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Development and Characterisation of Nonwoven Fabrics for Apparel Applications

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Abstract : The cost of making apparel fabrics for garment manufacturing is very high because of their conventional manufacturing processes and new methods/processes are being constantly developed for making fabrics by unconventional methods. With the advancements in technology and the availability of the innovative fibres, durable nonwoven fabrics by using the hydroentanglement process that can compete with the woven fabrics in terms of their aesthetic and tensile properties are being developed. In the work reported here, the hydroentangled nonwoven fabrics were developed through a hybrid nonwoven manufacturing processes by using fibrillated Tencel® and bi-component (sheath/core) polyethylene/polyester (PE/PET) fibres, in which the initial nonwoven fabrics were prepared by the needle-punching method followed by hydroentanglement process carried out at optimal pressures of 50 to 250bars. The prepared fabrics were characterized according to the British Standards (BS 3356:1990, BS 9237:1995, BS 13934-1:1999) and the attained results were compared with those for a standard plain-weave cotton, polyester woven fabric and commercially available nonwoven fabric (Evolon®). The developed hydroentangled fabrics showed better drape properties owing to their flexural rigidity of 252 mg.cm in the machine direction, while the corresponding commercial hydroentangled fabric displayed a value of 1340 mg.cm in the machine direction. The tensile strength of the developed hydroentangled fabrics showed an approximately 200% increase than the commercial hydroentangled fabrics. Similarly, the developed hydroentangled fabrics showed higher properties in term of air permeability, such as the developed hydroentangled fabric exhibited 448 mm/sec and Evolon fabric exhibited 69 mm/sec at 100 Pa pressure. Thus for apparel fabrics, the work combining the existing methods of nonwoven production, provides additional benefits in terms of cost, time and also helps in reducing the carbon footprint for the apparel fabric manufacture.

Keywords : hydroentanglement, nonwoven apparel, durable nonwoven, wearable nonwoven
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