

Selection of Dye

To select the proper dye for a fibre, it is necessary to categorise dyes according to their affinity for vegetable, animal or man-made fibres. In general, the dyes used for cotton and linen may be used for rayon but other fibres require different dyes. When a dye colours the fabric directly with one operation of impregnation without the aid of an affixing agent, the dye is said to be a direct dye for that fibre. Direct dyes are the easiest to produce, the simplest to apply, and have the cheapest initial cost and application process. They however have their own limitations. One of these is the degree of colour fastness.

Basically dyes can be broadly classified as natural dyes and synthetic dyes.

Natural Dyes

Since antiquity, dyes have been obtained from flowers, nuts, berries, and other forms of vegetable and plant life, as well as from mineral and animal sources. They are used in oriental countries to a certain extent for rug dyeing and in many parts of the world for native handicraft. The principal vegetable dyes are fustic, sumac, madder, henna, saffron, log wood and indigo. Animal dyes such as cochineal, lac and tyrian purple are obtained from species of fish and small insects. Minerals provide dye such as prussian blue, chrome yellow etc.

Synthetic Dyes

Synthetic dyes are derived from coal tar. Innumerable dye compounds made from coal tar have now supplanted natural dyes. These synthetic dyes are constantly being improved as to colour and colour fastness.

The synthetic dyes may be categorised into sixteen classes. The classification is based upon the particular type of chemical composition of the dye and/or the method of its application.

Basic Dyes

The first coal tar dye was basic dye. It was developed to give many bright shades for silk and wool. The other fibres like cotton, linen, acetate, nylon, acrylic and polyester can be dyed with the help of a mordant i.e. a dyeing agent on an acrylic fibre. Basic dyes have poor fastness on other fibres.

Acid Dyes

This type of dye is used mostly on wool and silk. They are also being more widely used for dyeing acetate, nylon, acrylics and spandex. Acid dyes are inexpensive and fairly fast to light, but not fast to washing.

Direct Dyes

These dyes are used to dye cellulosic fibres directly without any dyeing agents. Some direct dyes may be used on wool, silk and nylon. The dye colours often have fair fastness to light and poor fastness to washing.

Azoic Dyes

This is also a type of direct dye. It is further classified as naphthol and rapidogen types. They are quite fast to washing and they are used to a very great extent on cotton and rarely on nylon and acetate. A large number of colours are available, but they are mainly used for bright reds, yellows etc

Disperse Dyes

These dyes are used to dye nylon, polyester and acrylic. The disperse dyes as a class are fairly fast, except few colours.

Sulphur Dyes

These dyes are used for cotton and linen. They have good fastness to washing and light because dyeing is done at high temperatures. They are used for black, more than any other dye. They are also used for dull colours like khaki, navy and brown on heavy fabrics.

Vat Dyes

Vat dyes are the fastest dyes for cotton, linen and rayon. They can be applied to wool, nylon, polyester, and acrylics with the help of dyeing agent.

Reactive Dyes

These dyes were at first used for cellulose fibres until recently when newly designed dyes were introduced for wool, silk, nylon and acrylics. The advantages of these dyes are their excellent fastness to light and washing and their brilliant shades. Heat is used for certain dyeing colours.

Pigment Dyes

These dyes have the colours confined to light shades, bright colours and metallic colours such as gold and silver. They are usually applied on cotton cloth, but are also used on fabrics of wool and man-made fibres. They are applied and held to the fabric with resins which are then cured at high temperatures. These dyes have good fastness.

Selection of Dyeing Methods

Textile materials may be dyed at any stage of their development from fibre to fabric and also on certain garments. The names given at different stages of dyeing

are as follows:

- Stock dyeing, in the fibre stage.
- Top dyeing, in the combed wool sliver stage.
- Yarn dyeing, after the fibre has been spun into yarn.
- Piece dyeing, after the yarn has been constructed into fabric.
- Garment dyeing, after certain kinds of apparel are knitted.

Stock Dyeing

Stock dyeing refers to dyeing a staple fibre before it is spun. The fibres in the bale form are dyed as such by forcing the dye liquor. Stock dyeing is most effective and expensive method of dyeing; the colour is well penetrated in the fibres. Woven fibres are often stock dyed than other fibres.

Top dyeing

This is an other method of dyeing fibres. Mostly worsted (wool) fibres are dyed in this way. Top i.e., the combed wool in sliver form is wound on perforated spools and dyed.

Yarn Dyeing

When dyeing is done after the fibre has been spun into yarn, is described as yarn dyeing. There are several methods of yarn dyeing. Yarn dyed fabrics are usually cheaper and rich in colour. The primary reason for dyeing in the yarn form is to create interesting checks, stripes and plaids with different coloured yarns in the weaving process. For example, Chambrays are usually woven with a coloured warp and white filling.

Skein Dyeing (Hank Dyeing)

Yarn is prepared from skein or hank and then dyed. Skein dyeing is the most expensive method of yarn dyeing, but the colour penetration is the best.

Package dyeing

Yarn wound on spools, cones or similar units and then dyed is referred to as package dyed yarn. The packages of yarn are stacked on perforated rods in a rack and then immersed in dye bath and the dye is forced through the rods.

Warp-Beam Dyeing

Yarn is wound onto a perforated warp beam immersed in a tank and dyed under pressure. It is the most economical way of dyeing warp for woven fabric.

Fabric Dyeing

The great bulk of coloured fabric in the market is dyed

in the fabric from. Fabric dyeing gives manufacturers maximum flexibility for their inventories to meet large or small demands for a given colour as fashion requires. Small quantity or lots of fabrics of all fibres are dyed in batches and large quantities are dyed in continuous method. There are different methods used for fabric dyeing.

Jigger Dyeing

In this method, the fabric is held on rollers at full width. This procedure places some tension on the goods, causing flattering and loss of fullness. Jigger dyeing is less costly, but it cannot be done on fabrics where a soft hand is required and it cannot be used for knitted or stretched fabrics which should not be subjected to tension.

Winch Dyeing

Long length of cloth is dyed by passing the fabric in tension free rope form through the dye bath. The rope of cloth moves overall on the reed which immerses it into the dye and then draws the fabric up and forward to the front of the machine. Much of the original softness and fullness of the fabric is retained with this dyeing and it is therefore widely used for woolen and worsted woven goods and knitted fabrics.

Jet Dyeing

Fabrics may be jet-dyed by placing it in a heated tube or column where jets of dye solution are forced through it at pressures of up to 300 pounds per jet. The dye is continuously circulated as the cloth is moved along the tube at speeds of up to 300 yards per minute. This method is very fast.

Beam Dyeing

This method is similar to the warp beam dyeing of yarn. Here fabric is wound on a beam and dyed. Light weight fabrics of relatively open construction, such as tricot can be beam dyed. Beam dyeing does not subject the fabric to stress or tension. It is rapid and economical.

Garment Dyeing

Certain kinds of non tailored apparel, such as hosiery, panty hose, and sweaters can be dyed as completed garments. However, allowance must be made for anticipated shrinkage. A number of garments are loosely packed into large nylon net bags. The bags are then put into a paddle dyer, which is a tub with a motor driven paddle that agitates the dye bath. Garment dyeing is an economical method and it reduces the risk of building an inventory that could be affected by changes in colour fashion.