# Notice



## DESCRIPTION CN118955608A

A method for preparing duckweed peptone

---

一种浮萍蛋白胨的制备方法

### [0001]

Technical Field

---

技术领域

## [n0001]

This invention relates to the field of duckweed peptone processing technology, and in particular to a method for preparing duckweed peptone.

---

本发明涉及浮萍蛋白胨加工技术领域，尤其是一种浮萍蛋白胨的制备方法。

## [0003]

Background Technology

---

背景技术

## [n0002]

Peptone is mainly used as a raw material for microbial culture media and has wide applications in the pharmaceutical industry, fermentation industry, biochemical products and microbiological research.

---

蛋白胨主要用作微生物培养基的原料，在医药工业、发酵工业、生化制品及微生物学科研等领域有广泛应用。

Compared to traditional animal peptones, plant peptones have advantages such as lower contamination risk, higher safety assurance, and more consistent product quality, making them a preferred choice in fields such as biopharmaceuticals.

---

相较于传统的动物蛋白胨，植物蛋白胨具备污染风险少，安全保障高，产品质量均一等优点，已成为生物制药等领域的优先选择之一。

Duckweed is an aquatic plant rich in high-quality protein, vitamins, and minerals. Furthermore, duckweed is a fast-growing aquatic plant with excellent regenerative capabilities, making the extraction of duckweed peptone environmentally friendly and sustainable.

---

浮萍是一种水生植物，含有丰富的优质蛋白质，维生素和矿物质；同时，浮萍是一种快速生长的水生植物，具有良好的再生能力，因此提取浮萍蛋白胨对环境友好，并具有可持续性。

## [n0003]

Currently, the commonly used processes for producing peptone are hydrolysis and enzymatic hydrolysis.

---

目前，生产蛋白胨常用的工艺方法有：水解法和酶解法。

While the hydrolysis process yields a high amount of peptone, the harsh hydrolysis conditions severely damage the amino acids in the product, resulting in low nutritional value. The enzymatic hydrolysis process produces peptone under milder conditions, resulting in a more nutritious product, but it suffers from long hydrolysis times, poor solubility, and poor dispersibility.

---

水解法工艺生产蛋白胨虽然得率较高，但水解条件苛刻，严重破坏了产品中的氨基酸，使得所得蛋白胨产品的营养价值低；酶解法生产蛋白胨的工艺条件较为缓和，制得的蛋白胨产品营养价值更高，但存在酶解的时间长，溶解性不良，分散性不太好的问题。

Here we propose a method for preparing duckweed peptone.

---

在这里我们提出一种浮萍蛋白胨的制备方法。

## [0006]

Summary of the Invention

---

发明内容

## [n0004]

To address the aforementioned technical shortcomings, this invention employs a modified technical solution: a method for preparing duckweed peptone, specifically comprising the following processing steps.

---

本发明为解决上述技术不足，采用改性的技术方案，一种浮萍蛋白胨的制备方法，具体包括以下加工步骤，

## [n0005]

S1. First, wash the duckweed, then crush it and extract the liquid containing duckweed protein for later use.

---

S1，首先将浮萍进行清洗，然后将其破碎处理，提取含有浮萍蛋白的液体备用；

## [n0006]

S2, add duckweed protein extract to the mixed culture and incubate for 12-48 hours;

---

S2，将浮萍蛋白提取物，放入至混合培养物中进行培养12-48h；

## [n0007]

S3, add a regulator to adjust the pH value, and then use supercritical CO2 extraction to deoil the above raw materials;

---

S3，加入调节剂调整pH值，然后采用超临界CO<sub>2</sub>萃取法对上述原料进行脱油处理；

## [n0008]

S4 uses ultrafiltration and permeation to quickly separate peptone and solid particles, improving extraction efficiency;

---

S4，采用超滤、渗透，快速分离蛋白胨和固体颗粒，提高提取效率；

## [n0009]

S5. The filtered liquid is dried to obtain the duckweed peptone product.

---

S5，将过滤后的液体进行干燥处理，得到浮萍蛋白胨成品。

## [n0010]

As a further preferred embodiment of the present invention, in step S1, duckweed is placed in a basin and thoroughly rinsed with deionized water or distilled water. Then, it is washed a

second time with physiological saline at 28-45°C to remove surface impurities and dirt. The cleaned duckweed is then placed in a stirrer or crusher for uniform crushing. The pH is set between 6.5 and 7.5. The mixture is then poured into a centrifuge at a temperature of 20-35°C and centrifuged at a speed of 300-450 r/min for 3-8 minutes to obtain the extract.

---

作为本发明的进一步优选方式，步骤S1中，将浮萍放入盆中，用去离子水或蒸馏水彻底冲洗浮萍，然后使用28-45°C的生理盐水进行二次清洗，去除表面的杂质和污垢，将清洗干净的浮萍放入搅拌器或破碎机中，进行均匀的破碎处理，pH设置在6.5-7.5之间，然后倒入离心机中，温度控制在20-35°C，离心旋转，转速控制在300-450r/min，时间控制在3-8min得到提取物。

## [n0011]

As a further preferred embodiment of the present invention, the raw material composition ratio of step S2 is as follows: 5%-25% yeast powder, 5%-10% dipotassium hydrogen phosphate, 15%-20% duckweed protein extract, 5%-15% water, 5%-15% collagen, 5%-10% salt, 0%-5% glucose and 0%-15% agar.

---

作为本发明的进一步优选方式，步骤S2的原料成分配比为，5%-25%酵母粉、5%-10%磷酸氢二钾、15%-20%浮萍蛋白提取物、5%-15%水、5%-15%胶原蛋白、食盐5-10%、0%-5%葡萄糖和0%-15%琼脂。

## [n0012]

As a further preferred embodiment of the present invention, in step S3, the temperature of the supercritical CO<sub>2</sub> extraction method is 35°C and the pressure is 30MPa. Extraction: supercritical CO<sub>2</sub> is passed through the duckweed protein extract, dissolving and carrying away the oil components along the way. Separation: the dissolved supercritical CO<sub>2</sub> and the extract are separated by depressurization and condensation to obtain the extracted oil and oil-free peptone extract.

---

作为本发明的进一步优选方式，步骤S3，超临界CO<sub>2</sub>萃取法中温度为35°C，压力30MPa，萃取：将超临界CO<sub>2</sub>通过浮萍蛋白提取物，沿途溶解和带走油脂成分，分离：将溶解后的超临界CO<sub>2</sub>和萃取物通过减压和冷凝分离，得到萃取后的油脂和无油蛋白胨提取物。

## [n0013]

As a further preferred embodiment of the present invention, the regulator includes lactic acid, acetic acid, and sodium hydroxide. Lactic acid and acetic acid are added first, followed by sodium hydroxide solution, to adjust the pH value to between 8 and 9.5.

---

作为本发明的进一步优选方式，所述调节剂包括有乳酸、醋酸、氢氧化钠，先加入乳酸和醋酸，然后再加入氢氧化钠溶液，调整pH值至8-9.5之间。

## [n0014]

As a further preferred embodiment of the present invention, in step S4, the ultrafiltration membrane is selected from polyethersulfone, polyamide, and polypropylene, with a pore size between 0.001 and 0.02 micrometers, a feed flow rate of 1-5 L/h, an operating pressure of 0.5-2.5 MPa, a temperature controlled at 25-35°C, a concentration of 1.5-2 times the feed volume, the use of 0.1-0.5% acetic acid, and a cleaning time of 30-60 minutes.

---

作为本发明的进一步优选方式，步骤S4中，所述超滤膜选择，选择聚醚砜、聚酰胺、聚丙烯，膜孔径0.001到0.02微米之间，进料流速：1-5L/h，操作压力：0.5-2.5MPa，温度控制在25-35°C，浓缩1.5-2倍的进料体积，使用0.1-0.5%的醋酸，清洗时间为30-60分钟。

## [n0015]

As a further preferred embodiment of the present invention, in step S4, the permeation membrane is selected to be a polyamide membrane with a pore size of less than 1 nm, a feed flow rate of 5-20 L/h, an operating pressure of 8-20 MPa, a temperature of 15-30 °C, a cleaning solution of 1-2% sodium hydroxide, and a cleaning time of 30-60 minutes.

---

作为本发明的进一步优选方式，步骤S4中，所述渗透膜选择使用聚酰胺膜，膜孔径：孔径小于1nm，进料流速：5-20L/h，操作压力：8-20MPa，温度15-30℃，清洗液使用1-2%的氢氧化钠，清洗时间：30-60分钟。

## [n0016]

As a further preferred embodiment of the present invention, in step S5, the drying is carried out by spray drying, with the inlet air temperature controlled between 120-160°C and the outlet air temperature controlled between 60-80°C.

---

作为本发明的进一步优选方式，步骤S5中，干燥采用喷雾干燥，进风温度：控制在120-160℃之间，出风温度：控制在60-80℃之间。

## [n0017]

The beneficial effects achieved by this invention are as follows: This patent employs a detailed cleaning process, including secondary cleaning, to ensure that impurities and dirt on the surface of duckweed are thoroughly removed, which helps to improve the purity of protein extraction. Using mixed cultures for cultivation can effectively promote the production and accumulation of duckweed peptone, thereby increasing extraction yield. Supercritical CO2 extraction is used for oil removal, a highly efficient and environmentally friendly method that effectively separates oil-free peptone extract. Spray drying technology can rapidly convert

liquid peptone into dry powder at high inlet air temperatures, improving production efficiency and product stability. Ultrafiltration and permeation technologies, with the selection of suitable membrane materials and operating conditions, such as polyethersulfone and polyamide, along with corresponding operating pressure and temperature ranges, effectively separate peptone and solid particles, improving extraction efficiency and purity.

---

本发明所达到的有益效果是：该专利采用了详细的清洗过程，包括二次清洗，以确保浮萍表面的杂质和污垢被彻底去除，这有助于提高蛋白提取的纯度，使用混合培养物进行培养，可以有效促进浮萍蛋白胨的产生和积累，进而增加提取产量，采用超临界CO<sub>2</sub>萃取法进行脱油处理，这是一种高效且环保的方法，能有效分离出无油的蛋白胨提取物，使用喷雾干燥技术，能够在较高的进风温度下迅速将液体蛋白胨转化为干燥粉末，提高了生产效率和产品稳定性，使用超滤和渗透技术，选择了适合的膜材料和操作条件，如聚醚砜、聚酰胺等，以及相应的操作压力和温度范围，能够有效分离蛋白胨和固体颗粒，提高了提取效率和纯度。

## [0021]

Detailed Implementation

---

具体实施方式

## [n0018]

The technical solutions of the present invention will be clearly and completely described below with reference to the embodiments of the present invention. Obviously, the described embodiments are only some embodiments of the present invention, and not all embodiments.

---

下面将结合本发明实施例中，对本发明实施例中的技术方案进行清楚、完整地描述，显然，所描述的实施例仅仅是本发明一部分实施例，而不是全部的实施例。

Based on the embodiments of the present invention, all other embodiments obtained by those skilled in the art without creative effort are within the scope of protection of the present invention.

---

基于本发明中的实施例，本领域普通技术人员在没有做出创造性劳动前提下所获得的所有其他实施例，都属于本发明保护的范围。

## [n0019]

This invention provides a technical solution: a method for preparing duckweed peptone, specifically including the following processing steps,

---

本发明提供一种技术方案：一种浮萍蛋白胨的制备方法，具体包括以下加工步骤，

[n0020]

S1. First, wash the duckweed, then crush it and extract the liquid containing duckweed protein for later use.

---

S1，首先将浮萍进行清洗，然后将其破碎处理，提取含有浮萍蛋白的液体备用；

[n0021]

S2, add duckweed protein extract to the mixed culture and incubate for 12-48 hours;

---

S2，将浮萍蛋白提取物，放入至混合培养物中进行培养12-48h；

[n0022]

S3, add a regulator to adjust the pH value, and then use supercritical CO2 extraction to deoil the above raw materials;

---

S3，加入调节剂调整pH值，然后采用超临界CO<sub>2</sub>萃取法对上述原料进行脱油处理；

[n0023]

S4 uses ultrafiltration and permeation to quickly separate peptone and solid particles, improving extraction efficiency;

---

S4，采用超滤、渗透，快速分离蛋白胨和固体颗粒，提高提取效率；

## [n0024]

S5. The filtered liquid is dried to obtain the duckweed peptone product.

---

S5，将过滤后的液体进行干燥处理，得到浮萍蛋白胨成品。

## [n0025]

In step S1, place the duckweed in a basin and rinse it thoroughly with deionized water or distilled water. Then, use physiological saline at 28-45°C for a second wash to remove surface impurities and dirt. Place the cleaned duckweed in a stirrer or crusher for uniform crushing. Set the pH between 6.5 and 7.5. Then, pour it into a centrifuge at a temperature of 20-35°C and centrifuge at a speed of 300-450 r/min for 3-8 minutes to obtain the extract.

---

步骤S1中，将浮萍放入盆中，用去离子水或蒸馏水彻底冲洗浮萍，然后使用28-45°C的生理盐水进行二次清洗，去除表面的杂质和污垢，将清洗干净的浮萍放入搅拌器或破碎机中，进行均匀的破碎处

理，pH设置在6.5-7.5之间，然后倒入离心机中，温度控制在20-35°C，离心旋转，转速控制在300-450r/min，时间控制在3-8min得到提取物。

## [n0026]

The raw material composition ratio for step S2 is as follows: 5%-25% yeast powder, 5%-10% dipotassium hydrogen phosphate, 15%-20% duckweed protein extract, 5%-15% water, 5%-15% collagen, 5%-10% salt, 0%-5% glucose and 0%-15% agar.

---

步骤S2的原料成分配比为，5%-25%酵母粉、5%-10%磷酸氢二钾、15%-20%浮萍蛋白提取物、5%-15%水、5%-15%胶原蛋白、食盐5-10%、0%-5%葡萄糖和0%-15%琼脂。

## [n0027]

Step S3, in the supercritical CO_NER7 extraction method, the temperature is 35°C and the pressure is 30Mpa. Extraction: supercritical CO_NER8 is passed through the duckweed protein extract, dissolving and carrying away the oil components along the way. Separation: the dissolved supercritical CO_NER9 and the extract are separated by depressurization and condensation to obtain the extracted oil and oil-free peptone extract.

---

步骤S3，超临界CO<sub>2</sub>萃取法中温度为35°C，压力30Mpa，萃取：将超临界CO<sub>2</sub>通过浮萍蛋白提取物，沿途溶解和带走油脂成分，分离：将溶解后的超临界CO<sub>2</sub>和萃取物通过减压和冷凝分离，得到萃取后的油脂和无油蛋白胨提取物。

## [n0028]

The regulator includes lactic acid, acetic acid, and sodium hydroxide. Lactic acid and acetic acid are added first, followed by sodium hydroxide solution, to adjust the pH value to between 8 and 9.5.

---

所述调节剂包括有乳酸、醋酸、氢氧化钠，先加入乳酸和醋酸，然后再加入氢氧化钠溶液，调整pH值至8-9.5之间。

## [n0029]

In step S4, the ultrafiltration membrane is selected from polyethersulfone, polyamide, and polypropylene, with a pore size between 0.001 and 0.02 micrometers, a feed flow rate of 1-5 L/h, an operating pressure of 0.5-2.5 MPa, a temperature controlled at 25-35°C, a concentration of 1.5-2 times the feed volume, the use of 0.1-0.5% acetic acid, and a cleaning time of 30-60 minutes.

---

步骤S4中，所述超滤膜选择，选择聚醚砜、聚酰胺、聚丙烯，膜孔径0.001到0.02微米之间，进料流速：1-5L/h，操作压力：0.5-2.5MPa，温度控制在25-35℃，浓缩1.5-2倍的进料体积，使用0.1-0.5%的醋酸，清洗时间为30-60分钟。

## [n0030]

In step S4, the permeation membrane is selected as a polyamide membrane with a pore size of less than 1 nm, a feed flow rate of 5-20 L/h, an operating pressure of 8-20 MPa, a temperature of 15-30°C, a cleaning solution of 1-2% sodium hydroxide, and a cleaning time of 30-60 minutes.

---

步骤S4中，所述渗透膜选择使用聚酰胺膜，膜孔径：孔径小于1nm，进料流速：5-20L/h，操作压力：8-20MPa，温度15-30℃，清洗液使用1-2%的氢氧化钠，清洗时间：30-60分钟。

## [n0031]

In step S5, spray drying is used, with the inlet air temperature controlled between 120-160°C and the outlet air temperature controlled between 60-80°C.

---

步骤S5中，干燥采用喷雾干燥，进风温度：控制在120-160℃之间，出风温度：控制在60-80℃之间。

## [n0032]

Example 1

---

实施例一

## [n0033]

A method for preparing duckweed peptone specifically includes the following processing steps:

---

一种浮萍蛋白胨的制备方法，具体包括以下加工步骤，

## [n0034]

First, clean the duckweed, then crush it to extract the liquid containing duckweed protein. Place the duckweed in a basin and rinse thoroughly with deionized or distilled water. Then, rinse a second time with 45°C physiological saline to remove surface impurities and dirt. Place the cleaned duckweed in a mixer or crusher for uniform crushing, setting the pH to 7.5. Then, pour the mixture into a centrifuge at 35°C, centrifuge at 450 rpm for 3-8 minutes to obtain the extract. The mixture was cultured for 48 hours with 25% yeast powder, 10% dipotassium hydrogen phosphate, 20% duckweed protein extract, 15% water, 15% collagen, 5% salt, 5%

glucose, and 5% agar. Supercritical CO2 extraction was performed at 35°C and 30 MPa. Extraction involved passing supercritical CO2 through the duckweed protein extract, dissolving and carrying away the oil components along the way. Separation involved separating the dissolved supercritical CO2 and the extract under reduced pressure and condensation to obtain the extracted oil. Oil-free peptone extract, wherein the adjusting agents include lactic acid, acetic acid, and sodium hydroxide, is prepared by first adding lactic acid and acetic acid, then adding sodium hydroxide solution to adjust the pH to 9.5, adding the adjusting agents to further adjust the pH, and then using supercritical CO2 extraction to deoil the above raw materials; ultrafiltration and permeation are used to rapidly separate peptone and solid particles to improve extraction efficiency. The ultrafiltration membrane is selected from polyethersulfone, polyamide, and polypropylene, with a pore size of 0.02 micrometers, a feed flow rate of 5 L/h, and an operating pressure of: The feed volume was concentrated to 2.5 MPa and 35°C, using 0.5% acetic acid for 60 minutes. A polyamide membrane with a pore size less than 1 nm was used. The feed flow rate was 20 L/h, the operating pressure was 20 MPa, and the temperature was 30°C. 2% sodium hydroxide was used as the cleaning solution for 60 minutes. The filtered liquid was then dried using spray drying, with the inlet air temperature controlled at 160°C and the outlet air temperature controlled at 80°C to obtain the finished duckweed peptone product.

---

首先将浮萍进行清洗，然后将其破碎处理，提取含有浮萍蛋白的液体备用，将浮萍放入盆中，用去离子水或蒸馏水彻底冲洗浮萍，然后使用45°C的生理盐水进行二次清洗，去除表面的杂质和污垢，将清洗干净的浮萍放入搅拌器或破碎机中，进行均匀的破碎处理，pH设置在7.5，然后倒入离心机中，温度控制在35°C，离心旋转，转速控制在450r/min，时间控制在3-8min得到提取物，将25%酵母粉、10%磷酸氢二钾、20%浮萍蛋白提取物、15%水、15%胶原蛋白、食盐5%、5%葡萄糖和5%琼脂进行培养48h；超临界CO<sub>2</sub>萃取法中温度为35°C，压力30Mpa，萃取：将超临界CO<sub>2</sub>通过浮萍蛋白提取物，沿途溶解和带走油脂成分，分离：将溶解后的超临界CO<sub>2</sub>和萃取物通过减压和冷凝分离，得到萃取后的油脂和无油蛋白胨提取物，所述调节剂包括有乳酸、醋酸、氢氧化钠，先加入乳酸和醋酸，然后再加入氢氧化钠溶液，调整pH值至9.5，加入调节剂调整pH值，然后采用超临界CO<sub>2</sub>萃取法对上述原料进行脱油处理；采用超滤、渗透，快速分离蛋白胨和固体颗粒，提高提取效率，所述超滤膜选择，选择聚醚砜、聚酰胺、聚丙烯，膜孔径0.02微米，进料流速：5L/h，操作压力：2.5MPa，温度控制在35°C，浓缩2倍的进料体积，使用0.5%的醋酸，清洗时间为60分钟；渗透膜选择使用聚酰胺膜，膜孔径：孔径小于1nm，进料流速：20L/h，操作压力：20MPa，温度30°C，清洗液使用2%的氢氧化钠，清洗时间：60分钟；将过滤后的液体进行干燥处理，干燥采用喷雾干燥，进风温度：控制在160°C，出风温度：控制在80°C得到浮萍蛋白胨成品。

## [n0035]

The physicochemical properties of duckweed peptone are as follows:

---

浮萍蛋白胨的理化指标如下：

## [n0038]

Example 2

---

实施例二

## [n0039]

A method for preparing duckweed peptone specifically includes the following processing steps: First, the duckweed is washed, then crushed, and the liquid containing duckweed protein is extracted for later use. The duckweed is placed in a basin and thoroughly rinsed with deionized or distilled water, then washed a second time with physiological saline at 28-45°C to remove surface impurities and dirt. The cleaned duckweed is placed in a stirrer or crusher for uniform crushing, with the pH set at 6.5. Then, it is poured into a centrifuge at 20°C and centrifuged at a speed of 300 rpm. Extraction was obtained by controlling the extraction time to 3 minutes. A mixture of 20% yeast powder, 10% dipotassium hydrogen phosphate, 20% duckweed protein extract, 10% water, 15% collagen, 10% salt, 5% glucose, and 10% agar was cultured for 12 hours. Supercritical CO2 extraction was performed at 35°C and 30 MPa. Extraction involved passing supercritical CO2 through the duckweed protein extract, dissolving and carrying away the oil components along the way. Separation involved passing

the dissolved supercritical CO2 and the extract under reduced pressure and condensation. Separation was performed to obtain extracted oil and oil-free peptone extract. The adjusting agents included lactic acid, acetic acid, and sodium hydroxide. Lactic acid and acetic acid were added first, followed by sodium hydroxide solution to adjust the pH to 8. The pH was then adjusted again using supercritical CO2 extraction. Ultrafiltration and permeation were then used to rapidly separate peptone and solid particles, improving extraction efficiency. The ultrafiltration membrane was selected from polyethersulfone, polyamide, and polypropylene, with a pore size of 0.001 micrometers and a feed flow rate of 1-5 L/h. Pressure: 0.5 MPa, temperature controlled at 25°C, feed volume concentrated to 1.5-2 times, using 0.1% acetic acid, cleaning time 30 minutes; the permeation membrane is selected as a polyamide membrane, membrane pore size: less than 1 nm, feed flow rate: 5 L/h, operating pressure: 8 MPa, temperature 15°C, cleaning solution using 1% sodium hydroxide, cleaning time: 30 minutes; the filtered liquid is dried by spray drying, inlet air temperature controlled at 120°C, outlet air temperature controlled at 60°C to obtain the duckweed peptone product.

---

一种浮萍蛋白胨的制备方法，具体包括以下加工步骤，首先将浮萍进行清洗，然后将其破碎处理，提取含有浮萍蛋白的液体备用，将浮萍放入盆中，用去离子水或蒸馏水彻底冲洗浮萍，然后使用28-45°C的生理盐水进行二次清洗，去除表面的杂质和污垢，将清洗干净的浮萍放入搅拌器或破碎机中，进行均匀的破碎处理，pH设置在6.5，然后倒入离心机中，温度控制在20°C，离心旋转，转速控制在300r/min，时间控制在3min得到提取物，将20%酵母粉、10%磷酸氢二钾、20%浮萍蛋白提取

物、10%水、15%胶原蛋白、食盐10%、5%葡萄糖和10%琼脂进行培养12h；超临界CO<sub>2</sub>萃取法中温度为35℃，压力30Mpa，萃取：将超临界CO<sub>2</sub>通过浮萍蛋白提取物，沿途溶解和带走油脂成分，分离：将溶解后的超临界CO<sub>2</sub>和萃取物通过减压和冷凝分离，得到萃取后的油脂和无油蛋白胨提取物，所述调节剂包括有乳酸、醋酸、氢氧化钠，先加入乳酸和醋酸，然后再加入氢氧化钠溶液，调整pH值至8加入调节剂调整pH值，然后采用超临界CO<sub>2</sub>萃取法对上述原料进行脱油处理；采用超滤、渗透，快速分离蛋白胨和固体颗粒，提高提取效率，所述超滤膜选择，选择聚醚砜、聚酰胺、聚丙烯，膜孔径0.001微米，进料流速：1-5L/h，操作压力：0.5MPa，温度控制在25℃，浓缩1.5-2倍的进料体积，使用0.1%的醋酸，清洗时间为30分钟；所述渗透膜选择使用聚酰胺膜，膜孔径：孔径小于1nm，进料流速：5L/h，操作压力：8MPa，温度15℃，清洗液使用1%的氢氧化钠，清洗时间：30分钟；将过滤后的液体进行干燥处理，干燥采用喷雾干燥，进风温度：控制在120℃，出风温度：控制在60℃得到浮萍蛋白胨成品。

## [n0040]

The physicochemical properties of duckweed peptone are as follows:

---

浮萍蛋白胨的理化指标如下：

## [n0041]

Total nitrogen % (dry basis) 10-12; Amino acid nitrogen % (dry basis) 1.4-3.8; Sodium chloride % 0.6-1.6; Peptone % (dry basis) 32-66; Vitamins ≤mg/kg 1.45; Iron ≤mg/kg 1.8; Zinc ≤mg/kg 1.2; Calcium ≤mg/kg 1.5; pH value (2.5% aqueous solution) 5.5-6.0

---

总氮% 以干基计 10-12 氨基酸态氮% 以干基计 1.4-3.8 氯化钠% 0.6-1.6 蛋白胨% 以干基计 32-66 维生素 ≤mg/kg 1.45 铁 ≤mg/kg 1.8 锌 ≤mg/kg 1.2 钙 ≤mg/kg 1.5 pH值 2.5%水溶液 5.5-6.0

## [n0042]

Therefore, the preparation method of the present invention can increase the total nitrogen content and peptone content of duckweed peptone. This production process can overcome the problem of low peptone content in traditional production processes and improve the production efficiency of the bio-fermentation industry.

---

由此可知，本发明制备方法可提高浮萍蛋白胨的总氮含量和蛋白胨含量，此生产工艺可打破传统制作工艺蛋白胨含量低的问题，提高生物发酵行业的生产效率。

## [n0043]

The foregoing has shown and described the basic principles, main features, and advantages of the present invention. It will be apparent to those skilled in the art that the present invention is not limited to the details of the above exemplary embodiments, and that the

present invention can be implemented in other specific forms without departing from the spirit or basic characteristics of the present invention.

---

以上显示和描述了本发明的基本原理和主要特征和本发明的优点,对于本领域技术人员而言，显然本发明不限于上述示范性实施例的细节，而且在不背离本发明的精神或基本特征的情况下，能够以其他的具体形式实现本发明。

Therefore, the embodiments should be regarded as exemplary and non-limiting in all respects, and the scope of the invention is defined by the appended claims rather than the foregoing description. Thus, it is intended that all variations falling within the meaning and scope of the equivalents of the claims be included within the invention.

---

因此，无论从哪一点来看，均应将实施例看作是示范性的，而且是非限制性的，本发明的范围由所附权利要求而不是上述说明限定，因此旨在将落在权利要求的等同要件的含义和范围内的所有变化囊括在本发明内。

## [n0044]

Furthermore, it should be understood that although this specification describes embodiments, not every embodiment contains only one independent technical solution. This

narrative style is merely for clarity. Those skilled in the art should consider the specification as a whole, and the technical solutions in each embodiment can also be appropriately combined to form other embodiments that can be understood by those skilled in the art.

---

此外，应当理解，虽然本说明书按照实施方式加以描述，但并非每个实施方式仅包含一个独立的技术方案，说明书的这种叙述方式仅仅是为清楚起见，本领域技术人员应当将说明书作为一个整体，各实施例中的技术方案也可以经适当组合，形成本领域技术人员可以理解的其他实施方式。