

Sustainable Chemistry and Pharmacy

Valorisation of chicken feather barbs: Utilisation in yarn production and technical textile applications

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Abstract

Waste chicken feathers represent 5–10% of the total weight of mature chickens. Thus, they are produced in large quantities as a by-product of poultry meat processing industries. Currently, disposal of waste chicken feathers is problematic and the methodologies used are not environmentally sustainable. Consequently, technologies for beneficiation of the feathers are needed in order to overcome these problems. Considering that chicken feathers are similar to natural fibres (wool and silk) used in textile applications, it is plausible that protein in feathers can be exploited and used likewise. This paper reports on the physiochemical properties of proteinaceous fibre obtained from chicken feather barbs with the objective of assessing their potential for use in yarn production and technical textile applications. It is demonstrated that chicken feather barbs exhibit the following properties: hollow honeycomb structure, low density, high slenderness ratio, high flexibility, spinnable length, fineness, and high flexibility. These are unique properties that are not found in any other natural or synthetic fibres – the implication being that chicken feathers can be used in diverse manufacturing applications such as production of composites, yarns, technical textiles, nonwovens, and pulp and paper. However, this paper focuses on textile applications and illustrates how the physicochemical properties of fibres from feathers can be useful and applicable for textile applications. Beneficiation of waste chicken feathers in this manner will result in use of environmentally sustainable methods for disposal of the waste.