DYEING POLYESTER AT LOW TEMPERATURES WITH DISPERSE DYED AND ECOLOGICAL AUXILIARIES

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Abstract

Polyester fibers have a high glass transition temperature, approximately 80 °C (1), and so dyeing with disperse dyes is done at higher temperatures to achieve considerable dyeing rates. Disperse dyes which are almost insoluble in water are used to dye polyester by using dispersing agents (2,3). In the dyeing process at atmospheric pressure at 100 °C, molecular weight organic compounds, known as carriers, are absorbed quickly and accelerate the dyeing rate, but the carriers involve problems of non-biodegradability and they can partially plasticize the polyester fibers. Dyeing at a temperature higher than 100 °C, such as 130-135 °C, without carriers involves costly machinery in relation to the material processed and a considerable amount of energy to heat and maintain the dye bath at the operating temperature (4,5).

With the aim of reducing high energy costs, investment in expensive machinery and the undesirable effects of non-biodegradable carriers, we present an alternative method for dyeing polyester. In this paper we propose a dyeing process for polyester at low temperatures with disperse dyes using a microemulsion prepared using ultrasonic agitation composed of a small proportion of a non-toxic organic solvent and phosphoglyceride as emulsifier, in a mixture used as an auxiliary product like a carrier but with biodegradable compounds through improvement of a similar procedure by the same author (6). The procedure dissolves disperse dyes in this auxiliary mixture, applied at temperatures ranging from 50 °C to 95 °C for dyeing polyester. The kinetics of this dyeing system were determined as a function of temperature with various disperse dyes with different molecular weights. High, medium and low molecular weight disperse dyes were used. In general, dyes with lower molecular weights have faster dyeing rates and those with higher molecular weights have slower rates. The range of activation energies was similar to those achieved in traditional dyeing with a carrier.

References
