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ANION EXCHANGE RESIN-PACKED TOWER



G00002

Field of the Invention

The present invention relates to an anion exchange resin
5 packed tower. More specifically, the present invention relates
to an anion exchange resin packed tower, which can be used
particularly suitably for purifying a hydrogen peroxide aqueous
solution steadily and safely without an abnormal decomposition
of hydrogen peroxide.

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Background of the Invention

It is known to purify a hydrogen peroxide aqueous solution
by passing it through a cylindrical tower packed with an anion
exchange resin.

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Summary of the Invention

However, the above-mentioned prior art has a problem that
hydrogen peroxide may decompose abnormally to generate oxygen
gas, which accumulates in the tower and explodes to break the
20 tower in a remarkable case.

An object of the present invention is to provide an anion
exchange resin packed tower, which can be used particularly
suitably for purifying a hydrogen peroxide aqueous solution
steadily and safely without an abnormal decomposition of hydrogen
25 peroxide.

The present invention provides an anion exchange resin packed tower having no hollow on an inner wall of a space of the tower, in which space the anion exchange resin is packed.

The present invention also provides a process for purifying
5 a hydrogen peroxide aqueous solution, which comprises the step of passing a hydrogen peroxide aqueous solution through an anion exchange resin packed tower having no hollow on an inner wall of a space of the tower, in which space the anion exchange resin is packed.

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Brief Description of the Drawings

Fig. 1 is a flow chart showing an embodiment of a process for purifying a hydrogen peroxide aqueous solution using the anion exchange resin packed tower in accordance with the present
15 invention.

In Fig. 1, an anion exchange resin 4 is packed in a tower 3 equipped with a nozzle 1 and a cover 2 for the nozzle; a hydrogen peroxide aqueous solution is fed to the tower 3 continuously from an inlet 5; and a purified hydrogen peroxide aqueous solution
20 is taken out of the tower 3 continuously from an outlet 6. Fig. 2 illustrates an enlarged figure of the nozzle 1 and the cover 2.

Detailed Description of the Invention

25 A characteristic feature of the anion exchange resin packed

tower in accordance with the present invention is that the tower has no hollow on an inner wall of a space of the tower, in which space the anion exchange resin is packed. In the present invention, the term, "hollow", means a hollow, which may hold a hydrogen peroxide aqueous solution or an anion exchange resin, when the anion exchange resin packed tower is used, for example, for purifying a hydrogen peroxide aqueous solution.

While a sidewall of an anion exchange resin packed tower generally has (i) a nozzle to discharge the packed anion exchange resin out of the tower at the time of the renewal thereof, and (ii) a cover to open or shut the nozzle, an inner end surface of the conventional cover (namely, cover known in the art) hollows from an inner wall surface of the tower. Namely, said inner end surface of the cover and said inner wall surface of the tower do not form substantially the same surface. As a result, an end space of the nozzle inside the tower has a hollow, which is formed between said inner end surface of the cover and the nozzle; and therefore, the hollow holds easily a substance present in the tower such as the anion exchange resin and a material to be contacted with the anion exchange resin.

The anion exchange resin packed tower in accordance with the present invention can be made by using a cover having a shape, which does not form such a hollow; namely, (i) by using a cover, whose inner end surface makes substantially the same level surface as the above-mentioned inner wall surface of the tower

(see Fig. 1 and Fig. 2), or (ii) by using a cover, whose inner end surface sticks out inside the tower ahead from the inner wall surface of the tower (not illustrated in Figure). Here, the above-mentioned "cover, whose inner end surface makes
5 substantially the same level surface as the above-mentioned inner wall surface of the tower" also means a cover having a shape capable of forming a hollow, which however cannot hold a substance present in the tower.

A shape of the anion exchange resin packed tower itself
10 in accordance with the present invention is not limited, and is usually cylindrical. The anion exchange resin packed tower can be used in a similar manner to that in a conventional anion exchange resin packed tower. Further, the anion exchange resin packed in the anion exchange resin packed tower is not limited,
15 and may be a conventional one.

When a hydrogen peroxide aqueous solution is passed continuously through the anion exchange resin packed tower in accordance with the present invention for purifying the hydrogen peroxide aqueous solution, the following superior effect can
20 be obtained.

When the hydrogen peroxide aqueous solution is brought into contact with the anion exchange resin, a small amount of hydrogen peroxide decomposes to generate heat and an oxygen gas. However, the above-mentioned decomposition heat is removed out
25 of the tower together with the purified hydrogen peroxide aqueous

solution, because the anion exchange resin packed tower in accordance with the present invention does not have any hollow to hold the hydrogen peroxide aqueous solution on an inner wall of a space of said tower, in which space the anion exchange resin is packed. Incidentally, in the case of a conventional anion exchange resin packed tower having a hollow to hold the hydrogen peroxide aqueous solution on an inner wall of a space of the tower, in which space portion the anion exchange resin is packed, a possible dangerous situation happens owing to a mechanism, in which mechanism the following phenomena 1 to 4 occur continuously.

1. Hydrogen peroxide decomposes in the hollow to generate heat, which is accumulated in the hollow without removing out of the tower.

2. The accumulated heat raises a temperature in the vicinity.

3. The raised temperature accelerates a decomposition reaction rate of hydrogen peroxide.

4. The accelerated decomposition reaction rate decomposes a large amount of hydrogen peroxide to cause a dangerous situation.

Example

Comparative Example 1

In a cylindrical packed tower (diameter = 800 mm, height

= 2000 mm), which had a hollow on its inside wall surface to hold a hydrogen peroxide aqueous solution and an anion exchange resin, 0.55 m³ of an anion exchange resin, a trade name of DUOLITE A-368, manufactured by Sumitomo Chemical Co., Ltd. was packed.

5 A hydrogen peroxide aqueous solution was passed through it. The above-mentioned hollow was made by a nozzle for discharging the anion exchange resin out of the tower and an inner end surface of a cover for shutting the nozzle. The hollow was found to have a volume of about 750 cm³.

10 At the time when the hydrogen peroxide aqueous solution had been passed for about one day, an inner pressure of the tower increased abnormally owing to an abnormal decomposition of hydrogen peroxide. As a result, a pressure-relief valve worked by means of an interlock sequence to release the pressure.

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Example 1

Comparative Example 1 was repeated, except that a packed tower having no hollow on its inner wall surface to hold the hydrogen peroxide aqueous solution and the anion exchange resin
20 was used (see Fig.1 and Fig. 2).

Even at the time when the hydrogen peroxide aqueous solution had been passed for 18 days, an inner pressure of the tower did not increase abnormally owing to an abnormal decomposition of hydrogen peroxide, and the pressure-relief
25 valve did not work. As a result, purification of the hydrogen

peroxide aqueous solution could be carried out extremely steadily and safely.

Claims

1. An anion exchange resin packed tower having no hollow
on an inner wall of a space of the tower, in which space the
5 anion exchange resin is packed.

2. The anion exchange resin packed tower according to Claim
1, wherein the anion exchange resin packed tower is for purifying
a hydrogen peroxide aqueous solution.

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3. A process for purifying a hydrogen peroxide aqueous
solution, which comprises the step of passing a hydrogen peroxide
aqueous solution through an anion exchange resin packed tower
having no hollow on an inner wall of a space of the tower, in
15 which space the anion exchange resin is packed.