

Ekstraksi Keratin dari Limbah Bulu Ayam menggunakan Metode Green Extraction Ionic Liquid ([Bmim]Ac) dengan Bantuan Microwave serta Penambahan Na₂SO₃ = Keratin Extraction from Chicken Feather Waste Using the Green Extraction Ionic Liquid ([Bmim]Ac) Method with the Assistance of Microwave and the Addition of Na₂SO₃

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Abstrak

Industri pemotongan unggas menghasilkan limbah dalam jumlah besar yang kaya akan keratin, yaitu protein berserat yang menyusun sekitar 90% berat kering bulu ayam. Keratin memiliki potensi tinggi untuk dimanfaatkan sebagai biomaterial atau bahan baku produk bioteknologi, namun pemanfaatannya masih terbatas akibat rendahnya kelarutan dalam pelarut umum yang disebabkan oleh banyaknya ikatan disulfida, sehingga proses ekstraksinya menjadi lebih sulit. Pada penelitian ini dilakukan ekstraksi keratin dari bulu ayam menggunakan metode Ionic Liquid 1-butyl-3-metilimidazolium asetat ([Bmim]Ac) - Microwave Assisted Extraction (MAE) dengan penambahan natrium sulfit (Na₂SO₃) dan dibandingkan dengan metode pemanasan konvensional berbasis hotplate. Hasil penelitian menunjukkan bahwa metode IL-MAE dan penambahan Na₂SO₃ menghasilkan yield keratin tertinggi, yakni sebesar 83,899% dengan berat molekul 10 kDa yang diperoleh melalui SDS-PAGE. Spektrum FTIR menunjukkan adanya pita serapan khas gugus amida dan C-S, yang mengindikasikan keberadaan keratin. Selain itu, keratin hasil ekstraksi menunjukkan stabilitas termal yang paling tinggi, dengan total penurunan massa hanya 1,236% sampai suhu 500°C. Hasil XRD memperlihatkan bahwa hasil keratin didominasi oleh -sheet, yang ditandai oleh kemunculan puncak pada sekitar 22°.

.....The poultry processing industry generates a large amount of waste rich in keratin, a fibrous protein that makes up approximately 90% of the dry weight of chicken feathers. Keratin has high potential for utilization as a biomaterial or as a precursor for biotechnological applications. However, its application remains limited due to its low solubility in common solvents, caused by the abundance of disulfide bonds, which makes the extraction process more difficult. In this study, keratin was extracted from chicken feathers using the Ionic Liquid ([Bmim]Ac)-Microwave Assisted Extraction (IL-MAE) method with the addition of NaSO, and compared with the conventional heating method using a hotplate. The results showed that the IL-MAE method with NaSO addition produced the highest keratin yield, reaching 83.899%, with a molecular weight of 10 kDa as determined by SDS-PAGE. The FTIR spectrum exhibited characteristic absorption bands corresponding to amide and C-S functional groups, indicating the presence of keratin. In addition, the extracted keratin demonstrated the highest thermal stability, with a total mass loss of only 1.236% up to 500 °C. XRD analysis revealed that the keratin structure was predominantly composed of -sheets, as evidenced by a distinct diffraction peak around 22°.