## SUMMARY

In an aspect, there is provided a method for producing a polyacrylamide solution having increased viscosity when compared to a reference solution, comprising the following steps:

(a) preparing an aqueous acrylamide solution by converting acrylonitrile to acrylamide using a biocatalyst,

(b) separating the biocatalyst from the aqueous acrylamide solution of step (a) such that the $OD_{600}$ of the aqueous acrylamide solution is equal to or less than 0.6,

(c) polymerizing the aqueous acrylamide solution obtained in step (b) to polyacrylamide,

wherein the reference solution is a polyacrylamide solution prepared from an aqueous acrylamide solution having an $OD_{600}$ of more than 0.6 and wherein the reference solution is prepared by the same method without separating the biocatalyst.

In another aspect, there is provided a method for preparing a polyacrylamide solution prepared by biocatalyzed conversion of acrylonitrile to acrylamide comprising the following steps:

(a) preparing an aqueous acrylamide solution by converting acrylonitrile to acrylamide using a biocatalyst,

(b) separating the biocatalyst from the aqueous acrylamide solution of step (a) by disc stack separation performed with a specific settling area of 19.67 $m^2h/l$ or more,

(c) polymerizing the aqueous acrylamide solution obtained in step (b) to polyacrylamide.

In another aspect, there is provided the use of an aqueous acrylamide solution having an $OD_{600}$ equal to or less than 0.6, for increasing the viscosity of a polyacrylamide solution prepared from said acrylamide solution, wherein the OD is measured directly after separating a biocatalyst from the aqueous acrylamide solution.

In another aspect, there is provided an aqueous acrylamide solution having an $OD_{600}$ equal to or less than 0.6, preferably equal to or less than 0.4, more preferably equal to or less than 0.3, even more preferably equal to or less than 0.2, still more preferably equal to or less than 0.15, still more preferably equal to or less than 0.12, still more preferably equal to or less than 0.1, still more preferably equal to or less than 0.075, most preferably equal to or less than 0.05, but having an $OD_{600}$ of 0.025 or more; of 0.01 or more; of 0.005 or more; or of 0.001 or more, wherein the aqueous acrylamide solution is produced by converting

acrylonitrile to acrylamide using a biocatalyst and separating said biocatalyst from the aqueous acrylamide solution after completion of the conversation of acrylonitrile to acrylamide.

In another aspect, there is provided a polyacrylamide having a viscosity of at least 60 mPas at room temperature in artificial sea water and produced by the polymerization of an aqueous acrylamide solution having an $OD_{600}$ equal to or less than 0.6 but having an $OD_{600}$ of 0.025 or more wherein the aqueous acrylamide solution is produced by converting acrylonitrile to acrylamide using a biocatalyst, separating said biocatalyst from the aqueous acrylamide solution after completion of the conversation of acrylonitrile to acrylamide and polymerizing the acrylamide.

In another aspect, there is provided a method for producing a polyacrylamide solution having a viscosity of more than 60 mPas at room temperature in artificial sea water, comprising the following steps:

(a) preparing an aqueous acrylamide solution by converting acrylonitrile to acrylamide using a biocatalyst,

(b) separating the biocatalyst from the aqueous acrylamide solution after completion of the conversion of acrylonitrile to acrylamide, such that the $OD_{600}$ of the aqueous acrylamide solution is equal to or less than 0.6,

(c) polymerizing the aqueous acrylamide solution obtained in step (b) to polyacrylamide.

## DETAILED DESCRIPTION

The present invention is, at least partly, based on the surprising finding that separating a biocatalyst from a biocatalytically prepared aqueous acrylamide solution, such that the $OD_{600}$ of the aqueous acrylamide solution is equal to or less than 0.6, preferably equal to or less than 0.4, more preferably equal to or less than 0.3, even more preferably equal to or less than 0.2, still more preferably equal to or less than 0.15, still more preferably equal to or less than 0.12, still more preferably equal to or less than 0.1, still more preferably equal to or less than 0.075, most preferably equal to or less than 0.05, and subsequently polymerizing the aqueous acrylamide solution to polyacrylamide, provides a polyacrylamide solution having an increased viscosity. In particular, the viscosity of said polyacrylamide solution is increased when compared to a reference solution, wherein the reference solution is a polyacrylamide solution prepared from an aqueous acrylamide solution having an $OD_{600}$ of more than 0.6

and wherein the reference solution is prepared by the same method without separating the biocatalyst.

The value $OD_{600}$ indicates the absorbance, or optical density, of a liquid sample measured at a wavelength of 600 nm. It is a preferred method for determining the concentration or amount of a biocatalyst as described herein in an aqueous solution, such as an aqueous acrylamide solution. Accordingly, the $OD_{600}$ of an aqueous solution is measured, thereby the amount or concentration of a biocatalyst is determined.

Thus, the viscosity of the polyacrylamide solution prepared by the method of the present invention may depend on the residual amount of biocatalyst remaining in the aqueous acrylamide solution. This was unforeseeable, as it was not reported so far that the amount of remaining biocatalyst after bioconversion may directly influence the viscosity value of a polyacrylamide solution. The residual amount of biocatalyst may be determined by measuring the $OD_{600}$ of the aqueous acrylamide solution.

An aqueous acrylamide solution having an $OD_{600}$ which is equal to or less than 0.6 can for example be achieved by disc step separation performed with a low feed flow rate.

In some embodiments, the separation of the biocatalyst from the aqueous acrylamide solution is performed by centrifugation. Preferably the centrifugation is carried out by a disc stack separator.