

TECHNOLOGY OF CONSTRUCTING MEMBRANE DEVICE OF MODULE TYPE FOR LOWMOLECULAR CONNECTIONS ULTRAFILTRATING

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Abstract:

The article highlights the results of research on choosing the necessary type of membranes and on constructing ultraviolet filtering device applied for obtaining preperates for farm animals anemia treatment and prevention.

Introduction

Membrane technologies is the method adopted from nature and improved in its principle. Membranes, unlike filters are thin and polymer pellicle which look like capillary, cellular or spongy carcass on their macroscopic level and their separate elements make a single unit unlike filters, membranes are typical representatives of two phase colloidal systems of the "gas-solid matter" type [1]. Membrane filtration, unlike the usual one, is done in the regime of tangential (i.e. touching, not a normal to the membrane surface) stream of filtering medium.

Nowadays the processes of membrane filtration are applied in majority of technological schemes and the field of their applying is broadening. The reason of their technological case, high efficiency, low material and energy spending of membrane processes [2].

Successful decision of many actual problems of practical biochemistry and biotechnology provides improvement of old technologies and applying new ones on obtaining biologically active substances necessary in medicine and veterinary. The technologies based on membrane processes are developing actively nowadays [3]. Rather insignificant dispersedness of pore sizes, nearly complete absence of copolymers absorption on the surface and inside the polymer membranes make them perspective for manufacturing some biologically active substances.

There are technologies of obtaining homogenous concentrated colloids of some biologically active substances – these are multistage, laborious processes with a great number of operations on purification and distinguishing of the product. Applying membrane technologies enables to intensify the process of obtaining final product.

While creating new complex substances for prevention and treatment anemias in farm animals in the Scientific Research Institute of Ecology and Biotechnology of Bila Tserkva State Agrarian University there arose the necessity to create technological scheme of separating low molecular products from high molecular ones to obtain final product possessing the set of necessary qualities [4].

Thus, the aim of our research was to adapt the existing membrane technologies to solve the arisen technological problems.

Materials and methods

The research was conducted in the laboratories of SRI of Ecology and Biotechnology of BTSAU and Institute of physical and colloid chemistry of Ukraine NAS. The material; were membrane filters made of cellulose, acrylonitrile, polypropylene, polycarbonate, polysulfonamide ethers.

In some cases of applying membrane filters were some modified we defined the concentration of mixture ingredients both in thickened product and in filtrate and according to these data we calculated the degree of evaporation and losses during ultrafiltration.

The results

According to the theoretical thesis about the fact that the main kind of membrane processes is the reverse osmosis ultrafiltration and microfiltration of these processes in the overpressure from both sides of the membrane and that the difference between the three processes is defined with the size of separating particles or correspondingly pores. After the research we choose

membranes for ultrafiltration which enabled us to separate lowmolecular products from the highmolecular ones and from the ones with average molecular weight.

The selected imported membranes did not meet the necessary requirements, thus they were chemically treated after some researches and these modified membranes were considered to be the basis of the constructed ultrafiltration devices.

The developed devices for the filtrating preparates of biologically substances (proteins, dextrans, dextrans and other colloids) has the ultrafiltration block is a dominating in the skin of getting final product, i.e. 60–70 percent of the process expenditures are spent on this element.

The research proves to that efficiency of this stage of the process is defined by:

– primary concentration of ultrafiltration product, the reaction of the medium (pH), ligand editives content, mixtures which decrease circulating liquid toughness and provide complete output and quality of the final products which poses necessary qualities;

– construction of filtration system which provides intensive exchange between all the components of the medium;

– the optimal regimen of tangential stream of liquid over the membrane surface which enables to avoid quick pollution of membrane pores which causes filtration speed degrees.

The research enabled us to define optimal medium content and device work regimens, the number of module elements and electromotor power which enable us to provide stability of properties and stability of the final product under constant ultrafiltration process and enables to conduct the process at liquid highspeed flow.

We have developed the system for ultrafiltration and concentration of the module type in collaboration with the scientists of Institute of physical and colloid chemistry. The elements of plate with micropores membranes are connected into modules with the total area of filtrated surface of 5 m². The modules, in their turn, are gathered into a block, in the corpus of which holders for plates and connecting pipes are placed filtration solution is getting in and concentrated purified liquid is getting out of the pipes. The blocks are placed one over another, in a special case equipped with pump, reducers, manometre and pipes. The inside part of the system is isolated from the environment of the dividing lines have a slope and liquid can recirculate constantly as the liquid slack provides bacteria growth. When storing the bactericidal agents are applied into the system and they are washed out by aseptic water before work.

In the industrial filtration device applying allows any number of filtration modules. The significant peculiarities of the developed ultrafiltration system are: wide choice of membranes (modified as well) possibility to select pump for any kind of fluids (depending on the toughness), and which is the most essential, a peculiar construction of filtrating modules enables to support the surfaces contacting the obtained product in sterile conditions.

Conclusions

1. The results of the research enabled us to select the necessary type of membranes which enables to put into practice the process of separating lowmolecular connections from the ones with high and average molecular weight.

2. To give membranes the necessary characteristics and to increase the specific chemical modification of membranes was done.

3. We have developed ultrafiltration device, which possesses necessary characteristics and productivity for obtaining preparates for prevention and treatment of anemia in farm animals.

References

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