

ALIEN PROPERTY CUSTODIAN

PROCESS FOR THE PRODUCTION OF SUBSTANCES EXPEDITING THE GROWTH OF CELLS

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This invention relates to a novel process for the production of substances expediting the growth of cells.

It has already been suggested to produce growth expediting substances which cause the multiplication of cells from aqueous extracts of yeast or other microbes, seeds, germs or egg yolk after previous elimination of ballast substances by way of adsorption, e. g. with fuller's earth, or by precipitation, and repeated precipitation, if necessary, with a solvent which can be mixed with water, or with heavy-metal salts. Thereupon non-efficient substances were removed from the solution thus prepared, by precipitation with Reinecke-salt, picrolonic acid or oxalic acid, whereafter the active substance was precipitated with phosphoric tungstate acid, or mercuric chloride.

Under another process platinum chloride hydrochloric acid was used for biotina concentration. All of these processes imply the drawback that for the biotina concentration from the raw materials:

1. Many stages of operation are necessary, part of which is very difficult to be performed;

2. Expensive chemicals, e. g. hexaplatinum hydrate, must be used;

3. The substances used as primary material, e. g. germs of plants, yolk of eggs, compressed yeast, etc., are, already in themselves, valuable substances, which therefore, due to their high purchase prices, cannot be considered for the manufacture of technical bios-concentrations.

Therefore, in consequence of their expensiveness, bios-concentrations of the biotina type according to Kögl etc., are out of the question for further pharmaceutical or technical uses.

The present invention has for its object a process under which highly efficient bios concentrations are prepared in a simple and unexpensive manner, substances, in this regard, coming under the term "Bios," which expedite the cell growth.

It is already known that yolk of eggs, yeast and other tissues in their embryonic condition are a particularly suitable primary material rich in bios for the preparation of bios concentrations. It is also known that germs of cereals and fungoid mycelium show considerable bios contents. In order to prepare bios-efficient concentrations from the said primary materials rich in bios, it is usual to proceed in such a way that these materials are more or less disintegrated or broken-up, extracted with water or aqueous salt solutions, filtered, whereupon the

filtrates thus obtained are further processed. Thus the hitherto used methods of manufacture without any exception amount to a lixiviation process, in which the substance to be lixiviated is suspended in the solvent, generally water. This method implies the fact that the quantity of extracting agents is comparatively great, as compared with the comparatively small quantity of material rich in bios, which is to be lixiviated, and that the aqueous filtrates thus obtained contain the bios-efficient substances in a highly diluted condition. In order not to be compelled to concentrate by evaporation said diluted aqueous solutions, it was inevitable to avail oneself of expensive precipitation reactions, in order to thus render possible a concentration of, and at the same time an enrichment in, the bios substances.

It was now surprisingly found that it is possible to directly bring about bios concentrates without any precipitation, if primary substances rich in bios e. g. cerealian germs, and fungous mycelia, are subjected to a steaming action or to an extraction with steam, i. e. if limited quantities, preferably small quantities of water or steam, in vacuo and at ordinary or increased pressure are allowed to display their effect upon the primary materials rich in bios within a sealed steam chest, which, if desirable, can be provided with a backflow condenser. The steam extracts thus obtained will already contain bios at a concentration of 250 to 5000 YU* for example, wherefore, as compared with the primary materials used, which possess, as an example, a bios effect of about 10 to 100 YU, they are already to be considered as highly effective bios concentrates.

As the bios effect not only represents a function of the bios concentration in the individual solution concerned, but to a very considerable extent depends upon the quantities of counteracting agents, small amounts of which are always present in the natural substances it is possible, as a further step of this invention, to discharge the efficient raw bios concentrates prepared under the new process in a simple and cheap manner from the concentrating agents still present in them, if they are treated with hydroxides of alkaline earths. The highly efficient and aqueous pure bios concentrates resulting from the treatment with hydroxides of

* By a YU (Yeast Unit—German "HE":Hefe Einheit) that effect of growth is meant, which is brought about by 1 g of dry substance of the bios preparation in order to attain the factor "f₀", when using the tests prepared by the inventors for the ascertainment of bios.

alkaline earths after, a subsequent filtration have an effect of about 500 to 25000 YU, and can be concentrated still further by evaporation up to the dry condition.

Both the unpurified efficient, aqueous raw bios concentrates, and the aqueous pure concentrates treated with hydroxides of alkaline earths, as well as the dry residues prepared from them, can advantageously be used for technical purposes in the manufacture of compressed yeast, for baking purposes and pharmaceutical uses.

By way of experiments it has, moreover, been ascertained that husks of any fruits, e. g. husks of hazelnuts and walnuts, and such, as have been passed through an artificial fermentation process, e. g. cocoa-shells, are very well suitable for use as cheap primary materials rich in bios.

A special advantage offered by the new process is the fact that the measures taken for the preparation of bios concentrates only display a little influence upon the primary materials, which therefore can still be used for other purposes.

Examples

1. 20 kg of wheat germ cakes, i. e. residues left after compression in the manufacture of wheat germ oil, having bios contents of about 13 YU, are disintegrated, and pieces having the size of hazelnuts, and are, e. g. in hoses, put into the steam extraction device with a backflow cooling device described above, whereupon they are extracted with 10 l of water, and steam respectively, for about 24 hours at about 90 centigrades and at atmospheric pressure. After cooling about 7,5 l of a yellow aqueous liquid, having a smell like malt, and 22 kg of humid material will be left. The balance of 2,5 l of liquid will continue to be adsorbed by the material extracted. A further quantity of 20 kg of wheat germ cakes can be treated with these 7,5 l of bios raw concentrate, as described above, and this process can, if desired, be repeated with further lots. Thus it is possible to obtain highly concentrated preparations rich in bios.

The remaining balance of extracted wheat germ cake residues poor in bios, are either dried and ground to powder, or are, in their humid condition, ground together with other wheat germ cake not having been treated. In either alternative it is thus possible to manufacture feeding stuffs, the value of which will not be reduced in the least by the treatment. For this reason the residues can, without anything further, be used in the manufacture of other pharmaceutical preparations, e. g. germ extract. The bios raw concentrate of wheat germs which was, for instance, obtained, by an individual process of extraction, showed an effect of 250 YU. The lime still dissolved was quantitatively removed from the filtrate obtained with gaseous carbonic acid by an addition to the extract of the same quan-

tity of lime milk and by removal of the deposit charged with ballast substances. The resulting concentrate having a light yellow shade showed a bios effect of 500 YU.

2. 30 kg of humid mycelium of fungus containing 75% of water and 125 YU from citric acid fermentation (*aspergillus*) was filled into elastic metal tubes, and at water boiling temperature and at ordinary pressure for 24 hours with reflux treated with 10 l of water, and steam respectively.

After cooling about 11,1 kg of concentrate rich in bios are left. The solid extraction residues (24,2 kg) are now pressed in a filter-squeezer at a pressure of 350 atmospheres for several minutes. The pressed juice (3 l) thus obtained is added to the extracted solution. The dark-coloured bios raw concentrate resulting from one extraction stage, and having an effect of about 280 YU is, in accordance with Example 1, raised to an effect of 625 YU by precipitation with hydroxide of alkaline earths. The fair coloured solution can then be concentrated still further. The solid extraction residues which has a smell and taste reminding of bouillon, and to a high degree is freed of vegetable bitters, can under the already known processes be further used in order to prepare sterines and albuminous alimentary substances, e. g. soup seasoning extract.

3. 30 kg. of cocoa husks having an effect of 100 YU are put into hoses, when not yet ground, and are, with reflux, extracted for 24 hours with 10 l of water, and steam, respectively. One to the low adsorptive capacity of cocoa shells for water about 3,5 l of raw concentrate rich in bios will be obtained. The 33 kg of extracted residues resulting from the cocoa shell extraction are dried and finely ground down with Perplex grinders. This material can be added to humid food-stuffs, e. g. shredded beet-roots or pig fattening food, etc., just as the marketable cocoa husk powder, because its food value has not been reduced.

The extraction with steam can, after addition of an adequate further quantity of water, be repeated as often, as desired, with the quantity of water left after the first extraction, whereby also in this case always higher concentrates of raw bios will be produced. The concentration of the coloured raw concentrate obtained after the first steaming action and having an effect of 5000 YU, is carried out, as described in Examples 1 and 2. The effect of the almost colourless concentrate obtained by the precipitation with hydroxides of alkaline earths amounted to about 25,000 YU.

The preparations manufactured under the process are suitable to be used for processes of fermentation in bakeries, breweries, distilling plants, in the yeast industry, etc.

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