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COMPARATIVE CHARACTERISTICS OF METHODS FOR KERATIN EXTRACTION FROM WOOL FIBERS

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Over the past decade, there has been an increase in research on the use of keratin as a resource for biotechnology. Various methods for preparing a soluble keratin fraction from human hair, wool or feathers are provided in the literature. All of them are based on the use of urea (for the cleavage of non-covalent bonds), sodium dodecyl sulfate (to break down intermolecular interactions), as well as low molecular weight alcohols such as dithiothreitol or 2-mercaptoethanol as reducing agents (for the destruction of disulfide bonds). The purpose of this study is to find an effective way to obtain soluble keratin for its further use as example to produce biomaterials that are widely used in biology and medicine. They primarily include materials for the creation of implants, drug carriers, for tissue engineering due to their ability to form porous matrices, biocompatibility, bio-degradation and low cytotoxicity.

For the experiment wool fibers of various types, which differed in their morphology were used. The possibility of keratin extraction from wool using various reducing agents was studied. The effects of different parameters such as reducing agent concentration, pH of the extraction mixture, as well as the duration of hydrolysis were investigated to optimize the protein extraction process.

Optimal keratin extraction was achieved by using dithiothreitol in concentration 250 mM at a ratio of 1:10 for 48–72 hours. Regardless of the type of wool fibers the most effective extraction of keratins was observed at 50 °C and pH 8.5. It turned out that the degree of keratin extraction was the highest for thin fibers.

When applying electrophoresis in PAGE with sodium dodecyl sulfate, it was found that the molecular weight of extracted proteins from wool fibers varies from 10 to 60 kDa, which corresponds to the proteins of intermediate filaments and keratin-associated proteins.