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Частина 2

Київ НУХТ 2024

6. Machine-apparatus scheme for the production of recombinant human insulin from E. coli inclusion bodies

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Introduction. The existing literature lacks a description of the machine-apparatus scheme for insulin production that is understandable for students of technical specialties. Data on the Internet are of poor quality and unfounded. Manufacturers' data are usually classified.

Materials and Methods. The scheme development is based on the analysis of knowledge clusters about insulin production, manufacturers' data, and expert surveys.

Results and Discussion. The scheme involves the disruption of genetically modified E. coli bacteria in homogenizers under high pressure, separation of inclusion bodies, and extraction of insulin from them (Fig. 1).

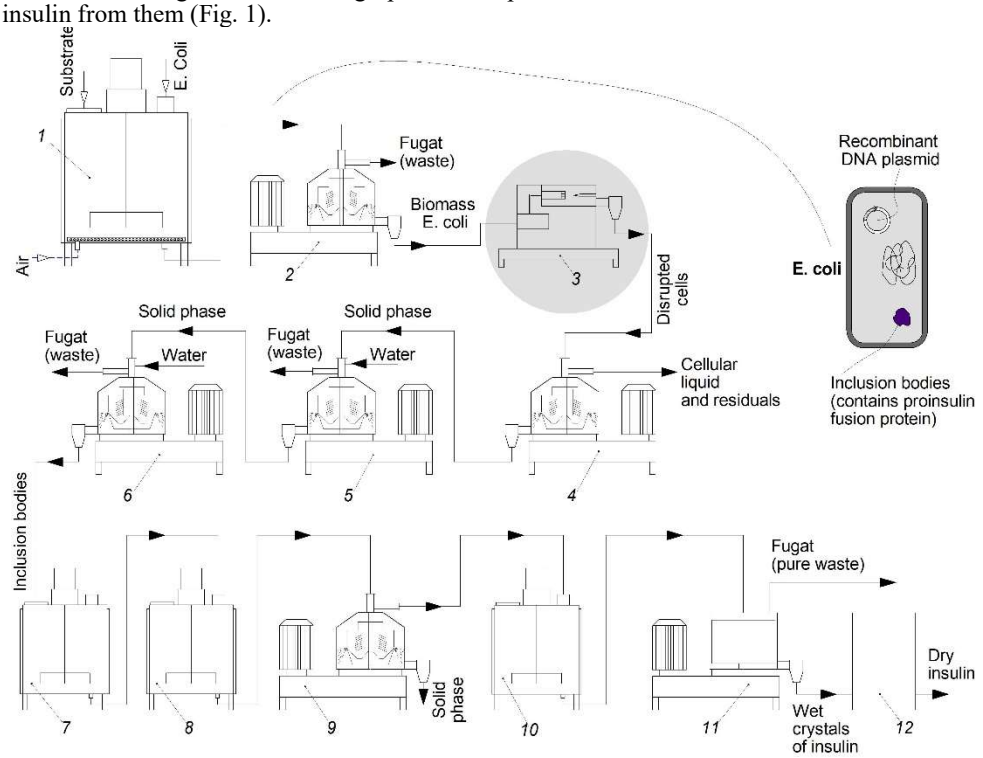

Fig. 1. Machine-Apparatus Scheme for the Production of Recombinant Human Insulin from E. coli Inclusion Bodies (cell destruction phase of E. coli highlighted in gray)

The E. coli culture is grown in a fermentor 1, and the biomass is fed into a nozzle separator 2, where it is concentrated. E. coli cells are disrupted in a homogenizer 3 under a pressure of 300 MPa with a productivity of 150 ml/min (note the lack of data on the method and modes of cell disruption). Separation of liquid and cellular debris occurs in separator 4. A two-stage separation and washing of the obtained solid phase to extract the inclusion bodies occur in separators 5 and 6. The inclusion bodies are processed in reactor 7 for protein coagulation and in reactor 8 for the precipitation of foreign proteins. Solid waste separation occurs in separator 9, insulin crystallization in the crystallizer 10, moisture separation from the crystals on the centrifuge 11. Drying of insulin occurs by freezing in a sublimation drying apparatus 12.

References

Siew Y.Y., Zhang W. (2021), Downstream processing of recombinant human insulin and its analogues production from E. coli inclusion bodies, *Bioresources and Bioprocessing*, 8, 65.