

DEFINATION OF TEXTILE AUXILIARIES

OBJECTIVE :- To given knowledge about various auxiliaries and chemicals used in different sections of process house (bleaching, dyeing, printing, and finishing), their natural, structure and use. All these are essential in order to perform the job responsibilities by diploma holder.

1. INTRODUCTION :-

In textile operation such as scouring bleaching dyeing printing and finishing acids alkalis reducing and oxidizing agents dye stuff and other chemicals are used, besides these some other substances are also used to increase the efficiency of above process, these substances are called textile auxiliaries , certain textile auxiliaries produce special finishing effects such as wash n wear . water repellency, fire retardancy its.

Selection of auxiliaries – the selection of auxiliaries depends on following factors

- (1) Type of fiber
- (2) Desired effects
- (3) compatibility with other ingredients
- (4) availability
- (5) ease of handling
- (6) Bio durability and storage

2. Various auxiliaries used in spinning-

Normal aqueous emulsion of spray oil or silica dispersion is used for cellulosic fiber
Antistatic agent are used for synthetic fiber

For textured yarn two types of Auxiliaries are used

- (1) Producer or spin finish agent
- (2) Coning oil

Producer finish – applied immediately extrusion of fiber lubricant used for this finish has high heat stability and good antistatic protection normal straight chain fatty glycerides and try glycerides are used

Coning oil -These are applied after texturizing during cone winding

The coning oil should have good cohesive and antistatic properties and low viscosity
Also it should be non volatile Normally mineral oil fatty ester bond oil used

Used for auxiliaries in sizing – Warp yarn are size to give strength adhesive or binders starch c m c , p v a various type of gums etc. are used along with adhesive
some other auxiliaries are used

- (1) Lubricant -Lubricant or softeners performs function

- (a) Corrects the hardness imparted by adhesive some other auxiliaries
- (b) Improve elasticity and flexibility of softener with high melting point and low is mainly used
- (c) Mutton or beef tallow is mostly used because stable against storage and atmospheric oxidation vegetable tallow are used to extent
- (2) Hygroscopic agent – increase the moisture yarn glycerin is most popular scopic agent
- (3) Antiseptics- Sized yarn may be attacked so some antiseptic like salicylic acid added

Desizing: -

Size applied should be removed to have efficient scouring and bleaching desizing can be done by using acids alkalis enzymes hypochlorite's and sodium bromic. Mainly enzymes are used. They convert starch into soluble products which are removed in washing some wetting agent are added to desizing bath to accelerate the process "ethylene oxide" is suitable wetting agent. Sodium bromate oxidises starch into alkali soluble product which is removed in scouring. Fabric is treated with solution containing 1g/l available bromic at pH 10-11 in presence of wetting agent for 15-20 mins followed by scouring.

Scouring of cotton:-

Naturally occurring wax is removed from cotton as wax makes fiber non absorbent and difficult to dye. Material is treated with NaOH which saponifies some of its impurities present in the cotton. The efficiency of process is improved by adding surfactants should be stable in hard water and under alkaline condition.

Soap is oldest kier assistant and has power of detergent and emulsification properties 'but not stable in hardness'. Sulphated fatty alcohol such as lissapol D' are more successful.

In case of fabric containing dyed yarn with vat dyes, mild oxidant is added to avoid the problem of bleeding of color.

Scouring of wool:-

Wool contains grease dirt and vegetable matter emulsion scouring is most widely used. Normally soap and soda is used for scouring of wool. Non ionic detergent have high scouring effect and also give soft handle and are easily removed from wool after washing. They are applied at temperature 70-75°C in the presence of natural electrolyte.

Carbonizing of wool:-

Foreign vegetable matter is removed by scouring. Cellulosic impurities are removed in carbonizing. After scouring, wool is treated with dil. H₂SO₄ and wetting and penetrating auxiliary, dried and baked.

Scouring of Silk:-

Removal of sericin which occurs as natural gum by treating with soap solution called Degumming. Some alkalinity is required which is provided by hydrolysis of soap.

Scouring of Rayon:-

Mill dirt and sizing agents are removed in scouring. The detergent selected should have high efficiency of removing in short time. The detergent should be stable at high temp. and should be easily washable. Mainly non-ionic and anionic detergents are used.

Scouring of Synthetic Fibres:-

As synthetic fibres have less impurities so simple and mild detergent action is sufficient. Scouring is done with hot solution of Na_2CO_3 in presence of non-ionic or anionic detergent.

Mercerization:-

Cotton is mercerized to improve its strength, lusture and dye absorption by treating it with 52-54'Tw NaOH solution, stretched and washed. Wetting of cotton by NaOH should be uniform.

The auxiliaries used for quick wetting

1. Should be stable in concentrated alkali.
2. Should have good wetting power.

Should be removed by simple washing.

Bleaching:-

It remove natural colour matter and give extra whiteness. Normally hypochlorite H_2O_2 and NaOCl_2 are a used for bleaching.

In case of hypochlorite material is highly absorbent and wetting of material is no problem so no auxiliary is required.

In case of H_2O_2 when scouring and bleaching are done in single stage, auxiliary is required for quick wetting and penetration normally sulphated for alchols are used

In case of NACLO_2 used for bleaching of synthetic fiber anionic fatty alcohol are used as auxiliary to increase wetting and penetration. This auxiliary is stable to chlorite and under hot acidic conditions.

Sequestering agent in scouring and bleaching:-

The S.A. removes underwater ionic contaminants (metallic impurities) which waste processing chemicals. In scouring Calgon is used as S.A.

In peroxide bleaching E.D.T.A. is acid main sequestering to avoid catalytic decomposition of H_2O_2 .

Stains and their removal:-

Various types of stains occur time to time in bleaching cloth. Removed of stains is called 'spotting'.

In case of cotton spotting is done before dyeing for full bleaching before finishing.

In case of p/c bland stains are removed before heat setting.

Normally stains are removed by using spotting agent based on trichloroethylene following washing with hot water.

For p/c bland stains removed with following chemical

Tri chloro ethylene

Butyl acetate

]Nonionic wetting

Acetic acid

Acetic acid

Dyeing:-

Dyeing is an important textile operation various types of auxiliaries used in various dyes on as following.

1. Wetting and penetrating agents.
2. Dispersing.
3. Levelling agent.
4. Sequestering.
5. Antifoaming agent.
6. Accelerators
7. Migration inhibitors.
8. Dye fixing agent.
9. After washing agent.
10. Stripping.

W.A. &P.A.:-

In preparation of solution of naphthols and Vat Dyes wetting agent such as sulphated oil is used for pasting the dyestuff.

Penetrating are added to ensure through and uniform wetting with dye solution.

In dyeing of polyester, P/C blends with Disperse Dye, Anionic as well as non-ionic wetting agents polyethylene glycol are used.

Dispersing agents:-

These are mainly used in application of Vat Dye by vat acid process and pigment padding method. "Sulphated fatty esters are generally used.

Dispersing agent are also used in Disperse dyes in order to ensure application of these Dyes from aqueous liquor. Anionic agents such as lingo sulphonates are generally used on Dispersing agent.

Leveling agent:- These are added to regulate the process of dyes and to get uniform result.

- a) **For direct Dye:-** Nonionic surfactants are added to dye bath. They promote leveling by breaking the dye.

- b) **For Vat Dye:-** Due to high affinity of leuco Vat Dye, it is difficult to get leveled dye. This problem can be overcome by –
- 1) By increasing the leveling properties of Vat dye by adding solvent to dye bath.
 - 2) By reducing affinity using L.A.

The most widely used L.A. for Vat dyes are cationic active surfactants and non-ionic ethylene oxide condensates.

L.A.in Nylon with Acid Dye:- Acid Dye are used for Nylon but in compound shade there is some problem.

- a) **Use of Anionic agents:-** Amino terminal group are used to control the rate of dyeing.
- b) **Use of Cationic Agents:-** fiber become (+ive) charge and attract the (-ive) dye anion. So a limited amount of dye ions is available to fiber and rate of dyeing is controlled.
- c) **Use of Nonionic Agents:-** Non-ionic agents have no effecting for dye. So it slow down the rate and degree of dye absorption by fiber.

Leveling Agents in Dyeing of Acrylic fibers with Cationic Dyes:-

Acrylic fibers pick up dye very rapidly above 80°C which may cause uneven dyeing. To get level dyeing on the acrylic fiber rate of dyeing reduces.

- a) **Use of cationic Retarding Agents:-** Cationic retardant complete with cationic dye for absorption occupy dye site and reduce the rate of dyeing. At boil retarders are replaced by dye.
- b) **Anionic retarders:-** they form complex with cationic dye and hence reduce the rate of dye. At boil the complex break down and free Dye cation are released and diffused in fiber.
- c) **Polymeric Retarder:-** these are more strongly absorbed because they have multiple charges. They are removed by treating the dyed material with anionic agent followed by washing.

Leveling agents for Disperse Dye:- Selected non-ionic surface active agents are used as leveling agents in dyeing Polyester with Disperse Dye. In exhaust method they increase migration, leveling and fiber penetration. Also rate of Dyeing is increased.

Sequestering Agents :- Presence of metals as salt of iron, copper, Zinc, Manganese etc. in Dye bath adversely affects the tone and brightness of colour. Sequestering agent can avoid these problems.

The most effective sequestering agent used in Dyeing is Ethylene Di amine Tetra Acetic Acid (E.D.T.A.).

Anti-Foaming Agents :- Foaming of dye bath is one of the major problem. Foaming is produced due to continuous motion of dye bath in presence of surfactants. Foaming causes uneven

treatment and loss of dye solution. Earlier benzene, Pyridine and Turpentine were used as antifoaming agent Di Methyl Poly Siloxane is most widely used antifoaming agent.

Carrier and Accelators:- Carriers are organic compound added to disperse dye bath to increase the rate of dyeing of polyester. In presence of carrier polyester can be dyed at 100°C

An ideal carrier should be non-toxic, available at low price, free from unpleasant odor and easily removable.

Mechanism of carrier action:-

- i. Carrier causes swelling of fiber and allows different of Dye rapidly.
- ii. Dye form loose complex with carrier which is readily absorbed.
- iii. Carrier increases the solubility of dye.

Carrier in common use

- a) D- phenyl phenol
- b) P- Phenyl Phenol
- c) Mono Methyl Naphthalene
- d) Halogenated Benzene

Migration Inhibitors:- In continuous dyeing methods fabric dried after padding and before developing. Water is evaporated from fabric surface after drying and also migration of dye particles occurs. This problem of “migration inhibitors.”

In Vat dyes migration inhibitors such as Common salt, Glauber salt, Sodium bi sulphate and various thickeners such as gum tragacanth are added to padding

In case of Reactive Dye, common or Glauber salt is added.

Dye Fixing Agents:- To increase washing and soaping fastness of Direct Dye, Cationic surface active agents such as Sandofix, Lyofix DF are used. These are called Dye fixing agents. They form complex with dye which is less soluble than Dye ion hence washing fastness is improved.

In case of Reactive Dye, an appreciable amount of dye is hydrolysed. After treatment with cationic such as “Fixanol PN” is suggested to remove this hydrolysed Dye.

- I. **After Washing Agent:-** After Dyeing, most of the dyes are given treatment with soap and process is called soaping.

Along with soap a no. of anionic and non- ionic surfactant are available for this purpose.

In Vat Dye soaping helps in developing true shades.

In Azoic dyes soaping improves rubbing unfinished hydrolysed dye.

Stripping Agents:- Sometimes Dye from dyed material is removed to correct the faulty shade and process is called stripping.

In case of Direct Dye, Sodium Chlorite is used as stripping agent.

Stripping of Vat dye is difficult. An effective stripping agent must remove leuco

compound. Polyethylene oxide in presence of caustic soda and hydrosulphite are useful.

Acid dyes are stripped by treatment with acidified sodium sulphoxylate formaldehyde.

1. Process must be effectively removing the dye.
2. Cost of process should be low.
3. Fiber should be redyed.

Brief studies of Various Ingredients used in printing

The essential ingredients of printing paste are as follow...

1. Dyestuffs, Pigments
2. Thickener
3. Wetting agents
4. Dispersing agents, solvents
5. Antifoaming agents or Defoaming agents
6. Hygroscopic agents
7. Oxidising and Reducing agents
8. Carriers and Catalysts
9. Binders
10. After washing agents
11. Miscellaneous agents

All these ingredients are not used simultaneously in any paste. Depending upon the class of dyestuffs and style of Printing suitable ingredients are selected.

- a) Dyestuff, Pigments:-** These are used to give colour. These are selected as per requirement (Depending on Fiber). Different type of dyes is used for different fibers.
- b) Thickeners:-** Main function of thickeners is
- a) To act as vehicle to carry dye on the fabric
 - b) To prevent spreading of colour beyond limit of defined portion.

Choice of thickener depends on the class of dye and style of printing. Also thickeners should be compatible with other ingredients.

Carbohydrates are mostly used variety of thickening agents Wheat starch, Maize starch are also used.

Various thickeners use as follows

- i. **Gums:-** Gum Tragacanth, Gum Arabic, Tragasol gum, Gum koraya
- ii. **Modified Starches:-** Dextrin or British gum
- iii. **Cellulose Derivatives:-** Methyl cellulose, Sodium corboxy methyl Cellulose.
- iv. **Sodium Alginate**
- v. **Emulsion Thickener**
- vi. **Thickener for Reactive Dye:-** Sodium Alginate in combination with emulsion thickener is used.

All the thickeners have their own advantages and disadvantages.

c) **Wetting agents:-** These agents are used for pasting the dyestuff. These agents reduce the surface tension of water, thereby allowing water to wet the surface easily. They are also known as surface active agents. When dye powder is pasted with water and if surface tension of water is high then lump formation takes place.

Wetting agent reduced the surface tension of water

Turkey Red Oil (T.R.O.) is the most commonly used wetting agents are added to ensure through and uniform wetting with dye solution.

d) **Dispersing Agents or Solvents:-** The concentration of dyestuff in the printing paste is high. Solvents or Dispersing agents are used to prevent aggregation Diethylene glycol thio di glycol. sodium benzyl, Sulphonilate as well as anionic surfactants are generally used as dispersing agents.

Solvent/ Dispersing agents produce better penetrated prints and increased colour yields.

e) **Antifoaming or Defoaming Agents:-** Many dyestuff paste produce considerable amount of foam during printing because of presence of wetting agent and continuous agitation. Prints produce are faulty and lighting shade. This foam formation can be reduced by adding antifoaming agents to printing paste.

Pyridine, Turpentine and some silicone compounds are used as antifoaming agents.

Hygroscopic agents:- The function of these agents in the Printing paste is to take up sufficient amount of wet during steaming to give mobility to dye molecule. **Glycerine, Diethylene Glycol and Urea are generally used as hygroscopic agents.**

Oxidising and Reducing Agents:- These are required for Printing certain classes of dyes and also in discharge and resist printing.

The most commonly used Oxidising agent are chlorites of sodium and potassium, Nitrates and Nitrites and Potassium Ferrocyanide.

The reducing agents are used Sodium hydrosulphite Sodium sulfoxylate formaldehyde, sodium bisulphit glucose, Ferrous Sulphate etc.

Oxidising agents are used in development of final colour in Printing solublised Vat Dye or Aniline Black agents are used for Vatting in case of Vat Dye.

Catalysts and Oxygen Carriers:- A no. of catalysts are used in printing paste when oxidation is involved in steaming. Oxidising agents may be attack fiber substance at elevated temp. In order to reduce this risk, catalyst may be used in place of Oxidising agent. Potassium Ferrocyanide, copper sulphide are used as catalyst or oxygen carrier.

a) **Acid and alkalis:-** If acidic conditions are required during steaming, an acid liberating agent is added to printing paste. This acid is needed for development of dye. In some case weak organic acids like citric acid lactic acid etc. are used.

Sodium Hydroxide and potassium hydroxyl are strong alkali used in printing paste.

b) **Carrier and swelling agents:-** Certain Hydrocarbon phenol etc. Accelerate the rate of Dyeing of Polyester fiber with dispersing agent about 100°C. these are called "Carrier". Their function is swell the fiber so that dye molecular can diffuse in them easily. In presence of carrier it is possible obtain deep shades on Polyester at 100°C.

An ideal carrier should be

1. Non Toxic
2. Easily removable after dyeing.
3. Free from unpleasant colour.
4. Compatible with all Disperse dye.

Advantages:- Dyeing is carried out in short period penetration is better, Improvement in leveling.

Disadvantages:- cost is high.

Certain carriers adversely affect light fastness.

Binders:- Binders are used in pigment printing. Binders a film at printed portion. The Binder film should colorless, clear, smooth and elastic. It should be easily removable from printing roller, screen etc.

Aluminum, casein, Glue etc. are used as binder but later on callouses acetate and cell-OH Nitrate were used recently synthetic binders like Vinyl Resins, acrylic resins, melamine formaldehyde etc. have been developed. They give print of good fastness properties.

After washing Agents:- After washing soaping of printing goods is an important operation It removes the thickener from printed goods and helps in developing true shades and also improves fastness properties along with soap a no. of anionic and nonionic surfactant are used.

Miscellaneous Printing Auxiliaries

1. **Mordent:-** Use in Printing of Basic dye on cotton. They have affinity for both fiber and Dyestuff
Tannic Acid along with tartar-emetic are employed as mordent.
2. **Leucot rope:-** It is used in discharged printing of Vat Dye. It forms a complex with leuco Vat dye. Which is not oxidised to parent Vat dye which is not oxidized to parent Vat dye and is easily removed from printed portion to get discharge prints.
3. **Mild oxidants:-** Resist salt is used as mild oxidant. In vat discharge on direct colour, it prevents the adverse effect of reducing agent on unprinted portion during steaming.

Finishing Chemicals

Fabric are finished to improve attractiveness or to import certain desirable properties. The important auxiliaries used in finishing are...

- a) **Stiffing Agent:-** they are applied on fabric to build up apparent weight, import thickness and to improve lusture. Effect is temporary and after washing stiffing is removed. Large no. of stiffing are used.
- a) **Starches:-** Potato, wheat and corn starches are applied in presence of softener and fillers like chino clay $MgSO_4$, $BaSO_4$ etc.

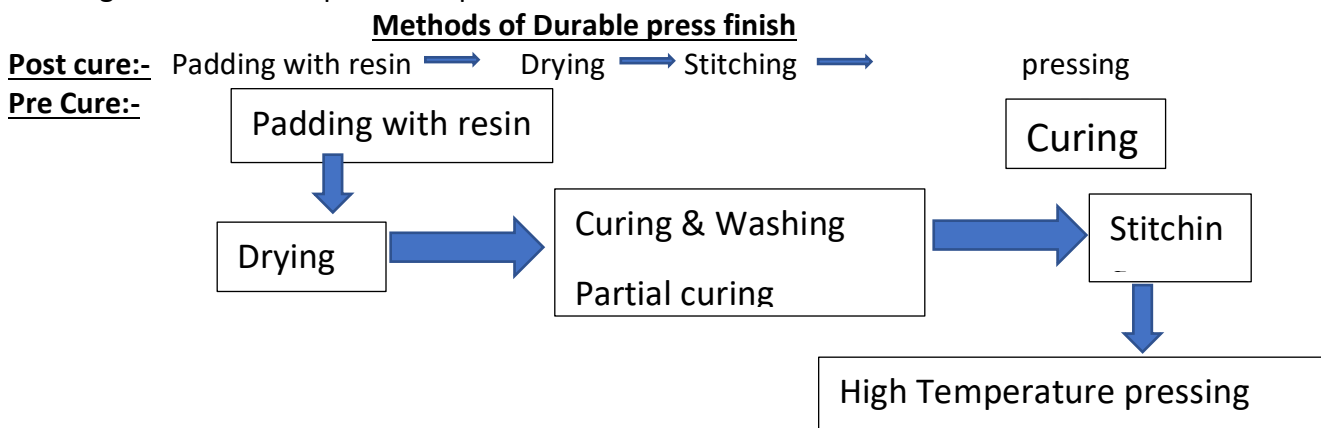
b) Modified Starch:- they are used for dyed and printed goods. They impart weight without dulling the shade.

c) Natural Gum:- Normally used in printing, sometimes in finishing.

d) Modified Cellulose:- Carboxy Methyl Cellulose is used as stiffener in certain finishes.

b) Crosslinking Agents:- The main object of resin is to overcome the problem of wrinkling of cotton. For wash-n-wear finish. Fabric is padded with cross linking chemical, catalyst and other additives followed by curing, washing and Drying. Wash-n-wear finish is given to saris, Dhotis where pressed increases are not required.

But for trousers, shirts pressed increase are required, so durable press finish is given. Durable press means shaping a garment and then treating in such a way that after washing it will return to preset shape.



Various Cross Linking Agents

a) Nitrogenous gps:-

- I. Urea formaldehyde derivatives
- II. Melamine
- III. Methylol derivatives
- IV. Trizoner
- V. Carbonates

b) Non Nitrogenous cross Linking Agents:-

- I. Formaldehydes
- II. Acetates
- III. Epoxides
- IV. Sulphones

Optical Brightening Agents:- All type of textile fibers do not appear perfectly white but have yellow tinge be cause of presence of certain coloured impurities.

These are three methods to remove yellow

- I. By using bleaching agents

- II. Use of bluing agent on bleached fabric
- III. Use of optical brightener or fluorescent brightener

O.B.A. absorb U.V. light and emit it is visible light. The imp. Trade product is Tinopal, Uvitex.

O.B.A. can be applied to fabric either by exhaustion method or by padding method. In padding method concentration of O.B.A. is more.

O.B.A. used for cotton can be used for Nylon

3. Softeners:-

Natural fiber contain oil, Wax or Fat which give it soft feel but during scouring and Bleaching these waxy substance are removed and material become harsh. Also certain stiffing agents used in finishing impart unpleasant feel. So some softening agents are applied to impart softness, smoothness and flexibility. Mainly five types of softener are used.

Anionic softeners:- They include sulphonated oil fatty alcohol sulphate, hydrocarbon sulphonates. Their washing fastness is poor not compatible with resin. they are mainly used in starch based temporary finish.

Nonionic softener:- In this group stearic acid or fatty amide type products are also used. They are compatible with catalyst and do not affect the shades of dyestuffs but they are not fast to washing

Cationic softener:- They impart full and silk like hand to fabric and treated material remains soft for a few washes. They are also stable in resin finishing bath but in case of white fabric, there is problem of yellowing.

Reactive softener:- They chemically react with cell-OH and give durable soft finish. Velan PF is oldest reactive softener which is ammonium salt containing pyridine base and applied to fabric in a solution buffered with sodium acetate. The fabric is then dried and baked at 120°-150°c for a few minutes. During baking softener reacts with cell-OH

Drawback is high cost, toxicity and yellowing. Fatty acid substituted melamine or thiazine's are useful reactive softener.

Emulsion softener:- they have high ability to reduce the losses in tear strength on resin finishes. Polyethylene emulsion, polyester emulsion etc. are mainly used. Emulsion softener give excellent full hand with adequate fastness to washing.

Silicone softener:- now a days silicone emulsion are also used as softener.

3.1 Method of process of silicones:-

a) Direct process:- stream of alkyl or aryl halide vapor is passed through a heated bed of silicon containing copper catalyst. A mixture of chlorosilanes is obtained which is hydrolysed and produced polymerization silicones.

Water repellent:- these agents make fiber impermeable to air but not very suitable for clothing.

An ideal water repellent should be inexpensive, fast to wash, easily applicable to fiber and compatible with other chemicals.

The important water repellents are

- I. **Aluminum compound:-** aluminum acetate (prepared from aluminum sulphate and lead acetate) is used. Fabric is padded and batched and process is repeated till sufficient deposit of aluminum acetate is obtained and then dried. Method is laborious.
- II. **Wax dispersion:-** these are anionic alkaline dispersions used for Nylon, Polyester and Acetate. But give no result on cotton.

Fabric is padded with a solution of wax dispersion, melamine formaldehyde, Ammonia and ammonium sulphate dried and cured. Finished is fast to washing.

- III. **Wax Dispersion Containing Ammonium Salt:-** Aqueous dispersion of paraffin wax containing aluminum salt is used for cellulosic and protein fibers. Fabric is padded with dispersion dried at (110-120)°C PH of solution is (3.5-5.5).
- IV. **Wax Dispersion contain zirconium salt:-** they are used for wool. They give pleasant feel and good water repellency. They are applied with used formaldehyde. Method used is pad – dry – cure.

Pyridinium type repellent:- Velan PF, Zelon etc. comes under this class. They give good water repellent finish, which is fast to washing & feel of fabric is also soft.

Waxy Thermosetting Repellents:- They are applied pad- dry – cure method. The well-known product is “phobotex”. It is fatty acid substitute triazine.

Silicones:- These chemicals differ from other repellents. Water repellency is provided by methyl groups, oriented and attached to fiber surface by silicon links. Fabric is padded, dried and cured at (150-160)°C for (2-3) min. Silicones give good water repellency which is fast to washing, dry cleaning. Handle of fabric is soft and smooth. They are useful for cotton, Rayon and Nylon.

Fluoro chemicals:- They provide resistance not only to water but also to Oil. The drawback is that once soil enters the finished fabric it is difficult to remove it. The finish is fast to washing and dry cleaning.

A Fluorochemical is an organic compound in which high proportion of hydrogen attached to carbon has been replaced by fluorine. Fluorochemicals are generally supplied as emulsion & are applied by Pad – Dry – Cure.

Fire Retarding Agents:- The object of fire retardant of agents is a modify the course of decomposition in such a way to produce a low % age of volatile and increase the amount of chore. An ideal flame retardant should clearly cause the dehydration of cell-OH on heating producing carbon and water. To protect the material from easy firing.

Fire retardant agent should be.....

- a) Durable in laundering
- b) Non Toxic
- c) Should not produce Strength loss
- d) Should not change the shade of Dye
- e) Cheap
- f) Compatible with other chemicals.

Non-Durable Fire Retardant:- These are soluble in water so not fast to washing. A mixture of Borax and Boric Acid give satisfactory result.

Ammonium sulphate when applied with ammonium phosphate gives flame retardant fabric with soft feel. But finish is not fast to washing.

Durable fire Retardant:-

- 1) **Insoluble compound:-** application of water insoluble compound by double decomposition gives durable fire retardant effect. It is prepared by double decomposition of Tertramatic and stannic Oxychloride.
In other process fabric is padded with a solution of sodium stannate, dried, again padded with ammonium sulphate solution is dried. Stannic oxide is precipitate and sodium sulphate formed is removing by washing

T.H.P.C. (Tetra hydroxymethyl phosphonium Chloride)

It is a crystalline compound prepared by reacting Phosphate with HCHO and HCl. It also imports durable flame retardancy.

F\R for wool:- Pyrocet CP + Phosphoric acid

Method:- Pad – Dry – Cure.

F\R for Polyester:- Halogen compound, phosphorous compound

Method:- Pad – Dry – Thermo fixation

F\R for P/C Blends:- THPC – Urea

P.V.C. – poly vinyl Chloride

Di sodium Hydrogen phosphate

Pad – Dry – cure

F/R for Nylon: - THPC

T.M.M. (tri methyl melamine)

UREA

Surfactant

Pad – Dry – cure

Antistatic agents:- Fiber yarn and fabric are subjected to friction by rubbing against each other or against other surface due to which static electricity is generated.

Antistatic agents either reduce the generation of electrical charges or increase surface conductance during spinning and weaving, nondurable agent are used. These are hygroscopic surface active material help in maintaining a layer of moisture on the surface of fiber there by reduce the static electricity

Disadvantage:- They impart sticky hand and increase soil pick up.

Permanent Antistatic finish:-

- I. Resin per condensate made by reaction of melamine with formaldehyde and polyethylene oxide is applied.
- II. In presence of ammonium nitrate by Pad – Dry – Cure method products based on ammonium or sodium salt of a copolymer of maleic acid and styrene are recommended as antistatic agents.
- III. For acrylic fiber polyethylene glycol acrylate is suggested.

Soil Release Agents:- Removal of accumulated soil from textile garment is an old problem and various term are used.

- I. **Soil Release:-** It comes in action during washing when soil from fabric transfer to washing liquor.
- II. **Soil Repellency:-** It is property imparted during finishing which enables the fabric to repel soil during use.
- III. **Prevention of soil Redispotion:-** Detergents prevent redispotion of soil from washing liquor.

3.3 Factor affecting Soil:-

- I. **Electrostatic Charges:-** Synthetic fiber attract more soil particles.
- II. **Size of Particle:-** Finer size particles will be attracted more.
- III. If fiber surface is smooth less will be soiling.
- IV. If moisture Regain is less more will be soiling.

4. Various methods

- I. **Mercerization:-** Fiber becomes smooth and resistance soiling is improved.
- II. Use of titanium oxide (TiO_2), BaSO_4 and all phosphate is recommended to impart soil repellency.
- III. Use of film forming material like starch, C.M.C. etc. block the soil particles from penetrating deeper in to fabric
- IV. Acrylic polymers like Avid Acetates give soil release as well as antistatic finish.

V. Ethoxylate Alkyl Phenols are soil release agents for Cotton, Rayon, Polyamide, Polyester and Acrylic fibers.

VI. **Fluoro chemicals:-** Impart both oil and water repellency Fluoro chemicals are prepared by two components A&B, A is fluorinated Urethane and B is partially hydrolysed Poly vinyl acetate. They are applied to polyester/cotton blend.

Method is Pad – Dry – Cure – wash – Dry.

The finished fabric is resistant to oil during wear quick soil release in washing and little soil redistribution.

Hydrophilic Finish:- Fabric is made hydrophilic which facilitates soil release and prevent soil redistribution durable hydrophilic finish can be obtained by applying a copolymer of terephthalic acid and ethylene glycol by pad-dry-cure method. This finish is applicable to synthetic fiber.

Antistatic agents:- Soil deposition can be reduced by reduced static charges by using antistatic agents.

Anti-pilling agents:- pills are bundles of entangled fibers formed on the surface during wear which affect the appearance this problem is more in synthetic fibers.

Pilling can be reduced by addition of organic compound of antimony, titanium to reaction mixture.

Another way is by selecting proper yarn twist and fabric construction.

Singeing also reduces pilling

Treatment of PET with steam, ammonia reduced pilling Di ethylene glycol when applied by pad-dry-cure method reduces pilling of PET

Treatment of PET with chlorine reduces

Moth and mildew proofing:- wool and other keratin fibers are attacked by moth

Permanent moth proofing is obtained by impregnating fiber with non volatile substances

A large no of inorganic salts are used as moth proofing agents.

Compounds containing fluorine like zinc fluoride, sodium fluoride etc. are useful

Several organic substances with a triphenyl methane structure are also suggested for moth proofing. Another way is to modify keratin structure of wool by chemical means, Di Sulphide linkages.

Mildew and rot proofing:- textile fibers such as cotton, rayon, linen, jute, hemp etc. are attacked by microorganism a solution of plain CuSO_4 is effective.

Treatment with cuprammonium solution is for water proofing and mildew proofing. Phenol formaldehyde, chlorophenols, salicylonilide etc. are also recommended

For cellulosic fiber partial acetylation and partial cyanoethylation is useful for rot and partial treatment with methylol melamine imports crease resistant as well as resistance to microbiological attack.

In mildew, This finish is very important for textile material. Because microorganism utilize them as therefore and destroy them. Antiseptic substance prevent to growth of mildew. Phenols, cresols, pheny phenol and salt of zinc copper or mainly used, salicylanilide is one of the most suitable antiseptic for cotton goods fabric is padded with 0.5% antiseptic solution and then dried and cured.

Moth Proofing:- Moth proofing is given to prevent the growth of moth, mainly carried out of wool fabric material is padded with 20% solution of soluble solvents such as Dichlorobenzene or substances containing fluorine, dried and carried.

Rot Proofing:- it is protection from Biological decay of textile exposed to moisture. This finish is given to cellulosic fibers as they are attacked by bacteria compounds of Antimony, Bismuth Cadmium, cobalt, copper are used these are applied to fiber by padding method using a Binder or emulsifier with water followed by drying Copper Naphtholates are particularly more efficient when compared with other copper compound.

Soil Release Finish:- Accumulation of soil and dust practical is known as soiling. Fabric can not be made totally soil repellent or soil Resistant but a type of finish is given so that during washing the accumulated soil can easily be removed.

Methods:-

1. Mercerization of cotton fabric.
2. Using P.V.A., Starch etc.
3. Making fiber Hydrophilic
4. Using metal oxides like silica, TiO₂.
5. Using Silicon Emulsion.
6. Using soluble solvent such as Dichloro Benzene, Sulphomethylomide and Dichloro Diphenyl tri chloro ethane.
7. Also it is suggested that structure of Keratin of wool can be changed by chemical modification Disulphide linkages can be changed.

Softening Agents:- Softeners are one of important finishing agents which gives softness to fabric. It give not only softness but also handle, Drape to material

Softeners are mainly of four types

1. **Cationic softener**
2. **Anionic Softener:-** Oil, fat, Soap, Sulphonated etc.
3. **Nonionic Softener:-** Fatty Acid, Ethylene oxide.
4. **Reactive Softener:-** Made from pyridinium chloride.

Water Proofing:- water proofing is preventing to resentence of both air and water through the fabric. It is used for rain coat, Tarpaulin, Umbrella Cloths. The only disadvantages of this finish are that it makes the wear feel uneasy and uncomfortable.

Principle:- A film on the surface with coating of suitable substances is formed for prevention the passage of air and water

Treatment should be given in such a manner that fabric should not become stiff and properties like feel, strength, fastness should not be adversely affected.

Method of Water Proofing:-

1. By depositing hydrophobic substance on fabric.
2. By making fabric hydrophobic it self

Various chemicals used for water proofing

1. Oxidized oils of varnishes
2. Cellulose Acetate
3. Cuprammonium Hydroxide solution
4. Poly vinylidene chloride
5. Poly vinyl Chloro acetate

Process:-

Simplest method is to coat fabric with rubber but fabric become harsh.

Coating with natural oil produces no brittleness but finish is temporary.

Coating with synthetic resin like poly vinyl chloro, cellulose Acetate also give water proofing Fabric is first padded with solution containing 1-3 kg wax emulsion in 50 liter water and then impregnate in a solution containing Aluminum Acetate, Squeeze and dry at (110-120)°C.

Durable Water Repellent Finish:- Stearoxy Methyl Pyridium Chloride is popularly used for durable finish. Methylated Methylol melamine can also be used along with some catalyst. They chemically react with fibers and produce durable water Repellent finish process is Pad – Dry – Cure.

Water Repellent Finish:- If fabric is allows air but prevents the passage of water through it then it is Known as water repellent finish.

Requirements:- They fabric should not become stiff and harsh.

Also finish should not affected the fastness properties of dyed goods feel, strength etc.

Method:-

1. Fabric is padded with metal slt like Aluminum acetate and then passed through soap solution.
2. Fabric is padded with a solution containing silicon resin emulsifier and metallic salt and then dried at 120°C.
3. Fabric is padded with wax emulsion and 3-4 times water at a temperature of (40-50)° and then dried.

Velon PF Process:- It imports water repellent and soft attractive finish.

It is fast to washing, boiling soap solution dry cleaning etc.

Fabric is padded with 6% velon PF (compound of quaternary ammonic salt with pyridine base)+3% sodium acetate at 35°C



Drying at 60-70°C



Curing at 120°C for 2-3min



Treatment with soap and soda at 35°C for 1-2min

Fire Retardant Finish :- To protect the fiber from easy firing is known as fire retardant finish. It is a chemical fire cotton and eliminated rays catch fire and causes fire hazards and fire accidents.

In defence the fabric for tents, ropes, parachutes are made flame proof.

Requirement:- The fastness properties and handle of fabric should not be adversely affected.

Also finish should be fast to light, washing and laundering.

Process:- Mechanism of flame proofing is reducing the oxygen content of fiber or increase the moisture content of fiber.

Flame proofing can be done by

Participating insoluble metallic compound by depositing soluble metallic salt.

Method For Cotton:- 1. By depositing insoluble metallic compound permanent fire proofing is obtained mainly antimony oxychloride is best suited.

2. Soluble compounds such as boric acid, sodium phosphate are used normally a mixture of boric acid and sodium phosphate is most effective.

Fabric is padded with a solution containing boric acid and sodium phosphate and then dried and cured.

Moth Proofing:- Moth proofing is a finishing which is given to growth of moth.

It is chemical finish.

Purpose:- It is mainly carried out on wool fabric as the keratin molecules are consumed by moth as food.

Woolen and worsted molecules are attacked by moth and quickly eaten away.

Requirement :- Finish should not affect strength, drape, handle, fastness properties of the fabric.

The finish should be fast to light washing and laundering.

Process:- moth proofing can be done in the following way.

1. By exposing the material to sunlight.
2. Using naphthalene balls and pure dichlorobenzene.
3. Using some substance containing flouring such as sodium flouring, Aluminium fluoride.

Surfactants or surface active agents:- Surface active agents are important group of textile auxiliaries which are used in almost every textile processing operation. A good surface active agent reduces the surface tension of water. Surfactant is the most important component in the bath. Surfactants are the heart of a detergent system. They have some other properties and use e.g. wetting agent, emulsifying agent, softening agent etc.

Essential Requirement of a Surfactant:- A surfactant must possess following properties.

- a. Ability to lower the surface tension of water.
- b. Sufficient solubility.
- c. Ability to form micelles.
- d. Adequate hydrophilic-lipophilic balance.

Classification of surface active agent:- a. Anionic, b. Cationic, c. Nonionic, d. Amphoteric.

- a. **Anionic surfactants:-** Their polar group is very charged in aqueous solution. They are divided into following groups.
 - i. **Carboxylic acid:-** They are mixture of triglyceride of varying composition. They are used for manufacturing. Soap which is best detergent under favorable condition. It is used for kier boiling and as after washing agent in dyeing and printing.
 - ii. **Sulphonated oil and fats:-** Olive oil after treating with sulphuric acid produced a useful wetting agent and dyeing assistance T.R.D. (Turkey Red Oil) is trade name.
 - iii. **Alkyl Sulphates:-** These are synthetic surfactants trade name are lissopols, gardinols etc. they are normally used as textile detergents.
- b. **Cationic Surface Active Agent:-** They bear a positive charge when dissolved in aqueous solution. Cationic surfactants are widely used as emulsifiers, wetting agents, dye fixing agents, textile lubricant textile softness, foam stabilizer and corrosion inhibitors. They are effective at much lower concentration. The cationic surfactants are further divided into two groups.
 1. Basic nitrogen joined directly to hydrophobic group.
 2. Hydrophobic group joined to cationic group through an intermediate linkage.
 3. Basic hydrophilic groups on heterocyclic ring.
- c. **Non ionic surfactants:-** Non ionic surface active agent have various properties like stability over wide range of pH, stability hard and soft water, they also show excellent compatibility

with dyes, finishing agent and other additives. Also they are foam less and can be removed easily. They are non toxic.

These are used as wetting agents in desizing. They are also popular as scouring and emulsifying agent for wool. They have good detergent properties and can also be used in continuous bleaching of cotton with peroxide.

The nonionic based on ethylene oxide are divided into three groups.

1. Ether Linkage
2. Ester Linkage
3. Amide Linkage

Objective Question

1. Object of scouring.
2. Object of bleaching.
3. Name any two water repellents.
4. Role of carrier.
5. What is desizing.
6. Name any two bleaching agents.
7. What are antiseptics.
8. Name any two softening agents.
9. Objects of stiffening.
10. What are textile auxiliaries.
11. Object of mercerizing.
12. Object of moth proofing.
13. What are surfactants.
14. Name any two dye fixing agents.
15. Role of blinder in printing.
16. Name any two cross linking agents.
17. What are mordants.
 1. What are antiseptics?
 2. Name any two hygroscopic agents.
 3. objects of desizing.
 4. Name any two stiffening agents.
 5. Name any two sequestering agents.
 6. What are stripping agents?
 7. Objects of moth proofing.
 8. Role of carrier in dyeing.
 9. what is the function of blinder in pigment printing?
 10. Role of after washing agent in printing.

11. Name any two cross linking agents.
12. Name any two water repellents.
13. Name any two fire retarding agents.
14. What are mordants?
15. what are anionic agents?
16. What are cationic agents?
16. What are assistants?

Short answer type question

1. Discuss the role of auxiliaries in textile processing.
2. Write note on role of carrier in dyeing.
3. Role of hygroscopic agents in printing.
4. Enlist various auxiliaries used in printing.
5. Write short note on stripping agents.
6. Discuss role of sequesting agents in scouring and bleaching.
7. Enlist various softeners used in finishing.
8. Role of retarding agents in basic dyes.
9. Role of blinder in printing.
10. Define textile auxiliaries. How they help in textile processing.
11. Discuss the role of stripping agents in dyeing.
12. Enlist various auxiliaries used in 'sizing'.
13. What is the role of lubricant in 'sizing'.
14. Discuss about auxiliaries used in 'mercerisation'.
15. Write short note on 'scouring of cotton'.
16. what is the function of softener in finishing?
17. 2. Give the function and method of application of anionic agents.
18. 3. List out various properties which are enhanced after mercerisation.
19. 4. Define textile auxiliaries. How they help in textile processing.
20. 5. Give properties of soap and its principle of detergency.
21. 6. What are stiffening agents. Why they are applied on fabrics?
22. 7. Discuss in brief about scouring of wool.
23. 8. Write short note on sequesting agents used in scouring and bleaching.
24. 9. Enlist various types of agents used as auxiliaries in dyeing.
25. 10. Enlist various auxiliaries used in printing.
26. 11. Discuss in brief about antifoaming agents.
27. 12. Write short note on cationic retarder.
28. 13. Discuss in brief about levelling agents.

29. 14. Write short note on stripping agents.
30. 15. Write short note on optical brightening.

Long answer type question

1. Write short note on water proofing, role of sequesting agents on dyeing.
2. Discuss in detail about 'soil release finish'.
3. Write short note on antifoaming agents used in finishing, Hygroscopic agents in used in printing.
4. Discuss in detail various softeners used in textile industry.
5. What is fire proofing. Give detail of various auxiliaries used for fire proof finish.
6. What are the objects of soil release finish. Give the detail of various auxiliaries used for soil release finish.

7. What are the objects of fire proofing. Give detail of various auxiliaries used for fire proof finish.

8. What are the various auxiliaries used in scouring and bleaching. Discuss their application.

9. Discuss the role of antifoaming agents, carriers and blinders in printing.

10. What are various ingredients of printing paste. Give detail about their purpose