

### Coloring of fibers

Client Ref:- PMT

---

*We are seeking a method of coloring blends of synthetic fibers (mainly polyester) and cellulose (mainly viscose) fibers, at preferably ambient temperature, non- or mildly toxic, preferably in an impregnation bath mixed with other add-on chemicals, and in a single step. In most cases we want to color white fibers into black.*

#### **Introduction to Technology Request**

The terms dye and pigment, while almost interchangeable in common use, have distinctly different meaning in coloration of textile. A dye is a substance affinity for the textile material. Dyes are soluble in the dyeing medium during or at least in some stage of the dyeing process. A pigment is simply a substance used to impart color and which does not have inherent affinity for the textile material. Both dyes and pigments can be used to color textile materials. Dyes can diffuse into fibers and interact with the polymer structure of the fiber. Pigments are simply bonded to the surface of the fiber, or fabric, by other chemical agents. Pigments can be either organic or inorganic substances. Further, a lot of different dyeing methods exist depending upon fiber types.

We produce a lot of non-woven fabrics by the blend of polyester/viscose fibers. The selection of these fibers ensure sufficient comfort resulting mainly from the use of viscose fibers, as well as suitable mechanical properties such as the tensile strength characteristic of synthetic fibers. However, the presence of both components (polyester/ viscose) in textiles causes some difficulties in the dyeing process.

In spite of their advantages, polyester fibers are difficult to dye. Polyester fibers show a hydrophobic character, and swell to a very small extent at ambient temperatures. Hence, the access of the dyestuff molecules to the fibers inside is very difficult. This fact, together with an absence of active chemical groups in polyester's macromolecules makes it impossible to apply the majority of dyestuffs apart from disperse dyes. The often applied pressure / heat method requires a suitable, intricate technology which causes complicated multiple step processes and increases the energy consumption. A dyeing process for polyester fiber at low temperature has been reported, however, the main disadvantage is the environmental problems that is produced by using toxic carriers.

On the contrary, hydrophilic cellulose fibers may easily undergo swelling at ambient temperatures. Owing to this phenomenon, the dyestuff molecules first adsorbed on the fiber surface may diffuse into the fiber interior. Subsequently, the bonding interactions between the dyestuff and cellulose may be formed.

#### **Background to Client**

Our client is part of a European group manufacturing a range of innovative non-woven fabrics which are further converted by their customers for use in technical applications. The client currently uses various manufacturing techniques, including chemical bonding and spunlace (hydroentanglement) processes. Client is keen to find innovative materials and processes which will allow them to functionalise their non-woven products and extend sales into a wider customer base.