

components thereof. The methionine and/or MHA products to be prepared from the acrolein are used as animal feed additives in modern animal nutrition. The production process therefore has to ensure that all toxic compounds are removed. From a technical point of view, accumulation of the unsaturated secondary components such as allyl alcohol additionally disrupts the downstream process steps. For example, in the process for preparing methionine, the product solution is purified after the hydrolysis over activated carbon as an adsorbent. An elevated concentration of impurities would consequently lead to an increased consumption of activated carbon and thus distinctly shorten the service life, which would lead to the production of greater amounts of waste streams and/or emissions from the plant. Due to the low concentration in the crude acrolein, a distillative separation is, however, achievable only with high capital and operating costs. Furthermore, valuable acrolein would be lost in the additional workup step, which reduces the overall yield of the process. For reasons of process reliability, a conversion of the crude acrolein and subsequent removal of the secondary components is likewise more favourable since acrolein has a much higher reactivity than the MMP conversion product. The consequence thereof is an increased plant availability since a distillation of more highly concentrated acrolein can lead to deposits in different apparatuses or pipelines, which would entail intensive purification steps and an increased number thereof.

The technical object of the disclosure was therefore to provide a process which enables removal of unsaturated secondary components, especially of allyl alcohol, from the preparation process of methionine and/or MHA.

This technical object is achieved by the inventive reactive rectification column and the use thereof in the process according to the disclosure.

The removal of the unsaturated secondary components, especially allyl alcohol, after the conversion of the acrolein to methionine and/or MHA is particularly advantageous. It was found that the alkaline hydrolysis of the methionine precursor in the inventive reactive rectification column is particularly suitable for removal of the allyl components, especially allyl alcohol, from the reaction mixture. The hydrolysis can be described as a combination of steam distillation and hydrolysis reaction which takes place at the same time.

The disclosure relates to a reactive rectification column (also called reactive distillation column or reactive distillation) with a weir height of 100 mm or more and to a method for

the continuous production of a methionine salt using the column according to the disclosure.

According to an aspect, there is provided a reactive rectification column for production of a

5 methionine salt, comprising

a weir height in the range from 100 to 1000 mm,

a plate spacing in the range from 500 to 1000 mm,

a ratio of column diameter to weir length in the range from 1.1 to 1.3,

a ratio of cross-sectional area to an area through which gas flows in the range from 1.5 to

10 2 and

a number of plates in the range from 15 to 25, preferably in the range from 18 to 20, and

wherein the column is configured to remove allyl components at the top of the column,

wherein in the reactive rectification column a method of continuous production of a

methionine salt by alkaline hydrolysis process of the 5-(2-methylmercaptoethyl)hydantoin

15 is carried out.

According to another aspect, there is provided a method for continuous production of a methionine salt,

wherein the method is carried out in a reactive rectification column as defined above and

20 wherein allyl components are removed at the top of the reactive rectification column,

wherein the following steps are carried out

- reaction of 3-methylmercaptopropionaldehyde and hydrogen cyanide or of a component that can be produced therefrom, wherein a solution containing 5-(2-methylmercaptoethyl)-hydantoin is obtained;

25 - alkaline hydrolysis of the 5-(2-methylmercaptoethyl)-hydantoin obtained to a methionine salt in a reactive rectification column, wherein only the solution containing 5-(2-methylmercaptoethyl)-hydantoin is fed on the topmost plate of the reactive rectification column and an alkaline circulating solution is fed on a plate located under that, preferably on the 2nd plate from the top.

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A preferred embodiment has the following design features:

Weir height **8**: 100-1000 mm, preferably 150 – 700 mm

Plate spacing **9**: 500 – 1000 mm

Ratio: column diameter **4** / weir length **3**: 1.1-1.3

35 Ratio: cross-sectional area / area through which gas flows: 1.5-2

Number of plates: 15-25, especially 18-20.

The cross-sectional area can be calculated from the column diameter 4. The area through which gas flows is found by subtracting the areas of the two downcomers (2) from the cross-sectional area.

5 Reference is made expressly to the preferred embodiments of the disclosure presented in the subclaims. The disclosure relates in particular to:

1. Reactive rectification column for production of a methionine salt, wherein the weir height is 100 mm or more.
- 10 2. Reactive rectification column according to 1, wherein the weir height is in the range from 100 to 1000 mm, preferably in the range from 150 to 700 mm, the plate spacing is in the range from 500 to 1000 mm, 15 the ratio of column diameter to weir length is in the range from 1.1 to 1.3, the ratio of the cross-sectional area to the area through which gas flows is in the range from 1.5 to 2 and the number of plates is in the range from 15 to 25, preferably in the range from 18 to 20.
- 20 3. Reactive rectification column according to 1 or 2, wherein the reactive rectification column is a sieve plate column, perforated plate column, valve plate column or bubble plate column.
- 25 4. Reactive rectification column according to 1 to 3, wherein the ratio total area of all holes / area through which gas flows is in the