SOME STUDIES ON COLOURATION OF SYNTHETIC FIBRES WITH PARTICULAR REFERENCE TO NYLON 6

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CERTIFICATE

This is to certify that the thesis entitled "Some Studies on Colouration of Synthetic Fibres with Special Reference to Nylon 6" being submitted by Mr. Sachidanand Mishra, to the Indian Institute of Technology Delhi, for the award of the degree of Doctor of Philosophy in the Department of Textile Technology, is a record of bonafide research work carried out by him. Mr. Sachidananda Mishra has worked under our guidance and supervision and has fulfilled the requirements for the submission of the thesis.

The results contained in this thesis have not been submitted, in part or in full, to any other University or Institute for the award of any degree or diploma.

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ABSTRACT

The studies reported in this thesis are in two directions. Firstly it aims at developing simpler techniques for shade prediction and rating a dye mixture. Secondly it explores the possibility of coupling mass colouration and conventional dyeing techniques to produce mixed shades.

A method based on "Response surface methodology' and 'Simplex experimental design' is developed for predicting the shades from the proportions of dyes in a mixture under standard conditions. It has been found that the method is simpler than conventional methods and can be used for industrial colour matching procedures.

A simple technique for rating the suitability of dyes for dyeing mixed shades has been suggested. This involves comparison of the CIELAB colour co-ordinates of two sets of dyed samples - one produced with varying depth of shade and the other produced with varying dyeing time, keeping the ratio of the dyes in the mixture constant.

Nylon 6 filament yarns containing carbon black upto 1.5% were prepared using two different methods, viz. (a) by incorporating carbon black in disperse form during polymerisation and melt spinning, and (b) by blending the chips containing 1.5% carbon black prepared by method (a) with chips without any carbon black (blank) and melt spinning. The

filaments thus produced were examined for their structure and properties. It was observed that the two methods of producing nylon 6 containing carbon black gave filaments having differences in their fine structure and properties. Method (a) gave more homogeneous filaments.

Nylon 6 filaments containing carbon black were dyed to different depths with 12 dyes. The colour of the dyed material was evaluated by using CIELAB colour space concept. The results have been analysed to determine the effect of dulling of shade by carbon black.

Nylon 6 filaments containing carbon black were dyed with 15 dyes and exposed to daylight and mercury lamp light. These samples were then evaluated for lightfastness of dyes. The presence of carbon black in the fibre appears to protect both dyes and fibre-substrate from photo-degradation. Also the fading effect is masked by the dulling effect of carbon black.

Nylon 6 filaments containing [illegible] were produced and dyed. [illegible]

CONTENTS