinkage nor shrinkage due to molecular-level deformation.

2.1.3.2 CHEMICAL PROPERTIES

Silk is made up of the amino acids Gly-Ser-Gly-Ala and forms Beta pleated sheets. H-bonds form between chains, and side chains form above and below the plane of the H-bond network.The high proportion (50%) of glycine, which is a small amino acid, allows tight packing

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and the fibers are strong and resistant to stretching. The tensile strength is due to the many interseeded hydrogen bonds. Since the protein forms a Beta sheet, when stretched the force is applied to these strong bonds and they do not break.Silk is resistant to most mineral acids, except for sulfuric acid which dissolves it. It is yellowed by perspiration.There are five major types of silk of commercial importance, obtained from different species of silkworms which in turn feed on a number of food plants. These are:

- Mulberry
- Tasar
- Oak Tasar
- Muga
- Eri

Except mulberry, other varieties of silks are generally termed as non-mulberry silks. India has the unique distinction of producing all these commercial varieties of silk.
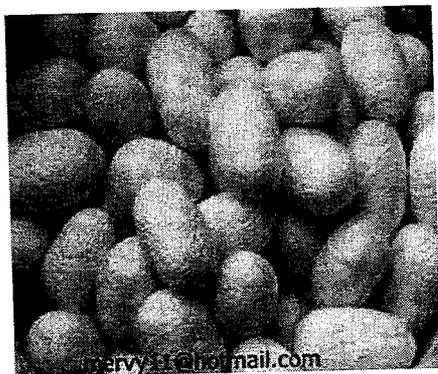
2.1.4.1 MULBERRY:

Fig 1

The bulk of the commercial silk produced in the world comes from this variety and often silk generally refers to mulberry silk. Mulberry silk comes from the silkworm. *Bombyx mori* L. which solely feeds on the leaves of mulberry plant. These silkworms are completely domesticated and reared indoors. In India, the major mulberry silk producing states are

Karnataka, Andhra Pradesh, West Bengal, Tamil Nadu and Jammu & Kashmir which together accounts for 92 % of country's total mulberry raw silk production.

Mulberry silk is made from the silkworms of the Bombyx mori moth. The moth has one job to do and that is to lay eggs. After it lays about 500 eggs, its job is finished and it dies The tiny silkworms that are born are then fed an exclusive diet of mulberry leaves 24 hours a day, 7 days a week (mulberry leaves are the only food the Bombyx mori moth will eat). After about a month of the constant gorging on the mulberry leaves, the silkworms will have increased their weight about 10,000 times and will have built up enough energy to start spinning their cocoon. It takes anywhere from three to as long as eight days for the silkworm to weave the cocoon.

The cocoons are then kept in a warm place for several days. Great care is taken to ensure the silkworms do not hatch into moths because that would damage the cocoon and break the silk filament it has woven. To harvest the silk from the cocoons, they are place in water to soften the filament. The softened filament is then unwound from the cocoon. One filament can be up to 1,600 yards long. It takes 4-8 of the silk filaments woven together to create one mulberry silk thread.

The silkworms may have a short life with their only purpose to be providing silk, but those short lives are pampered ones. In addition to the constant fresh supply of mulberry leaves available to them, their environment is strictly controlled to prevent them from being subjected to loud noises and strong odors such as those from fish and the human odor of sweat.

The resulting mulberry silk thread is the strongest natural fiber in the world, making it incredibly durable. A silk fiber the same diameter as a fiber of steel is stronger than the steel.The mulberry silk thread is also rounder, finer, smoother, and a lighter more uniform color than silk harvested from the wild where those silkworms have to eat whatever leaves and plants that are available to them.

Mulberry silk is also known as cultivated silk and bombyx silk but mulberry silk is the most commonly used term. It is also sometimes referred to it by its type which is thrown or reeled silk.

2.2 PERFUMES

Perfume is a mixture of fragrant essential oils and aroma compounds, fixatives, and solvents used to give the human body, animals, objects, and living spaces a "pleasant" smell.

fig 2

2.2.1 HISTORY

The word *perfume* used today derives from the Latin *"per fumum"*, meaning *through smoke*. Perfumery, or the art of making perfumes, began in ancient Mesopotamia and Egypt and was further refined by the Romans and Persians.

Although perfume and perfumery also existed in India, much of its fragrances are incense based. The earliest distillation of Attar was mentioned in the Hindu Ayurvedic text Charaka Samhita. The Harshacharita, written in 7th century A.D. in Northern India mentions use of fragrant agarwood oil.

The world's first recorded chemist is considered to be a woman named Tapputi, a perfume maker who was mentioned in a cuneiform tablet from the second millennium BC in Mesopotamia. She distilled flowers, oil, and calamus with other aromatics then filtered and put them back in the still several times.

Recently, archaeologists have uncovered what are believed to be the world's oldest perfumes in Pyrgos, Cyprus. The perfumes date back more than 4,000 years. The perfumes were discovered in an ancient perfumery. At least 60 stills, mixing bowls, funnels and perfume bottles were found in the 43,000-square-foot (4,000 m^2) factory. In ancient times people used herbs and spices, like almond, coriander, myrtle, conifer resin, bergamot, as well as flowers.

The Arabian chemist, Al-Kindi (Alkindus), wrote in the 9th century a book on perfumes which he named *Book of the Chemistry of Perfume and Distillations*. It contained more than a hundred recipes for fragrant oils, salves, aromatic waters and substitutes or imitations of costly drugs. The book also described 107 methods and recipes for perfume-making, and even the perfume making equipment, like the alembic, still bears its Arabic name.

The Persian Muslim doctor and chemist Avicenna (also known as Ibn Sina) introduced the process of extracting oils from flowers by means of distillation, the procedure most commonly used today. He first experimented with the rose. Until his discovery, liquid perfumes were mixtures of oil and crushed herbs or petals, which made a strong blend. Rose water was more delicate, and immediately became popular. Both of the raw ingredients and distillation technology significantly influenced western perfumery and scientific developments, particularly chemistry.

Knowledge of perfumery came to Europe as early as the 14th century due partially to the spread of Islam. But it was the Hungarians who ultimately introduced the first modern perfume. Made of scented oils blended in an alcohol solution, the first modern perfume was made in 1370 at the command of Queen Elizabeth of Hungary and was known throughout Europe as Hungary Water. The art of perfumery prospered in Renaissance Italy, and in the 16th century, Italian refinements were taken to France by Catherine de' Medici's personal perfumer, Rene le Florentin. His laboratory was connected with her apartments by a secret passageway, so that no formulas could be stolen en route. France quickly became the European center of perfume and cosmetic manufacture. Cultivation of flowers for their perfume essence, which had begun in the 14th century, grew into a major industry in the south of France. During the Renaissance period, perfumes were used primarily by the wealthy to mask body odors resulting from infrequent bathing. Partly due to this patronage, the western perfumery industry was created. By the 18th

century, aromatic plants were being grown in the Grasse region of France to provide the growing perfume industry with raw materials. Even today, France remains the centre of the European perfume design and trade.

2.2.2 Concentration

Perfume types reflect the concentration of aromatic compounds in a solvent, which in fine fragrance is typically ethanol or a mix of water and ethanol. Various sources differ considerably in the definitions of perfume types. The concentration by percent/volume of perfume oil is as follows:

- Perfume extract (Extrait): 15-40% (IFRA: typical 20%) aromatic compounds
- Eau de Parfum (EdP), Parfum de Toilette (PdT): 10-20% (typical ~15%) aromatic compounds. Sometimes listed as "eau de perfume" or "millésime".
- Eau de Toilette (EdT): 5-15% (typical ~10%) aromatic compounds
- Eau de Cologne (EdC): Chypre citrus type perfumes with 3-8% (typical ~5%) aromatic compounds
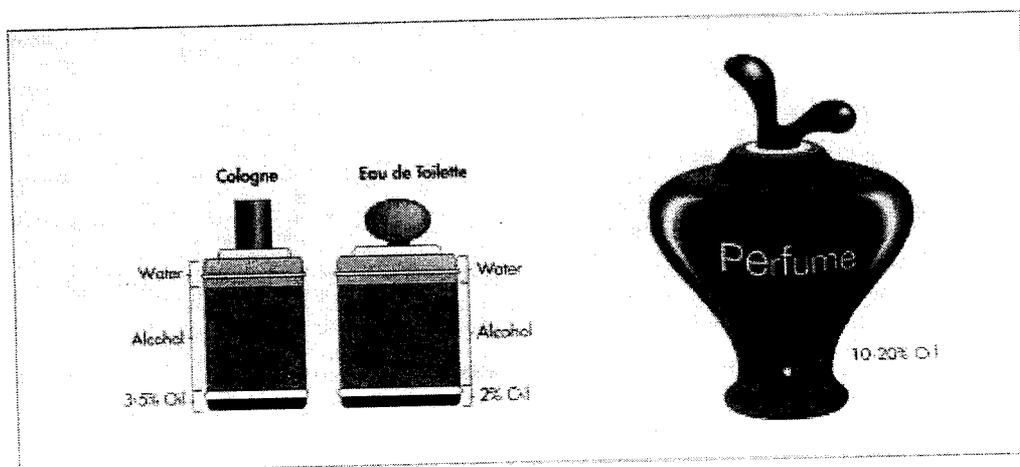- Splash and After shave: 1-3% aromatic compounds

Fig 3

It is the ratio of alcohol to scent that determines perfume, eau de toilette, and cologne.

Perfume oils are often diluted with a solvent, though this is not always the case, and its necessity is disputed. By far the most common solvent for perfume oil dilution is ethanol or a mixture of ethanol and water. Perfume oil can also be diluted by means of neutral-smelling oils such as fractionated coconut oil, or liquid waxes such as jojoba oil. Commercially a mixture of 60% ethanol and 40 % water is used as a solvent base in the perfumes

The intensity and longevity of a perfume is based on the concentration, intensity and longevity of the aromatic compounds (natural essential oils / perfume oils) used: As the percentage of aromatic compounds increases, so does the intensity and longevity of the scent created. Different perfumeries or perfume houses assign different amounts of oils to each of their perfumes. Therefore, although the oil concentration of a perfume in *Eau de Parfum* (EdP) dilution will necessarily be higher than the same perfume in *Eau de Toilette* (EdT) from within the same range, the actual amounts can vary between perfume houses. An EdT from one house may be stronger than an EdP from another.

Men's fragrances are rarely as EdP or perfume extracts. As well, women's fragrances are rarely sold in EdC concentrations. Although this gender specific naming trend is common for assigning fragrance concentrations, it does not directly have anything to do with whether a fragrance was intended for men or women.

Furthermore, some fragrances with the same *product name* but having a different *concentration name* may not only differ in their dilutions, but actually use different perfume oil mixtures altogether. For instance, in order to make the EdT version of a fragrance brighter and fresher than its EdP, the EdT oil may be "tweaked" to contain slightly more top notes or fewer base notes. In some cases, words such as "*extrême*", "*intense*" or "*concentrée*", that might indicate aromatic concentration are sometimes completely different fragrances that relates only because of a similar perfume *accord*. An example of this would be Chanel's *Pour Monsieur* and *Pour Monsieur Concentrée*.

Eau de Cologne (EdC) since 1706 in Cologne, Germany is originally a specific fragrance and trademark. However outside of Germany the term has become generic for Chypre citrus perfumes (without base-notes).

2.2.3 Describing a perfume

The precise formulae of commercial perfumes are kept secret. Even if they were widely published, they would be dominated by such complex ingredients and odorants that they would be of little use in providing a guide to the general consumer in description of the *experience* of a scent. Nonetheless, connoisseurs of perfume can become extremely skillful at identifying components and origins of scents in the same manner as wine experts.

The most practical way to start describing a perfume is according to the elements of the *fragrance notes* of the scent or the *family* it belongs to, all of which affect the overall impression of a perfume from first application to the last lingering hint of scent

2.2.4 FRAGRANCE NOTES

Perfume is described in a musical metaphor as having three sets of 'notes', making the harmonious scent accord. The notes unfold over time, with the immediate impression of the top note leading to the deeper middle notes, and the base notes gradually appearing as the final stage. These notes are created carefully with knowledge of the evaporation process of the perfume.

- **Top notes:** The scents that are perceived immediately on application of a perfume. Top notes consist of small, light molecules that evaporate quickly. They form a person's initial impression of a perfume and thus are very important in the selling of a perfume. Also called the head notes.
- **Middle notes:** The scent of a perfume that emerges just prior to when the top notes dissipate. The middle note compounds form the "heart" or main body of a perfume and act to mask the often unpleasant initial impression of base notes, which become more pleasant with time. They are also called the "heart notes".
- **Base notes:** The scent of a perfume that appears close to the departure of the middle notes. The base and middle notes together are the main theme of a perfume. Base notes bring depth and solidity to a perfume. Compounds of this class of scents are typically rich and "deep" and are usually not perceived until 30 minutes after application.

The scents in the top and middle notes are influenced by the base notes, as well the scents of the base notes will be altered by the type of fragrance materials used as middle notes. Manufacturers of perfumes usually publish perfume notes and typically they present it as fragrance pyramid, with the components listed in imaginative and abstract terms.

2.2.5 TRADITIONAL CLASSIFICATION

The traditional classification which emerged around 1900 comprised the following categories:

- **Single Floral**: Fragrances that are dominated by a scent from one particular flower; in French called a *soliflore*. (e.g. Serge Lutens' *Sa Majeste La Rose*, which is dominated by rose.)
- **Floral Bouquet**: Is a combination of fragrance of several flowers in a perfume compound e.g. Attar Majmua & Fancy Boquet etc.
- **Amber**: A large fragrance class featuring the sweet slightly animalic scents of ambergris or labdanum, often combined with vanilla, flowers and woods. Can be enhanced by camphorous oils and incense resins, which bring to mind Victorian era imagery of the Middle East and Far East.
- **Wood**: Fragrances that are dominated by woody scents, typically of agarwood, sandalwood and cedarwood. Patchouli, with its camphoraceous smell, is commonly found in these perfumes.
- **Leather**: A family of fragrances which features the scents of honey, tobacco, wood and wood tars in its middle or base notes and a scent that alludes to leather.
- **Chypre**: Meaning *Cyprus* in French, this includes fragrances built on a similar accord consisting of bergamot, oakmoss, patchouli, and labdanum. This family of fragrances is named after a perfume by François Coty. A notable example is *Mitsouko* (a popular name for girls in Japanese) by Guerlain.
- **Fougère**: Meaning *Fern* in French, built on a base of lavender, coumarin and oakmoss. Houbigant's *Fougère Royale* pioneered the use of this base. Many men's fragrances belong to this family of fragrances, which is characterized by its sharp herbaceous and woody scent

2.2.6 MODERN CLASSIFICATION

Since 1945, due to great advances in the technology of perfume creation (i.e., compound design and synthesis) as well as the natural development of styles and tastes; new categories have emerged to describe modern scents:

- **Bright Floral**: combining the traditional Single Floral & Floral Bouquet categories.
- **Green**: a lighter and more modern interpretation of the Chypre type, with pronounced cut grass and cucumber-like scents
- **Aquatic, Oceanic, or Ozonic**: the newest category in perfume history, appearing in 1991 with Christian Dior's Dune. A very clean, modern smell leading to many of the modern androgynous perfumes. Generally contains calone, a synthetic scent discovered in 1966. Also used to accent floral, oriental, and woody fragrances.
- **Citrus**: An old fragrance family that until recently consisted mainly of "freshening" eau de colognes, due to the low tenacity of citrus scents. Development of newer fragrance compounds has allowed for the creation of primarily citrus fragrances.
- **Fruity**: featuring the aromas of fruits other than citrus, such as peach, cassis (black currant), mango, passion fruit, and others.
- **Gourmand**: scents with "edible" or "dessert"-like qualities. These often contain notes like vanilla, tonka bean and coumarin, as well as synthetic components designed to resemble food flavors. An example is Thierry Mugler's Angel.

2.2.8 AROMATICS SOURCES

2.2.8.1 PLANT SOURCES

Plants have long been used in perfumery as a source of essential oils and aroma compounds. These aromatics are usually secondary metabolites produced by plants as protection against herbivores, infections, as well as to attract pollinators. Plants are by far the largest source of fragrant compounds used in perfumery. The sources of these compounds may be derived from various parts of a plant. A plant can offer more than one source of aromatics, for instance the aerial portions and seeds of coriander have remarkably different odors from each other. Orange leaves, blossoms, and fruit zest are the respective sources of petitgrain, neroli, and orange oils.

- **Bark:** Commonly used barks includes cinnamon and cascarilla. The fragrant oil in sassafras root bark is also used either directly or purified for its main constituent, safrole, which is used in the synthesis of other fragrant compounds.

- **Flowers** and **blossoms:** Undoubtedly the largest source of aromatics. Includes the flowers of several species of rose and jasmine, as well as osmanthus, plumeria, mimosa, tuberose, narcissus, scented geranium, cassie, ambrette as well as the blossoms of citrus and ylang-ylang trees. Although not traditionally thought of as a flower, the unopened flower buds of the clove are also commonly used. One orchid hybrid named "Miss Udorn Sunshine" is extracted for perfume. Other orchid flowers are not commercially used to produce essential oils or absolutes, except in the case of vanilla, an orchid, which must be pollinated first and made into seed pods before use in perfumery.

- **Fruits:** Fresh fruits such as apples, strawberries, cherries unfortunately do not yield the expected odors when extracted; if such fragrance notes are found in a perfume, they are synthetic. Notable exceptions include litsea cubeba, vanilla, and juniper berry. The most commonly used fruits yield their aromatics from the rind; they include citrus such as oranges, lemons, and limes. Although grapefruit rind is still used for aromatics, more and more commercially used grapefruit aromatics are artificially synthesized since the natural aromatic contains sulfur and its degradation product is quite unpleasant in smell.

- **Leaves** and **twigs:** Commonly used for perfumery are lavender leaf, patchouli, sage, violets, rosemary, and citrus leaves. Sometimes leaves are valued for the "green" smell they bring to perfumes, examples of this include hay and tomato leaf.

- **Resins:** Valued since antiquity, resins have been widely used in incense and perfumery. Highly fragrant and antiseptic resins and resin-containing perfumes have been used by many cultures as medicines for a large variety of ailments. Commonly used resins in perfumery include labdanum, frankincense/olibanum, myrrh, Peru balsam, gum benzoin. Pine and fir resins are a particularly valued source of terpenes used in the organic synthesis of many other synthetic or naturally occurring aromatic compounds. Some of what is called amber and copal in perfumery today is the resinous secretion of fossil conifers.

- **Roots, rhizomes and bulbs:** Commonly used terrestrial portions in perfumery include iris rhizomes, vetiver roots, various rhizomes of the ginger family.

- **Seeds:** Commonly used seeds include tonka bean, carrot seed, coriander, caraway, cocoa, nutmeg, mace, cardamom, and anise.

- **Woods:** Highly important in providing the base notes to a perfume, wood oils and distillates are indispensable in perfumery. Commonly used woods include sandalwood, rosewood, agarwood, birch, cedar, juniper, and pine. These are used in the form of macerations or dry-distilled (rectified) forms.

2.2.8.2 ANIMAL SOURCES

- **Ambergris:** Lumps of oxidized fatty compounds, whose precursors were secreted and expelled by the Sperm Whale. Ambergris is commonly referred to as "amber" in perfumery and should not be confused with yellow amber, which is used in jewelry.

- **Castoreum:** Obtained from the odorous sacs of the North American beaver.

- **Civet:** Also called Civet Musk, this is obtained from the odorous sacs of the civets, animals in the family *Viverridae*, related to the Mongoose. The World Society for the Protection of Animals investigated African civets caught for this purpose.

- **Hyraceum:** Commonly known as "Africa Stone," is the petrified excrement of the Rock Hyrax.

- **Honeycomb:** From the honeycomb of the Honeybee. Both beeswax and honey can be solvent extracted to produce an absolute. Beeswax is extracted with ethanol and the ethanol evaporated to produce beeswax absolute.

- **Musk:** Originally derived from the musk sacs from the Asian musk deer, it has now been replaced by the use of synthetic musks sometimes known as "white musk".

2.2.8.3 SYNTHETIC SOURCES

Many modern perfumes contain synthesized odorants. Synthetics can provide fragrances which are not found in nature. For instance, Calone, a compound of synthetic origin, imparts a fresh ozonous metallic marine scent that is widely used in contemporary perfumes. Synthetic aromatics are often used as an alternate source of compounds that are not easily obtained from natural sources. For example, linalool and coumarin are both naturally occurring compounds that can be inexpensively synthesized from terpenes. Orchid scents (typically *salicylates*) are usually

not obtained directly from the plant itself but are instead synthetically created to match the fragrant compounds found in various orchids.

2.3 GAS CHROMOTOGRAPHY– MASS SPECTRUM

To determine the composition of a pure perfume sample, e.g. for cost analysis or quality control, the perfume houses and home and personal-care companies use a very similar approach based on capillary GC with flame ionization and mass spectrometric detection. The perfume sample is, after appropriate dilution, analyzed with capillary GC on at least two different columns. The PDMS (i.e. poly-dimethyl siloxane; apolar phase) and PEG (i.e.polyethylene glycol; polar phase) columns are the most frequently used for this purpose. Temperature-programmed Kovats Indices (KIs) of the unknown peaks are determined with the use of a series of n-alkanes or linear esters. Additionally, GC-MS is used to obtain electron-impact ionization (EI) mass spectra. With the use of specific perfume KI and EI- MS databases, the unknowns are identified. The complexity of some of the perfumes requires this "three-point" identification process because peak overlap and mixed mass spectra are quite common. The "crude" perfume composition is determined on the basis of a 100% measure- ment of the FID peak areas in one of the chromatograms (usually the chromatogram obtained on the apolar column). Finally, the composition undergoes further fine tuning by adding together the ingredients that make up a single perfume raw material and applying some correction factors based on knowledge of the raw materials used in the perfume industry.

Especially challenging is the identification of essential oils in full formulations. These steam distillates or cold pressings of natural products, such as flowers and fruits, can comprise up to 50 individual ingredients. Additionally, the main compounds are usually quite common, and (cheaper) synthetic analogues can also be used in the composition. However, for some oils the presence of specific trace markers can indicate their presence in the perfume.

Although, on average, systematic errors by neglecting these effects will not be huge, some common perfume ingredients, such as DPG (dipropylene glycol, an odorless solvent), heliotropine and helional, possess FID sensitivities that are less than 50% of those for terpenes, such as limonene, pinene and myrcene.

The formulation process starts with the identification of the individual perfume ingredients on the basis of KI values and mass spectra. The more the ingredients (partially) overlap in the chromatograms, the more difficult this identification becomes. Automation of the formulation process (e.g. automated MS library searches, automated peak integration) is better achievable when the chromatographic conditions are resolution-optimized instead of speed-optimized. Therefore, the perfume industry tends to prefer long, medium-to-narrow-bore GC columns that generate many plates for optimal resolution. If the inner diameter is too small, pressure drops become excessive, limiting the column length. For that reason, typical columns used for perfume formulation are 30–60 m in length and have an internal diameter of 0.25–0.32 mm.

In a perfume composition, numerous ingredients can be present at a low level (i.e. <1%) and still have an important impact either olfactively or economically. Therefore, sensitivity is also an important aspect in GC and GC-MS perfume analysis. In this case, sensitivity is directly linked to mass loadability, because perfumes can also contain ingredients that make up to as much as 50% of the total composition. Therefore, it is important that capillary-GC columns provide maximum sensitivity in combination with maximum dynamic range

2.6 PROBLEM ANALYSIS

Silk is a special fabric, which needs special care and should be handled carefully.

- Silk is a protein fiber, chlorine bleach is not used to clean silk because chlorine will damage silk
- Silk is not dried in direct sun light for a prolonged period, sun light will damage silk fabric
- Substance containing alcohol will damage silk fabric, hence perfume and hair sprays are not applied on silk directly

It is clear that the alcohol contained in the perfume can seriously damage the perfume, which will cause the color in the fabric to fade, resulting in a "reverse stain".

There are many stain repellent finishes which could repel alcohols and will not let the perfume to retain a stain on the silk fabric, but there is no standard method described to check the color fastness to perfume of silk fabric, which is required to confirm the effect of finish applied.

3. METHODS AND MATERIALS

3.1. MATERIALS

Materials used are listed below

- 100 % acid dyed silk fabric (light , medium , dark colour)
- Specially finished acid dyed silk fabric (water oil repellent finish)
- Silk cotton (30:70)

3.1.1.PARAMETERS

The work was carried out using a 100% dyed silk fabric which was sourced from Shri Lakshmi Textiles,Salem which has the following parameters. Commercially sold silk samples were also collected.The fabric parameters is mentioned in the table

PARAMETERS	100% dyed silk	Silk cotton
Warp Count	85	120
Weft Count	48	41
Ends Per Inch	54	65
Picks Per Inch	52	65
GSM	49	59.4
Weave	Plain weave	Plain weave

3.1.2.PERFUME NOTES

3.1.2.1 Perfume 1

Perfume 1 is classified as a floral-aldehyde fragrance and it is a line of women's and men's fragrances produced by the American cosmetic and perfume house Revlon in 1973.

Top notes : citrus, bergamot, hyacinth, green leaf, tarragon, peach, and aldehyde

Heart notes : top notes, cyclamen, carnation, orris root, lily of the valley, jasmine and rose

Base notes : sandalwood, musk, vanilla, oakmoss, and cedar

3.1.2.2 Perfume 2

Perfume 2 is inspired by wildflowers gathered from the American landscape. The effervescent floral scent combines clarity with energy, freshness with spirit, and floral notes with a fresh feel.

Top notes: Black currant flowers, camelia, mandarin orange and apple tree blossom.

Heart notes: Honeysuckle, lily, violet, mint, grapefruit, citruses, green leaves and rose.

Base notes: Magnolia, leather, sandalwood, jasmine and cedar.

3.1.2.3.Perfume 3

Perfume 3 is a Oriental Floral fragrance for women. It was launched in 2006.

Top notes: Mandarin orange and osmanthus.

Middle notes: Peony, orchid and ylang-ylang.

Base notes : Amber and vanilla.

3.1.3. SPECIALLY FINISHED SILK FABRIC

There are numerous specially finished fabrics are available in the market like stain guard finished fabric, flame retardant finished fabric, anti bacterial finished fabric.etc.We have chosen water-oil repellant finished fabric.The finishing work was carried out in the 100% acid

dyed silk fabric. The chemical used in water oil repellent finishing is Nuva HPU supplied by Clariant chemicals. The dosage given was 60 gpl. Padding method is used on the basis of Dry on wet – 75 % pick up.

3.2. METHODOLOGY

To do quantitative and qualitative analysis of commercial perfumes

↓

To prepare a reference test solution of perfume

↓

Sourcing fabric

↓

Testing

↓

100% dyed silk fabric (light,medium,dark)	Specially finished silk fabric(oil-water repellent)	Silk cotton (30 :70)

↓

Color fastness to commercial perfume 1,2,3

↓

Color fastness to perspiration

↓

Color fastness to perfume1 + perspiration

↓

Color fastness to perfume2 + perspiration

↓

Color fastness to perfume3+ perspiration

```
                    │
                    ▼
        ┌───────────────────────────┐
        │  Color fastness to        │
        │  reference solution1 ,2   │
        └───────────────────────────┘
                    │
                    ▼
        ┌───────────────────────────┐
        │  Color fastness to        │
        │  reference  solution1     │
        │  +perspiration            │
        └───────────────────────────┘
                    │
                    ▼
        ┌───────────────────────────┐
        │  Color fastness to        │
        │  reference  solution2 +   │
        │  nersniration             │
        └───────────────────────────┘
```

## 3.3.GAS CHROMOTOGRAPHY –MASS SPECTRUM

Gas chromatography-mass spectroscopy (GC-MS) is one of the so-called hyphenated analytical techniques. As the name implies, it is actually two techniques that are combined to form a single method of analyzing mixtures of chemicals. Gas chromatography separates the components of a mixture and mass spectroscopy characterizes each of the components individually. By combining the two techniques, an analytical chemist can both qualitatively and quantitatively evaluate a solution containing a number of chemicals.
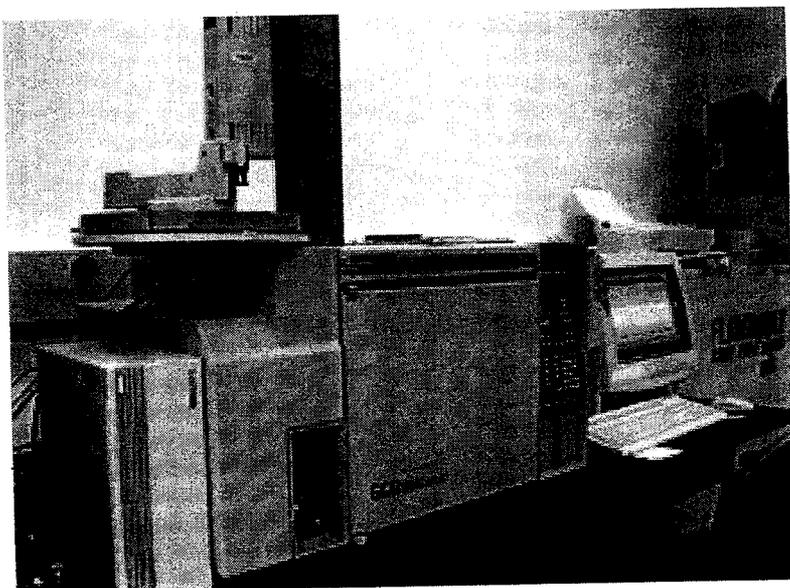
In general, chromatography is used to separate mixtures of chemicals into individual components. Once isolated, the components can be evaluated individually.As the compounds are separated, they elute from the column and enter a detector. The detector is capable of creating an electronic signal whenever the presence of a compound is detected. The greater the concentration in the sample, the bigger the signal. The signal is then processed by a computer. The time from when the injection is made (time zero) to when elution occurs is referred to as the **retention time** (RT).

While the instrument runs, the computer generates a graph from the signal. (See figure 1). This graph is called a **chromatogram**. Each of the **peaks** in the chromatogram represents the signal created when a compound elutes from the GC column into the detector. The x-axis shows the RT, and the y-axis shows the intensity (abundence) of the signal. In Figure 1, there are several peaks labeled with their RTs. Each peak represents an individual compound that was separated from a sample mixture.
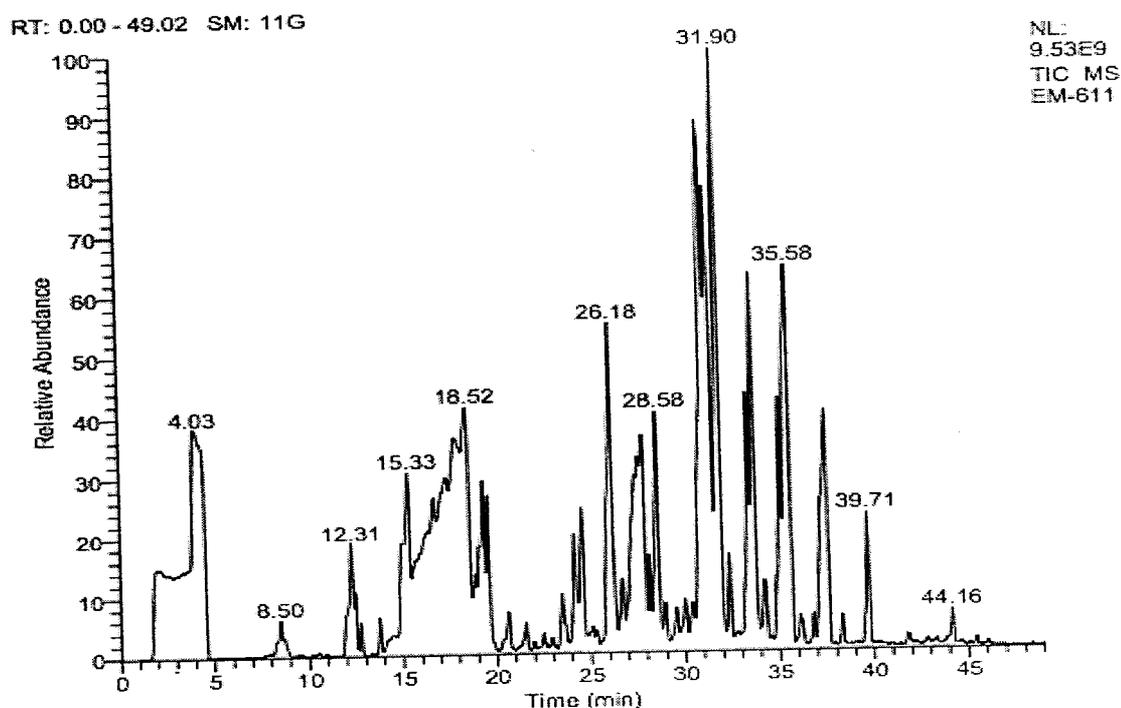
As per the GC MS result numerous chemicals were found through library search results. The composition of perfumes based on retention time and peak are identified .From this , solvents which may used alone can be predicted and confirmed.

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3.4 INSTRUMENTS USED FOR TESTING

For testing the perfume fastness we require an instrument which could maintain the body temperature and pressure constantly so that the human body simulation is brought over the temperature. These conditions are similar to the color fastness to perspiration test. By replacing the perspirometer solution to perfume solution we will be able to conduct perfume fastness test with same instrument

3.4.1 PERSPIROMETER

The Perspirometer applies a specified pressure to a package of test specimens separated by acrylic or glass plates. The spring loaded mechanism ensures the correct pressure is maintained when the loading Weight is removed. Two loading Weights are available to accommodate the requirements of the ISO and AATCC test methods.
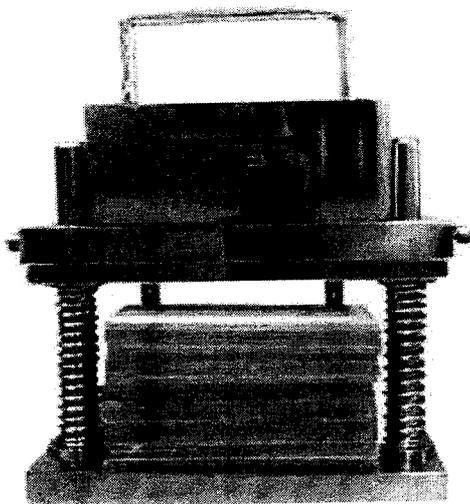

Fig 4 Perspirometer

PRINCIPLES

To test the color fastness to perspiration, sea water or water specimens (fabric, yarn or fiber) in contact with the multifiber fabric are treated in two different solutions. One solution is acidic and one solution s alkaline. The specimens are subsequently drained and placed under a specific load between the separator plates. The units are placed in an oven for a pre determined

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length of time, after which time the units are removed from the oven. The specimens are removed from the plates and placed in an oven/incubator to dry after which they are assessd with grey scale.

Color Fastness to Perspiration, Water and Sea Water

To test color fastness to perspiration, specimens (fabric, yarn or fibre) in contact with Multifibre Adjacent Fabric, are treated in two different solutions containing histidine, one alkaline and one acidic.The specimens are subsequently drained and placed under constant pressure between separator plates in the Perspirometer. Up to 20 test specimens can be accommodated.The units are then placed in an Incubator for 4 hours at 37°C (body heat).After drying, change in colour of the specimens and staining of the adjacent fabrics are assessed with Grey Scales.Separate Perspirometer units must be used for alkaline and acidic tests to avoid chemical interaction.

Preparation of the test solution

Solution should be made up immediately prior to the use as the chemicals can degrade over time. For one liter of solution

- Add 0.5 g of l-histidine monohydrochloride monohudrate
- Add 5 g of sodium chloride
- Add 2.5 g of disodium hydrogen orthophosphate dehydrate

Sample preparation

- Cut multifiber fabric measuring 40mm X 100mm
- Cut the sample which is to be tested measuring 40mm X 100mm
- Keep the samples one over the other and sew at the eges

3.4.2 COLORFASTNESS TO DRYCLEANING

Principle

- A specimen of the textile in contact with cotton fabric, multifiber swatch and noncorrodible steel discs is agitated in perchloroethylene (see 11.2)s and then dried in air. Any change in color of the specimen is then assessed with the standard gray scale for color change.

- Any staining is assessed by using the gray scale for staining or the chromatic transference scale.

Procedure

- Prepare a bag of each specimen with inside dimensions of 10×10 cm using the undyed cotton twill cloth by sewing together two squares of this cloth around three sides . place the specimen and 12 steel discs inside the bag, close the bag.

- In a hood prepare the detergent solution to a 1000ml volumetric flask filled partially with perchloroethylene add 10ml of detergent, shake or stir. Add perchloroethylene until the total volume equals 1000ml.add 0.6ml water shake until the solution is no longer cloudy .this mixture produces a 1% charge volume.

- In a hood place the bag containing this specimen and steel disc in the standard 500ml stainless still container and add 200ml perchloroethylene detergent solution at 30±2 C .close the container and agitate the specimen for 30mins at 30±2 C in the specified equipment

- Place the container in an adequately ventilated hood. Remove the bag from the container, withdraw the specimen and place the specimen between the layer of absorbent paper to remove surplus solvent. Air dry the specimen in a hood.

- Prepare the tested specimens and staining fabric for evaluation by trimming of raveled yarns and lightly brushing off any loose fiber and yarn on the fabric surfaces. Brush pile fabric specimens in required directions to restore them as nearly as possible to the same pile angle as the untreated specimes.specimens should be flattened if there are wrinkles. Specimens may be mounted on cards to facilitate identification and handling in their

evaluation. Mounting must not interfere with rating as specified in AATCC evaluation procedure 1 (gray scale for color change),2 (gray scale for staining) and 3 (AATCC chromatic transference scale). For consistency in backing material use a white mounting card with Y tristimulus value of at least 85%

3.4.3 GRADING THE TESTED SAMPLES

The tested samples are graded with two types of scales, they are

- Grading for staining

  The multifibre fabric is matched with the grey scale, it is graded and ratings are given

- Grading for changing in color

  The dyed samples is matched with the grey scale, it is graded and rating are given

3.4.4 PREPARATION OF REFERENCE TEST SOLUTION

There are two different types of reference solution were prepared and named as reference solution 1 and reference solution 2 .These solutions were prepared based upon the common chemicals which are present in the perfume-Top,middle,base node. Influences of essential oil were not used, since availability of essential oils are unlimited. For 100ml solution following composition of chemicals were prepared.

Reference solution 1

- 93.5ml of denaturated ethanol
- 0.5 ml of isopropyl alcohol
- 6 ml of distilled water.

Reference solution 2

- 93.5ml of denaturated ethanol
- 0.5ml of propylene glycol
- 6 ml of distilled water.

3.4.5. COMPUTERISED COLOR MATCHING

The Computerized Color Matching is used to compare and match the color between samples ie original sample and tested sample.This is done in addition to colour change /colour stain grading so as to measure quantitatively the colour difference.

DE value gives the difference in color between the two samples, if the DE value is below 0.6 the sample is accepted and if the DE value is above 0.6 the sample is rejected DE value is found using Computerized Color Matching for all the tested samples.

K/S calculations are invaluable in evaluating the build characteristics of dyestuffs because there is a direct relationship between K/S and dye concentration.K/S value was taken at 420 nm.

If the K/S of a target color is measured at several wavelengths, the concentrations of each dye can be calculated by trial and error from primary dyeing to achieve the closest match. A computer color matching program is capable of performing hundreds of iterations in a short period of time to produce the initial dye concentrations.

4. RESULT AND DISCUSSION

4.1 TEST RESULTS FOR 100% DYED SILK FABRIC (LIGHT,MEDIUM,DARK),SPECIALLY FINISHED SILK FABRIC (WATER OIL REPELLENT FINISH),SILK COTTON(30:70)
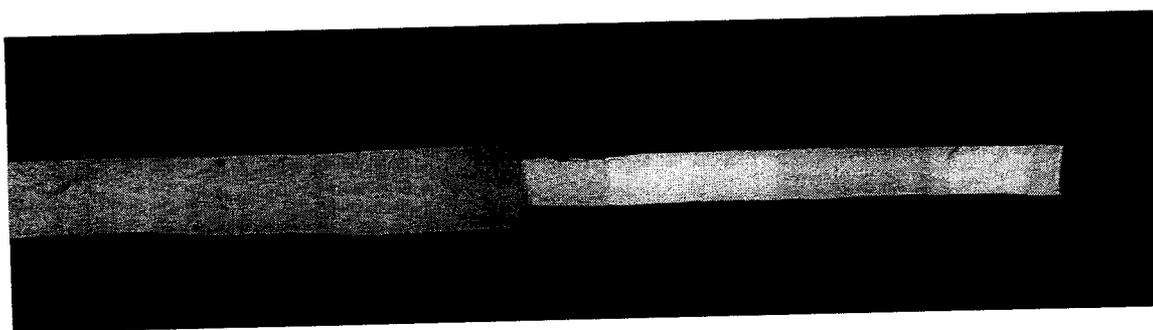
4.1.1 COLOR FASTNESS TO PERFUME

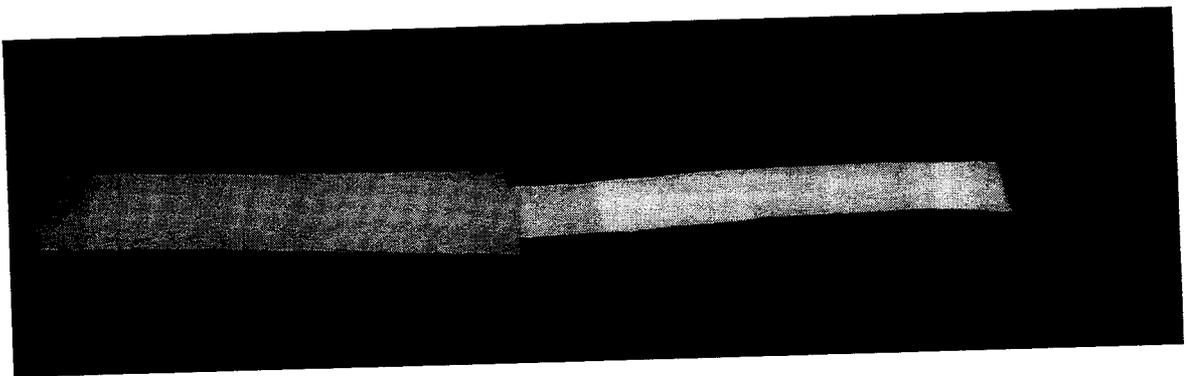| COLOR	PERFUME 1		PERFUME 2		PERFUME 3	
	DE	K/S	DE	K/S	DE	K/S
LIGHT	0.8	27.24	0.86	27.37	2.45	17.52
MEDIUM	1.1	14.65	1.39	14.34	2.88	17.44
DARK	1.45	14.21	1.57	14.14	2.89	17.29
SPECIAL FINISH	1.25	14.45	1.32	14.3	2.55	17.42
SILK COTTON	0.8	27.25	1.26	14.26	2.32	17.3

4.1.2.COLOR FASTNESS TO REFERENCE SOLUTION

| COLOR | GREY SCALE RATING FOR | | | | DE VALUE | | K/S VALUE | |
| | STAINING | | CHANGE IN COLOR | | | | | |
	SOL1	SOL2	SOL1	SOL2	SOL1	SOL2	SOL1	SOL2
LIGHT	4 -5	4 -5	4	4	1.25	1.34	14.45	14.57
MEDIUM	2-3	3-4	2-3	2-3	2.18	2.23	15.65	15.83
DARK	2-4	2-4	2-3	2-3	3.54	3.2	12.33	12.1
SPECIAL FINISH	3-4	3-4	3	3	2.29	2.15	15.18	15.37
SILK COTTON	4-5	4-5	4	4	1.09	1.15	14.28	14.8

4.1.3 COLOR FASTNESS TO REFERENCE SOLUTION 1 + PERSPIRATION

SAMPLE

COLOR	GREY SCALE RATING FOR				DE VALUE		K/S VALUE	
	STAINING		CHANGE IN COLOR					
	ACID	ALKALI	ACID	ALKALI	ACID	ALKALI	ACID	ALKA
LIGHT	3-5	3-5	4	4	2.93	2.38	17.53	17.32
MEDIUM	1-3	1-3	1-2	1-2	3.58	3.65	12.32	2.26
DARK	1-4	2-4	2	2	4.68	4.45	10.32	10.48
SPECIAL FINISH	3-4	3-4	2	2	4.32	4.52	10.45	10.27
SILK COTTON	4-5	4-5	2-3	2-3	2.18	2.32	17.75	17.5

COMPUTERISED COLOUR MATCHING REULTS
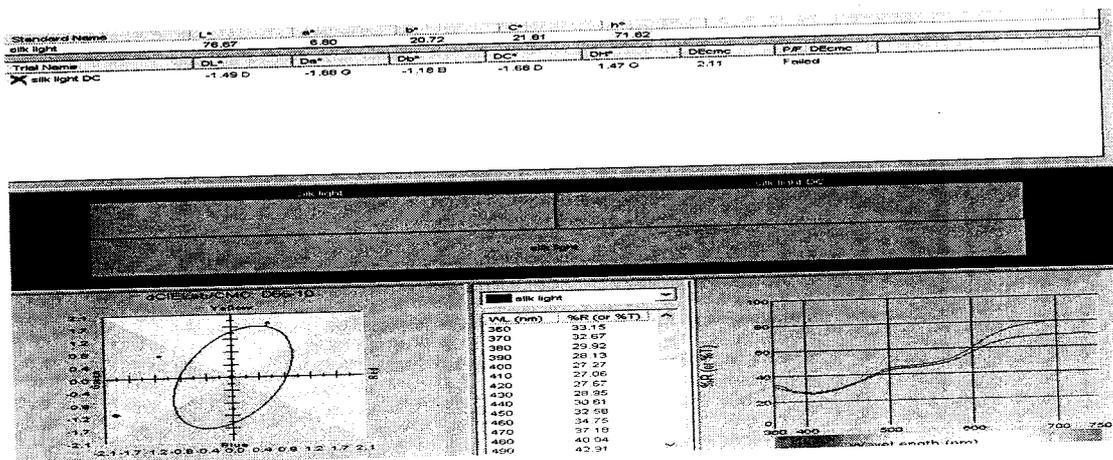
Standard Name	L*	a*	b*	C*	h°			
silk medium	55.47	23.05	14.34	27.15	31.90			
Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc	
✗ silk medium DC	-1.39 D	1.59 R	-0.00	1.36 B	-0.82 R	1.25	Failed	

dCIELab/CMC: D65-10

silk medium

WL (nm)	%R (or %T)
360	15.74
370	15.11
380	14.49
390	14.23
400	14.21
410	14.23
420	14.59
430	15.03
440	15.49
450	16.03
460	16.52
470	17.07
480	17.55
490	17.93
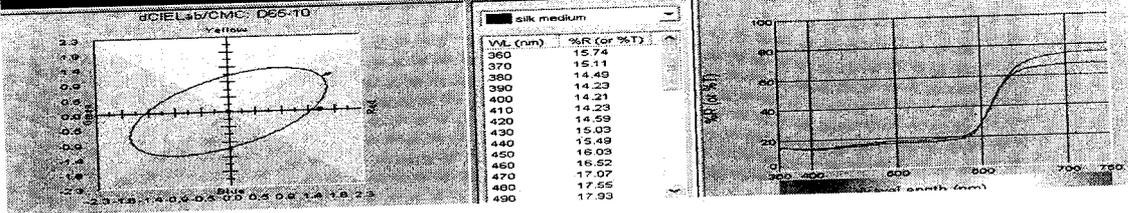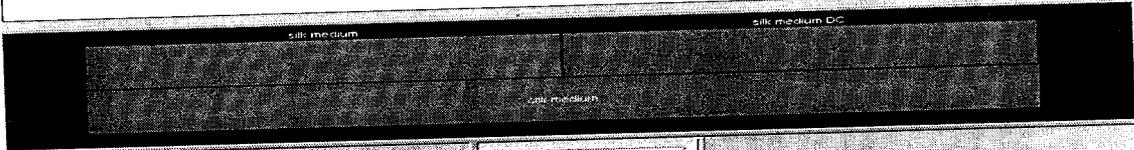
Standard Name	L*	a*	b*	C*	h°			
silk dark	48.70	1.13	6.23	6.33	79.76			
Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc	
✗ silk dark DC	3.13 L	1.22 R	3.87 Y	4.03 B	-0.40 R	4.28	Failed	

dCIELab/CMC: D65-10

silk dark

WL (nm)	%R (or %T)
360	13.04
370	13.62
380	13.53
390	13.14
400	13.04
410	13.02
420	13.19
430	13.56
440	14.01
450	14.49
460	14.96
470	15.44
480	15.92

33
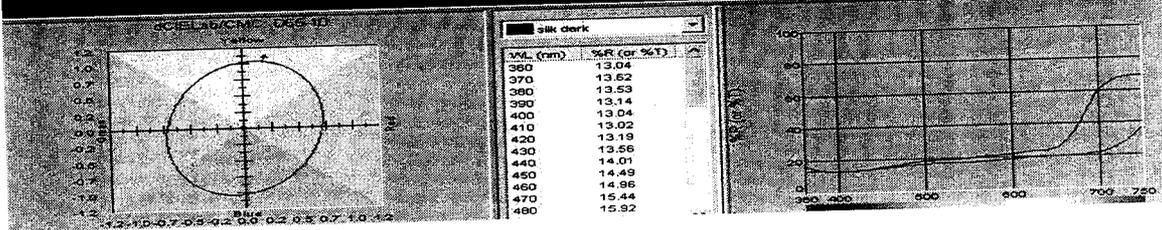
Standard Name	L*	a*	b*	C*	h°		
specially	46.82	2.58	10.43	10.74	76.11		

Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc
✗ specially DC	6.61 L	-0.69 G	-3.33 B	-3.40 D	-0.16 R	4.16	Failed

WL (nm)	%R (or %T)
360	9.90
370	11.23
380	10.49
390	9.93
400	9.88
410	9.86
420	10.05
430	10.51
440	11.00
450	11.54
460	12.06
470	12.67
480	13.30

Standard Name	L*	a*	b*	C*	h°		
Silk cotton	79.99	11.49	-1.71	11.61	351.53		
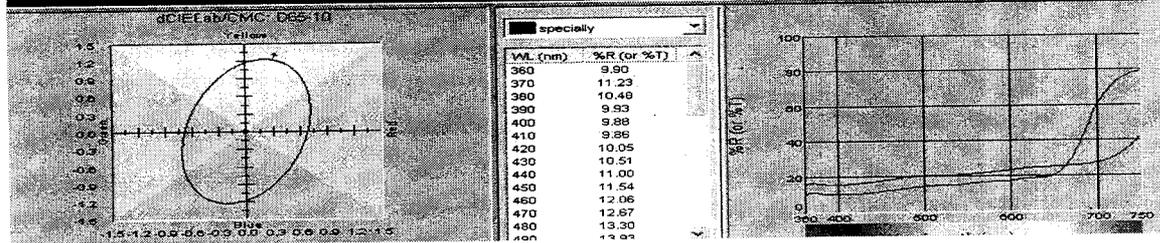
Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc
✗ Silk cotton DC	-0.55 D	-2.67 G	-0.28 B	-2.57 D	-0.76 B	2.18	Failed

WL (nm)	%R (or %T)
360	34.67
370	35.86
380	38.31
390	42.54
400	47.81
410	52.18
420	55.15
430	57.53
440	59.05
450	59.82
460	59.92
470	59.51
480	58.53
490	57.16
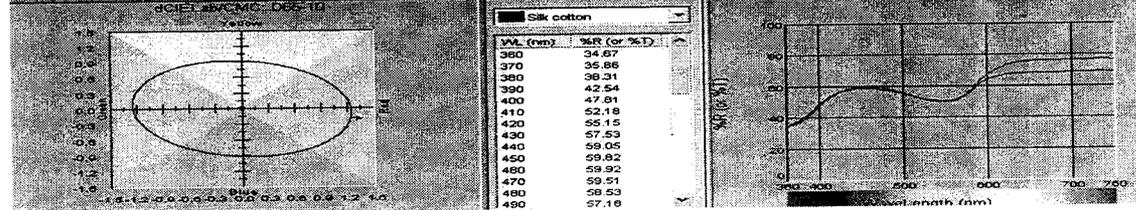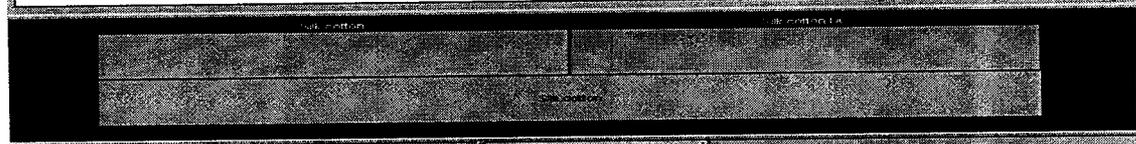
- The DE value in the above result is above 0.6.
- This means that the change in color is severe.

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4.1.4 COLOR FASTNESS TO REFERENCE SOLUTION 2 + PERSPIRATION

SAMPLE
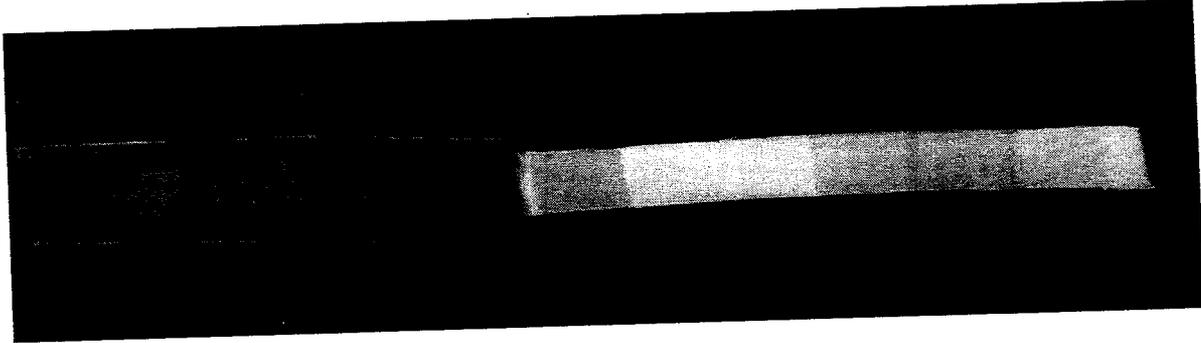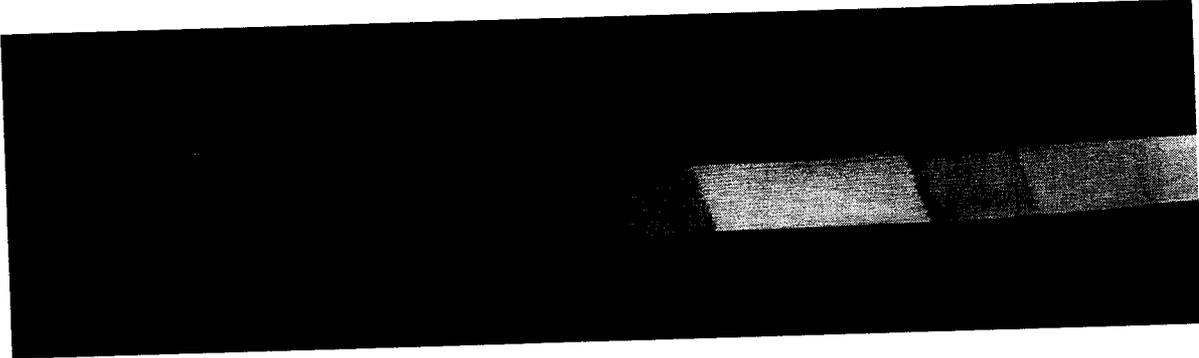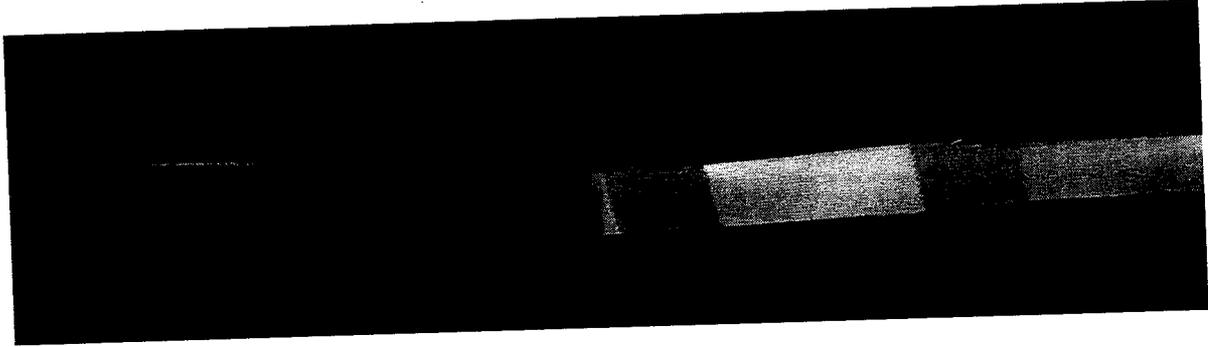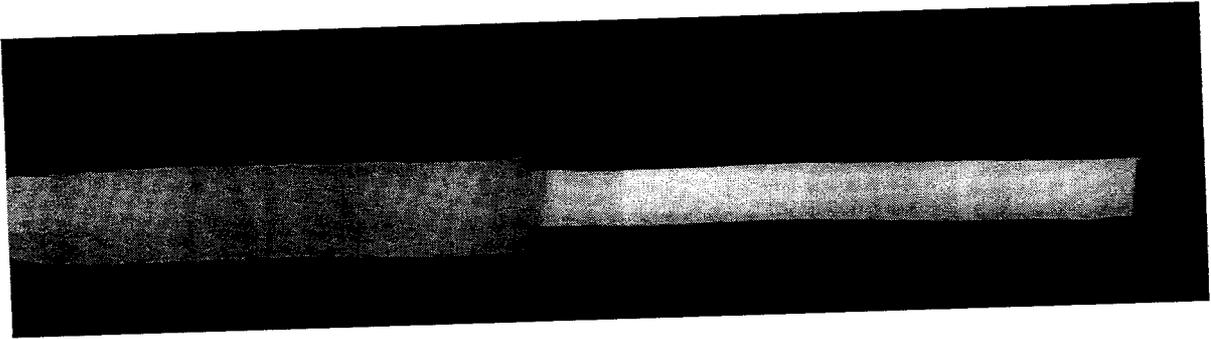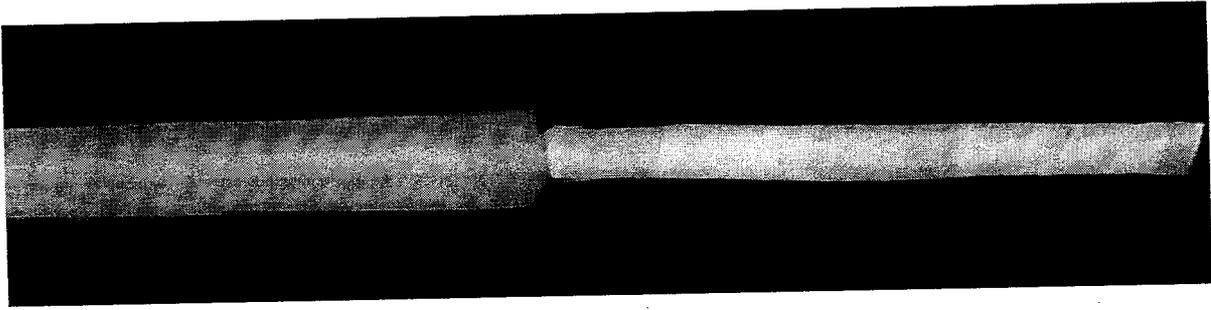
COLOR	GREY SCALE RATING FOR				DE VALUE		K/S VALUE	
	STAINING		CHANGE IN COLOR					
	ACID	ALKALI	ACID	ALKALI	ACID	ALKA	ACID	ALKA
LIGHT	3-5	4-5	4	4	2.9	2.63	17.75	17.32
MEDIUM	2-3	2-3	1-2	1-2	3.92	3.85	12.18	12.26
DARK	1-4	1-4	1-2	1-2	4.5	4.65	10.44	10.28
SPECIAL FINISH	2-4	2-4	2	2	4.47	4.35	10.46	10.51
SILK COTTON	4	3-5	3	3	2.23	2.52	17.47	17.38

COMPUTERISED COLOUR MATCHING REULTS

Standard Name	L*	a*	b*	C*	h°		
silk light	76.75	6.70	21.40	22.43	72.62		
Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc
X silk light alkali	-1.17 D	-1.77 G	-2.54 B	-3.03 D	0.97 C	2.13	Failed

WL (nm)	%R (or %T)
360	34.03
370	32.24
380	29.51
390	27.78
400	26.84
410	26.56
420	27.18
430	28.40
440	30.07
450	32.11
460	34.38
470	36.92
480	39.86
490	42.82
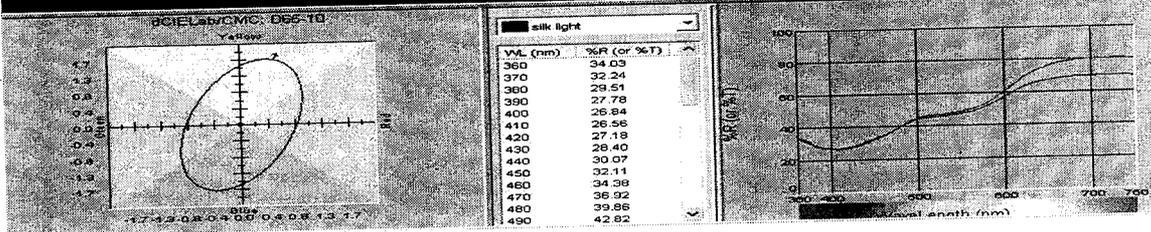
Standard Name	L*	a*	b*	C*	h°		
silk medium	54.81	24.24	14.21	28.09	30.37		
Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc
X silk medium acid	-12.35 D	19.62 R	12.28 Y	23.14 B	0.50 Y	13.06	Failed

WL (nm)	%R (or %T)
360	16.19
370	15.85
380	15.11
390	14.55
400	14.33
410	14.23
420	14.34
430	14.66
440	15.10
450	15.58
460	16.03
470	16.52
480	16.97
490	17.34

37
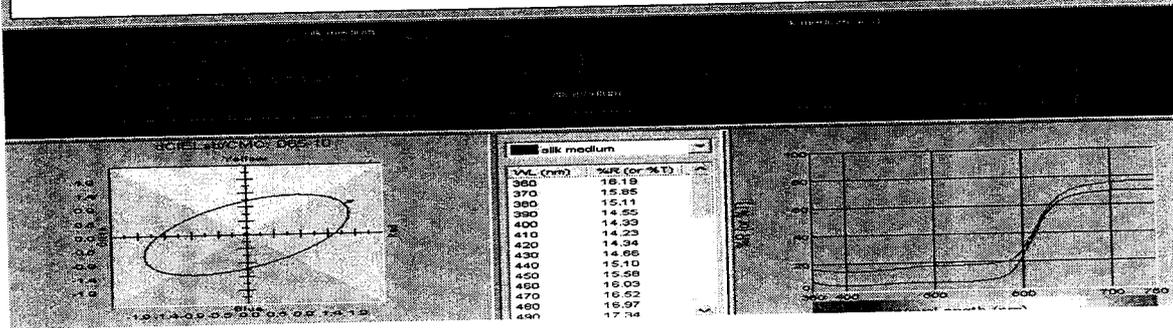
Standard Name	L*	a*	b*	C*	h°			
specialty	48.06	2.54	10.59	10.89	76.50			
Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc	
X specialty alkali	3.38 L	-1.56 G	0.61 Y	0.35 B	1.64 G	2.94	Failed	

dCIELab/CMC: D65-10

specialty	
WL (nm)	%R (or %T)
360	12.14
370	11.77
380	10.99
390	10.58
400	10.47
410	10.53
420	10.76
430	11.18
440	11.68
450	12.24
460	12.81
470	13.44
480	14.09
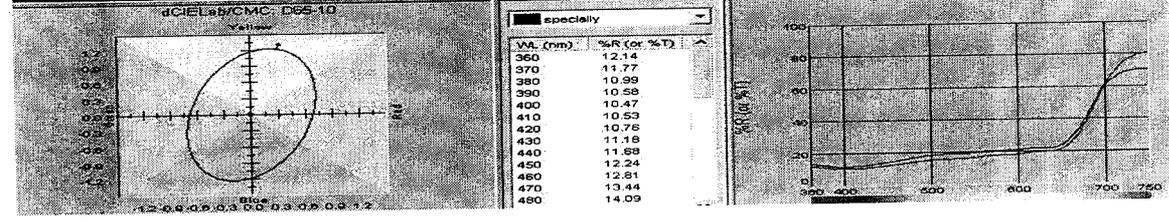
Standard Name	L*	a*	b*	C*	h°			
silk dark	45.14	1.06	4.85	4.97	77.42			
Trial Name	DL*	Da*	Db*	DC*	DH*	DEcmc	P/F DEcmc	
X silk dark alkali	-1.99 D	5.03 R	-0.98 B	2.27 B	-4.60 R	6.98	Failed	

dCIELab/CMC: D65-10

silk dark	
WL (nm)	%R (or %T)
360	13.19
370	13.24
380	12.62
390	11.96
400	11.85
410	11.69
420	11.78
430	12.02
440	12.30
450	12.60
460	12.93
470	13.28
480	13.61

38

Standard Name: Silk cotton — L* 79.99 — a* 11.49 — b* -1.71 — C* 11.61 — h° 351.53

Trial Name: Silk cotton DC — DL* -0.55 D — Da* -2.67 G — Db* -0.28 B — DC* -2.57 D — DH* -0.76 B — DEcmc 2.18 — P/F DEcmc — Failed
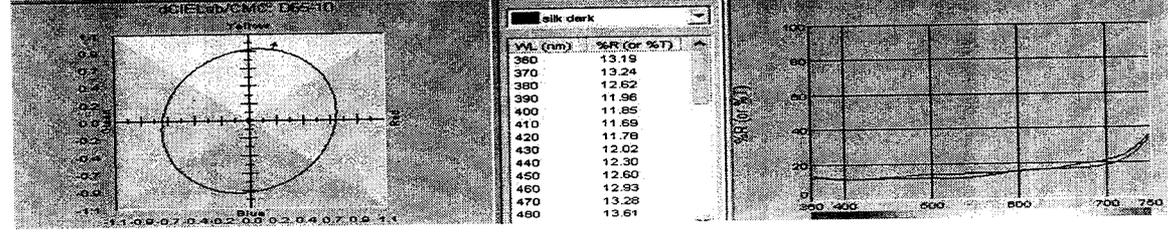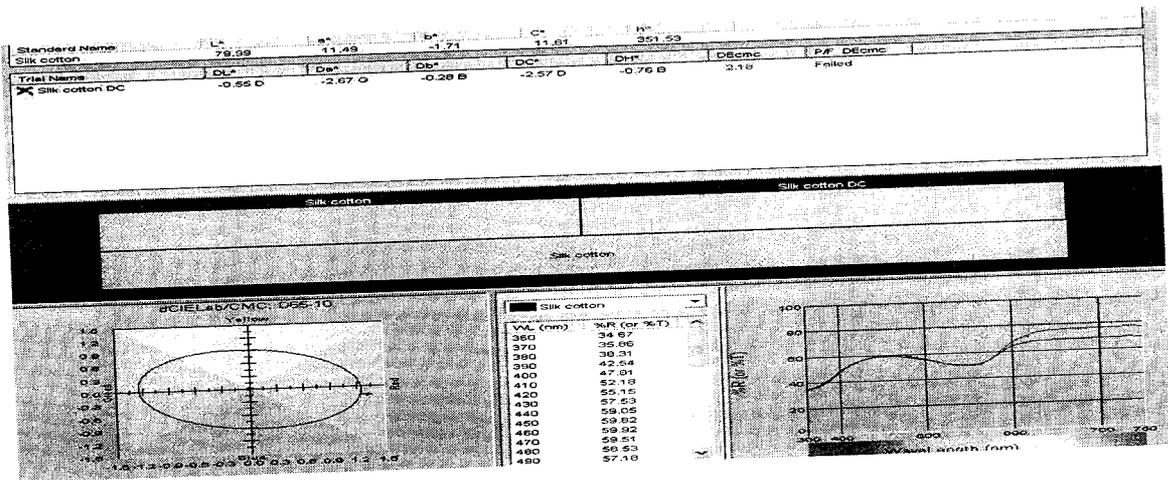
- The DE value in the above result is above 0.6.
- This means that the change in color is sever.

4.1.5 COLOR FASTNESS TO PERSPIRATION

COLOR	GREY SCALE RATING FOR				DE VALUE		K/S VALUE	
	STAINING		CHANGE IN COLOR					
	ACID	ALKA	ACID	ALKA	ACID	ALKA	ACID	ALKALI
LIGHT	4 -5	4 -5	4	4	1.18	1.13	14.67	14.73
MEDIUM	2-4	3-5	2	2-3	2.65	2.7	13.89	13.67
DARK	2-5	3-5	1-2	2	4.68	4.98	10.78	10.54
SPECIAL FINISH	2-5	4-5	2-3	3-4	4.97	4.94	10.56	10.53
SILK COTTON	4-5	4-5	4	4	1.83	1.04	14.64	14.23

39

4.1.6 COLOR FASTNESS TO PERFUME 1 + PERSPIRATION

| COLOR | GREY SCALE RATING FOR | | | | DE VALUE | | K/S VALUE | |
| | STAINING | | CHANGE IN COLOR | | | | | |
	ACID	ALKA	ACID	ALKA	ACID	ALKA	ACID	ALKALI
LIGHT	4 -5	4 -5	4	4	1.29	1.63	14.37	14.13
MEDIUM	3-5	2-4	2	2-3	2.49	2.54	12.96	12.43
DARK	2-4	3-4	2	2	4.65	4.8	10.86	10.62
SPECIAL FINISH	3-5	4-5	3	3-4	4.03	4.92	10.29	10.15
SILK COTTON	4-5	4-5	4	4	1.16	1.67	14.62	14.54

4.1.6 COLOR FASTNESS TO PERFUME 2 + PERSPIRATION

COLOR	GREY SCALE RATING FOR				DE VALUE		K/S VALUE	
	STAINING		CHANGE IN COLOR					
	ACID	ALKA	ACID	ALKA	ACID	ALKA	ACID	ALKA
LIGHT	4 -5	4 -5	4	4	1.13	1.83	14.43	14.12
MEDIUM	2-4	3-4	2	3	2.03	2.34	12.67	12.56
DARK	3-4	3-4	2	2	4.6	4.42	10.76	10.87
SPECIAL FINISH	3-4	4-5	2-3	3	4.87	4.51	10.23	10.34
SILK COTTON	4-5	4-5	4	4	1.23	1.58	14.52	14.36

4.1.7 COLOR FASTNESS TO PERFUME 3 + PERSPIRATION

| COLOR | GREY SCALE RATING FOR | | | | DE VALUE | | K/S VALUE | |
| | STAINING | | CHANGE IN COLOR | | | | | |
	ACID	ALKA	ACID	ALKA	ACID	ALKA	ACID	ALKALI
LIGHT	4 -5	4 -5	4	4	1.11	1.24	14.9	14.25
MEDIUM	2-4	3-5	2	3	2.9	2.56	12.43	12.54
DARK	2-4	3-5	2	2	4.85	4.95	10.65	10.41
SPECIAL FINISH	3-5	4-5	2-3	3	4.02	4.08	10.2	10.32
SILK COTTON	4-5	4-5	4	4	1.33	1.52	14.46	14.52

4.1.8 COLOR FASTNESS TO RUBBING

| COLOR | GREY SCALE RATING FOR | | | DE VALUE |
| | STAINING | | | |
	DRY	WET	DRY	WET
LIGHT	4	3	2.3	3.5
MEDIUM	3-4	3	2.6	3.8
DARK	4	3-4	1.3	1.8
SPECIAL FINISH	4	3-4	1.06	1.58
SILK COTTON	3-4	2-3	1.56	2.86

4.1.9 COLOR FASTNESS TO WASHING

| COLOR | GREY SCALE RATING FOR | | DE VALUE |
	STAINING	CHANGE IN COLOR	
LIGHT	3-4	2-3	2.04
MEDIUM	1	1	14.83
DARK	1	1	15.3
SPECIAL FINISH	-1	-1	16.84
SILK SCOTTON	3	1	4.84

4.1.10 COLOUR FASTNESS TO DRY CLEANING

COLOR	GREY SCALE RATING FOR		DE VALUE
	STAINING	CHANGE IN COLOR	
LIGHT	4 -5	4	2.11
MEDIUM	4 -5	4	1.25
DARK	4 -5	4	4.29
SPECIAL FINISH	4 -5	4	4.18
SILK COTTON	4 -5	4	2.18

4.8.6 COMPARISION

COMPARISION OF THREE COMMERCIAL PERFUMES (DE VALUE)
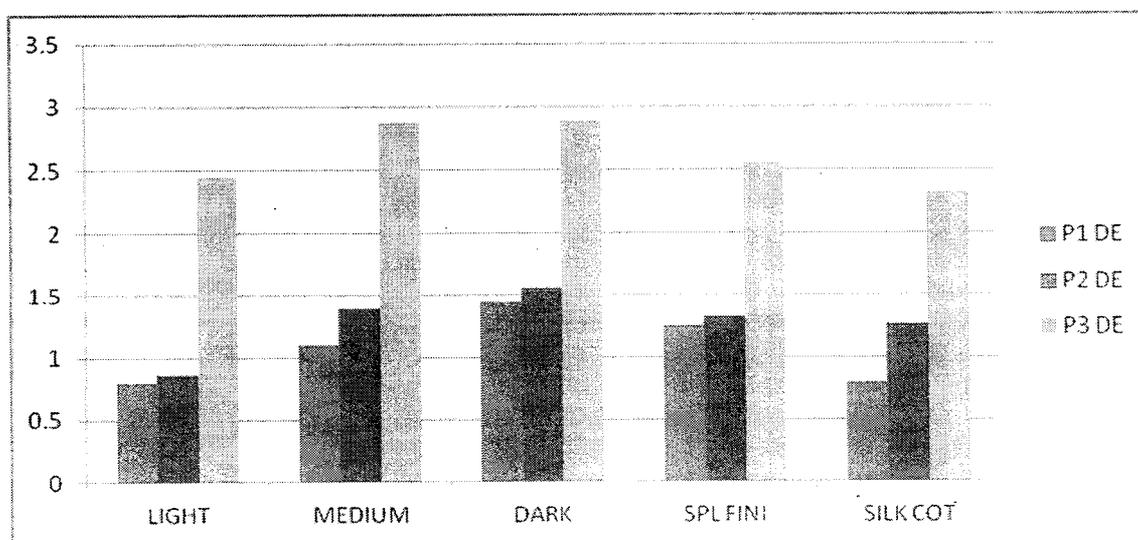
Delta value of three different commercial perfumes were plotted in the above graph.It is found that same five fabrics react diffently to all three perfumes.As the compositions differs, the results are like this.Colour change is more in case of perfume3.

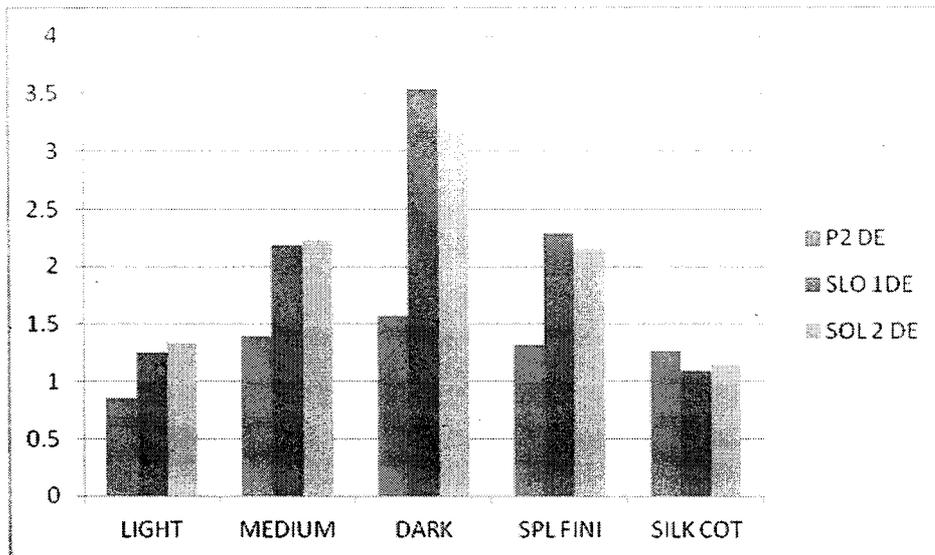## COMPARISION OF REFERENCE SOLUTION 1,2

FOR DE VALUE
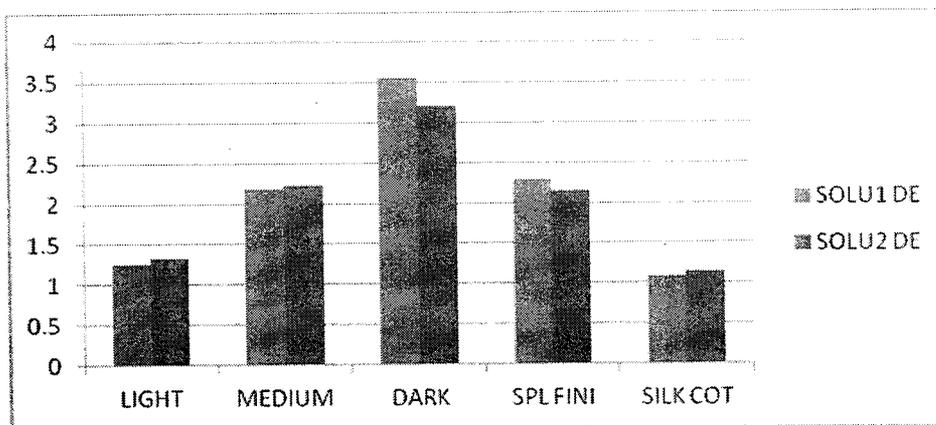
Two different solutions were prepared based on the solvents being used by manufacturers of perfumes .DE value and k/s value of both solutions are more or less same .Also as in direct perfumes, medium and dark shades colur change is more.

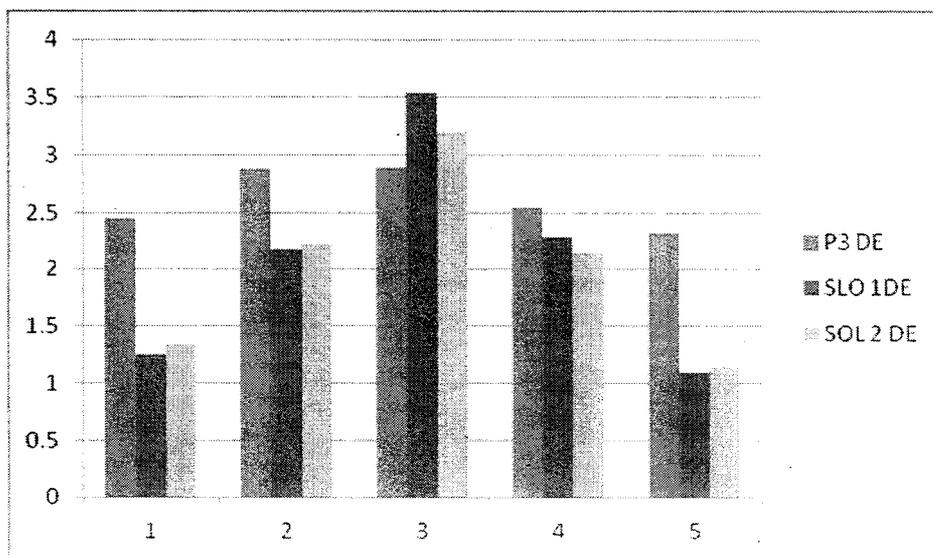## COMPARISION OF PERFUME1 +REFERENCE SOLUTION 1,2
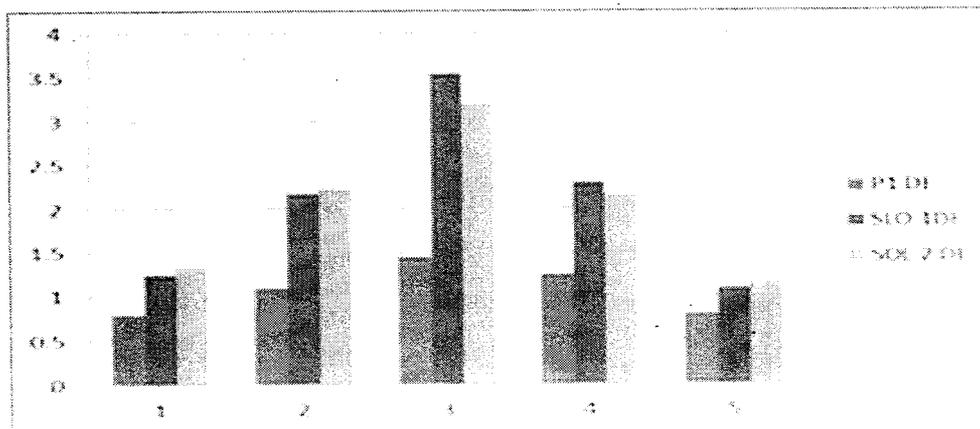
FOR DE VALUE

COMPARISION OF PERFUME SOLUTION 2 + REFERENCE SOLUTION 1,2
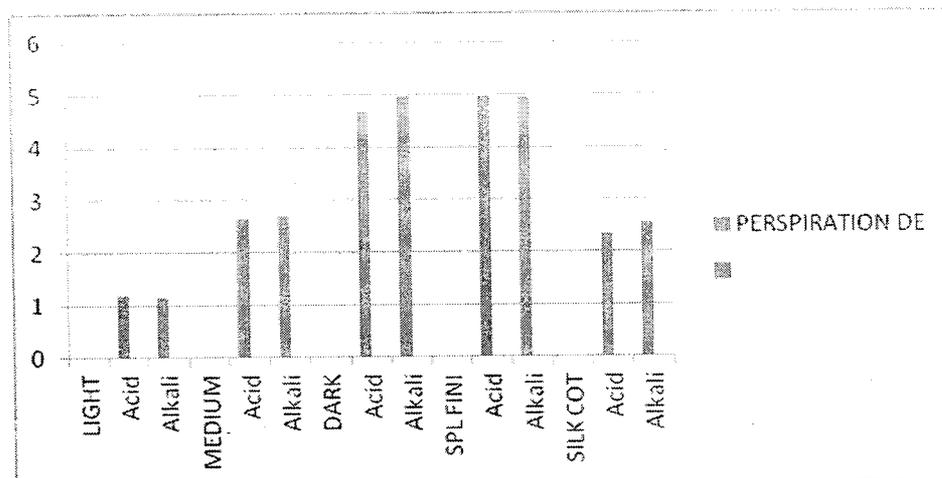
FOR DE VALUE

COMPARISION OF PERFUME SOLUTION 3 + REFERENCE SOLUTION 1,2

FOR DE VALUE

## 4.8.7.5 COMPARISION OF PERSPIRATION

FOR DE VALUE

The above graph shows the combined values of acidic and alkaine persipiration solution reactions of all the samples.Compared to colur change due to perfumes alone, persipiration solution colour change results are more.Hence to predict the influence of perfume, persipration solution also can be added.And to be tested as this will simulate real wearing conditions also.

COMPARISION OF PERFUME SOLUTION 1,2,3 +REFERANCE SOLUTION 1,2

FOR DE VALUE
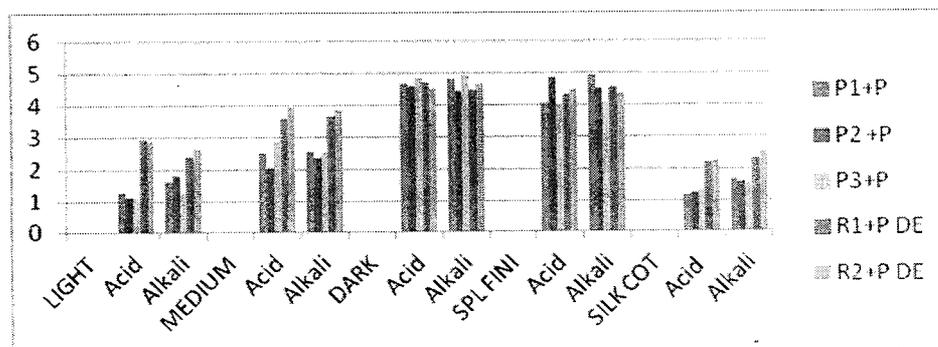
FOR K/S VALUE
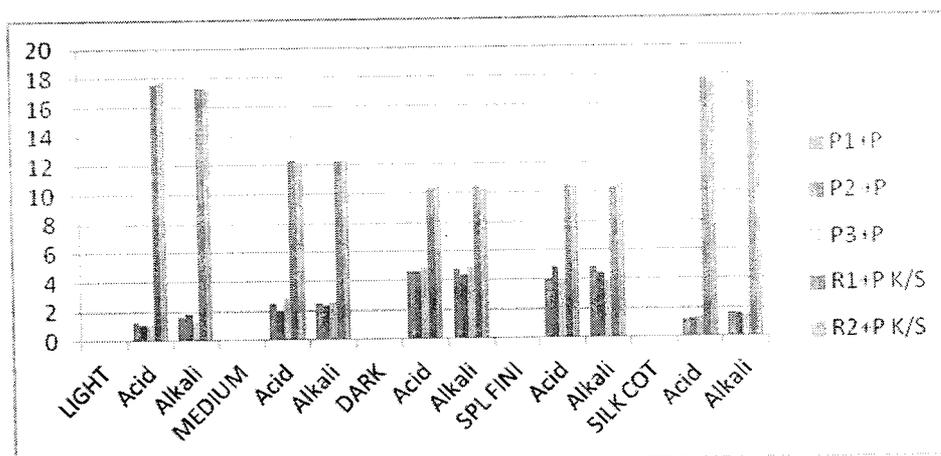
This graph shows the delta values of all perfume and reference solution along with perspiration solution. As seen other results, colour change is more in medium and dark colour.Commercial perfumes along with perspiration solution and reference solution results shows same or slightly higher values in all the cases similar to individual values.

It is also noticed that two test solutions behavior is similar and found that in all cases it causes slightly high values but all have positive correlation. The value of DE is indirectly proportional to the value of K/S.

5. CONCLUSION

The color fastness is good in light coloured silk fabric and in silk cotton.The color fastness is moderate in medium, dark and in specially finished silk fabric.When treating the fabric with perfumes + perspiration the color fastness is good when comparing with reference solutions +perspiration.Each perfume has different characteristics and .it will vary based upon the fabric characteristics. when treating the reference solution 1 and 2 we get positive correlation value in light colour and in silk cotton.

6.FUTURE WORK

In future it can be done with different alcohol proportion. Influence of essential oils alone can be taken and studied.

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