

# Modification method of yellow humic acid, product obtained therefrom, and use thereof in preparation of immunity improving or HIV preventing medicaments

## Abstract

The invention discloses a method for modifying yellow humic acid, which comprises the following steps that: (1) a raw material containing the yellow humic acid or the yellow humic acid is directionally degraded to obtain a yellow humic acid degradation product under the action of a degradation agent in water; and the degradation agent is  $\text{HNO}_3$ ,  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$ , or acetic acid and  $\text{H}_2\text{O}_2$ ; and (2) under microwave conditions, the yellow humic acid degradation product prepared in step (1) reacts with kojic acid or an extract containing the kojic acid to obtain a yellow humic acid modified substance. The invention also relates to the yellow humic acid modified substance prepared by the method and application of the yellow humic acid modified substance to preparation of a medicine for improving the immunity or a medicine for preventing and treating HIV. The yellow humic acid modified substance has remarkable effect of improving the immunity, particularly improving the immunity of HIV patients, and has the advantages of small toxic side effect, small drug tolerance, definite target, simple and easy preparation method, and low cost.

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## Worldwide applications

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## Application CNA2008102051106A events

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## Claims (15)

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1, a kind of method of modifying of yellow humic acid, it comprises the steps:

(1) will contain the raw material or the yellow humic acid of yellow humic acid, in water, under the effect of degradation agents,, make yellow humic acid degradation products through the orientation degraded; Described degradation agents is  $\text{HNO}_3$ ,  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$ , perhaps acetic acid and  $\text{H}_2\text{O}_2$

(2) under the microwave condition, the yellow humic acid degradation products that step (1) is made with kojic acid or contain the extract reaction of kojic acid, promptly makes yellow humic acid modifier of the present invention.

2, the method for claim 1 is characterized in that: in the step (1), the described raw material that contains yellow humic acid is peat, brown coal or the weathered coal that contains yellow humic acid.

3, method as claimed in claim 2 is characterized in that: in the step (1), described peat is natural low moor pat.

4, the method for claim 1 is characterized in that: in the step (1), described raw material or the yellow humic acid that contains yellow humic acid, with the mass volume ratio of water be  $1\text{g}/0.5 \sim 10\text{ml}$ .

5, the method for claim 1 is characterized in that: in the step (1), the consumption of described degradation agents is  $10 \sim 50\%$ ; Per-cent is the mass concentration per-cent of degradation agents in water.

6, the method for claim 1 is characterized in that: in the step (1), when using  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  During as degradation agents,  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  Mass ratio be  $8:1 \sim 3:1$ ; When using acetic acid and  $\text{H}_2\text{O}_2$  During as degradation agents, acetic acid and  $\text{H}_2\text{O}_2$  Mass ratio be  $1.2:1 \sim 2:1$ .

7, the method for claim 1 is characterized in that: in the step (1), the temperature of described directed degraded is  $50 \sim 125^\circ\text{C}$ ; Described directed degradation time is  $10 \sim 200\text{min}$ .

8, the method for claim 1 is characterized in that: in the step (1), described directed degraded is carried out under the ultrasonic wave condition, and frequency of ultrasonic is  $100 \sim 800\text{KHz}$ .

9, the method for claim 1 is characterized in that: in the step (1), the consumption of described degradation agents is  $25 \sim 40\%$ , and per-cent is the mass concentration per-cent of degradation agents in water; Described directed degraded is at ultrasonic wave  $460\text{KHz}$ , carries out under  $80 \sim 110^\circ\text{C}$  of the temperature, and directed degradation time is  $60 \sim 180\text{min}$ .

10, the method for claim 1 is characterized in that: in the step (2), described microwave frequency is 915 ~ 2450MHz, and the power of microwave is 200 ~ 550W, and the time of described reaction is 5 ~ 30min.

11, the method for claim 1 is characterized in that: described kojic acid or the consumption that contains the extract of kojic acid are 0.5 ~ 2mol kojic acid/1mol yellow humic acid degradation products; The molar weight of described yellow humic acid degradation products is calculated with following formula: yellow humic acid degradation products quality ÷ yellow humic acid degradation products molecular-weight average.

12, the method for claim 1 is characterized in that: the product that step (2) is made is through charcoal absorption or cross activated carbon column, the yellow humic acid modified thing that obtains purifying.

13, the yellow humic acid modifier that makes as each described method of claim 1 ~ 12.

14, the application of yellow humic acid modifier as claimed in claim 13 in preparing medicine that improves immunizing power or the medicine of preventing and treating HIV.

15, application as claimed in claim 14 is characterized in that: the medicine of described control HIV is HIV vaccine dose or HIV vaccine adjuvant.

## Description

A kind of method of modifying of yellow humic acid, and products obtained therefrom and the application in preparation raising immunizing power or control HIV medicine thereof

### Technical field

The present invention relates to a kind of method of modifying of yellow humic acid, and products obtained therefrom and the application in preparation raising immunizing power or control HIV medicine thereof.

### Background technology

Humic acids (Humic Acid writes a Chinese character in simplified form HA) is the animals and plants remains, mainly is the remains of plant, through decomposition and the conversion of microorganism, and a series of chemical process and a type organic matter that accumulates. It has functions such as good physiologically active and absorption, complexing, exchange by the polymeric organic acid that aromatic series and multiple functional group thereof constitute. Humic acids extensively is present in soil, lake, river, ocean, and in peat (claiming the peat composed of rotten mosses again), brown coal and the weathered coal etc. According to the solubleness of humic acids in solvent, can be divided into three components: the part that 1. is dissolved in acetone or alcohol is called ulmic acid; 2. be insoluble to partial acetone and be called Ulmic acids; Part 3. water-soluble or diluted acid is called xanthohumic acid (claiming fulvic acid again).

Human research to humic acids obtained existing 214 years history first from soil from 1786. If with " coal looses " of enrolling in the famous medical scholar's LI Shi-Zhen Compendium of Material Medica works of China " medicine sage " Ming Dynasty is an example, existing more than 400 year of that Application humic. At present, humic acids is as organic matter raw material, has been widely used in farming, woods, herds, every field such as oil, chemical industry, building materials, medicine, health, environmental protection. China's resource of humic acid is very abundant, and its reserves is big, and it is wide to distribute, and grade is good. According to the pertinent data statistics, 124.8 hundred million tons in peat is arranged, occupy the 4th in the world; 1,265 hundred million tons in brown coal also have a large amount of weathered coals. Therefore, the research and development to resource of humic acid have great development prospect.

Acquired immune deficiency syndrome (AIDS) (AIDS), i.e. acquired immune deficiency syndrome (AIDS) is a kind of immunodeficiency diseases that is caused by human immunodeficiency virus (HIV, Human Immunodeficiency Virus). Current, hiv virus just spreads in the whole world with the infected speed of people's every days 1.5 ten thousand. Along with the progress of modern humans's material progress, acquired immune deficiency syndrome (AIDS) has been not only the problem in science that modern society faced, and becomes the human social concern of being paid close attention to day by day. Therefore, when French Xi Nuoxi (Francoise Barre-Sinoussi) and Meng Tani (Luc Montagnier) discovery human immunodeficiency virus, first isolates U.S.'s Gallo (Robert Gallo) after human reverse transcript virus-human T-cell leukemia virus HTLV (being commonly referred to as HIV), and developing efficiently, anti-AIDS drug is one of important topic of countries in the world new drug development always. At present, people often adopt the main medicine of hiv protease as treatment acquired immune deficiency syndrome (AIDS) (HIV), but exist hiv protease inhibitor biological activity low, and side effect is strong, and shortcoming such as cost an arm and a leg. Therefore, demand seeking the medicine of new control HIV disease urgently.

At present, in field of medicaments, total clinical application example of humic acids (comprising yellow humic acid) reaches more than 1000, but the pertinent literature report of Shang Weijian aspect raising immunizing power, control HIV.

### Summary of the invention

Technical problem to be solved by this invention provides a kind of method of modifying of yellow humic acid, and yellow humic acid modifier obtained by this method, and the application in the medicine of preparation raising immunizing power or control HIV.

Method of the present invention comprises the steps:

(1) will contain the raw material or the yellow humic acid of yellow humic acid, in water, under the effect of degradation agents,, make yellow humic acid degradation products through the orientation degraded; Described degradation agents is  $\text{HNO}_3$ ,  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$ , perhaps acetic acid and  $\text{H}_2\text{O}_2$

Wherein, the described raw material that contains yellow humic acid is mainly the natural matters such as peat, brown coal or weathered coal that contain humic acids. The abundant natural peat of preferred resources among the present invention, especially preferred natural low moor pat. Described natural low moor pat is to need the more plant of nutrient inorganic salt by low-lying place, seasonal ponding or the local growth of ponding throughout the year, accumulate the peat of formation for many years as each kind of plant the broken branches and fallen leaves that sedge belongs to, and alluviation is got off, its general degree of decomposition is higher, acidity is lower, and ash content is higher. Natural low moor pat has a large amount of distributions in China southwest, Central China, North China and northeast, the natural low moor pat of the preferred Yunnan of the present invention stone screen. Described yellow humic acid is for by the humic acids part of the water-soluble or diluted acid that extracts in the above-mentioned various natural matters, or the yellow humic acid that is made by artificial biochemical fermentation by prior art, the preferably yellow humic acid that extracts from natural low moor pat. Described raw material or the yellow humic acid that contains yellow humic acid can be through using after pulverizing and/or the weathering.

Wherein, the consumption of described water is so that contain the raw material of yellow humic acid or yellow humic acid is dissolved as suitably, preferable, and containing the raw material of yellow humic acid or the mass volume ratio of yellow humic acid and water is 1g/0.5 ~ 10ml, that better is 1g/0.6 ~ 2ml, and that best is 1g/1ml.

Wherein, what the consumption of described degradation agents was preferable is 10 ~ 50%, and better is 25 ~ 40%, and per-cent is the mass concentration per-cent of degradation agents in water. When using  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  During as degradation agents,  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  Mass ratio preferable be 8:1 ~ 3:1. When using acetic acid and  $\text{H}_2\text{O}_2$  During as degradation agents, acetic acid and  $\text{H}_2\text{O}_2$  Mass ratio preferable be 1.2:1 ~ 2:1.

Wherein, what the temperature of described directed degraded was preferable is 50 ~ 125 °C, and better is 70 ~ 120 °C, and best is 80 ~ 110 °C. That described directed degradation time is preferable is 10 ~ 200min, and that better is 60 ~ 180min.

Preferable, described directed degraded is carried out under the ultrasonic wave condition. That frequency of ultrasonic is preferable is 100 ~ 800KHz, and that better is 460 ~ 520KHz.

The condition of most preferred directed degraded is: the consumption of degradation agents is a mass percent 25 ~ 40%, ultrasonic wave 460KHz, and 80 ~ 110 °C of temperature, directed degradation time are 60 ~ 180min.

(2) under the microwave condition, the yellow humic acid degradation products that step (1) is made with kojic acid or contain the extract reaction of kojic acid, promptly makes yellow humic acid modifier of the present invention.

Wherein, described kojic acid is 5-hydroxyl-2-methylol 1-4-pyrone. The described extract that contains kojic acid can prepare as follows: get stalk fermentations such as corn or sweet sorghum and produce the residual sugar liquid of bio-ethanol (but concrete grammar reference: make pottery and build, Tang Xiaoyu etc., the Processing Technology Research of membrane bioreactor closed circulation ethanol fermentation raffinate, the Sichuan chemical industry, 2006,6,41 ~ 44; Li Wei, Lv Weimin, Liu Qun, with starch is that fermenting raw materials is produced kojic acid. wine brewing, 2006,32,2,35 ~ 36), 75 ~ 105 °C of following evaporation concentration be original volume 1/10 ~ 1/20 after, the ether or the ethyl acetate that add 1 ~ 3 times of concentrated solution volume, 5 ~ 15 °C are cooled off 1 ~ 3h down afterwards, and solid is the extract that contains kojic acid mutually after the layering, and its kojic acid content is generally 75 ~ 90wt% (Lu Zhengqing, Wang Yan, the fermentative Production of kojic acid and in Application in Food Processing, China's seasonings, 2008,347,1,65 ~ 67).

Described kojic acid or contain the consumption of extract of kojic acid preferable be 0.5 ~ 2mol kojic acid/1mol yellow humic acid degradation products. Among the present invention, the molar weight of described yellow humic acid degradation products is calculated with following formula: yellow humic acid degradation products quality ÷ yellow humic acid degradation products molecular-weight average; Described yellow humic acid degradation products molecular-weight average can be measured (concrete grammar reference: Li Shanxiang with dark type viscometer or ebullioscopic method, humic acids product analysis and standard, Chemical Industry Press, in September, 2007, p110 ~ 112, p112 ~ 113), generally recording the yellow humic acid degradation products molecular-weight average is 130 ~ 420.

Wherein, that described microwave frequency is preferable is 915 ~ 2450MHz, and that the power of microwave is preferable is 200 ~ 550W. That the described reaction times is preferable is 5 ~ 30min.

Preferable, after reaction finishes, with products therefrom through charcoal absorption or cross activated carbon column, to remove impurity.

The yellow humic acid modifier that is made by aforesaid method can directly use separately, also can use with drug matchings such as radix bupleuri, the root of large-flowered skullcap or Radix Glycyrrhizae.

In the method for modifying of the present invention, the optimum condition arbitrary combination of above steps promptly obtains each preferred embodiments of the present invention.

The invention still further relates to the yellow humic acid modifier that makes by aforesaid method. This yellow humic acid modifier has significant raising immunizing power, especially improves the effect of HIV patient's immunizing power.

Therefore, the invention further relates to the application of yellow humic acid modifier of the present invention in preparing medicine that improves immunizing power or the medicine of preventing and treating HIV. What the medicine of described control HIV was preferable is HIV vaccine dose or HIV vaccine adjuvant. As required, the acceptable various conventional auxiliary materials of yellow humic acid modifier of the present invention and pharmacy can be mixed, make the product of various formulations, as paste, liquid agent or pulvis.

Agents useful for same of the present invention and raw material are all commercially available to be got.

Positive progressive effect of the present invention is: yellow humic acid modifier of the present invention has effects such as significant raising immunizing power, especially improve the effect of HIV patient's immunizing power, and toxic side effect is little, resistance is little, target is clear and definite, and the preparation method is simple, and cost is low. The present invention provides new way for making full use of yellow humic acid.

#### Embodiment

Further specify the present invention with embodiment below, but the present invention is not limited.

In following examples, the natural peat yellow humic acid is provided by Shaping County, Yunnan science and technology office, and medical activated carbon is available from Shanghai gac company limited. The humic acid degradation product molecular-weight average is measured (concrete reference: Li Shanxiang, humic acids product analysis and standard, Chemical Industry Press, in September, 2007, p112 ~ 113) by ebullioscopic method.

#### Reference example

Getting stalk fermentations such as corn, sweet sorghum produces bio-ethanol residual sugar liquid (pottery is built, Tang Xiaoyu etc., the Processing Technology Research of membrane bioreactor closed circulation ethanol fermentation raffinate, the Sichuan chemical industry, 2006,6,41 ~ 44), after 85 °C of following evaporation concentration are original volume 1/10ml, add the ether of 2 times of concentrated solution volumes, put into 10 °C refrigerator internal cooling 2h afterwards, layering, solid phase is the kojic acid extract, and kojic acid content is 85wt%.

#### Embodiment 1

With 100g natural peat yellow humic acid, containing  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  The aqueous solution (100ml, total concn 25wt%,  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  Mass ratio be 4:1) in, under 110 °C of the temperature, under the ultrasonic wave of 150KHz, directed DeR 120min obtains molecular-weight average and is 140 yellow humic acid degradation products.

The kojic acid extract (containing the 1.5mol kojic acid) that 1mol yellow humic acid degradation products and reference example are made is at microwave frequency 2450Hz, and under the microwave power 500W, reaction 30min through medical activated carbon absorption impurity elimination, promptly makes yellow humic acid modifier of the present invention again.

#### Embodiment 2

500g at the natural peat yellow humic acid, under the ultrasonic wave of 100KHz, is being contained  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  The aqueous solution (250ml, total concn 50wt%,  $\text{HNO}_3$  and  $\text{H}_2\text{SO}_4$  Mass ratio be 4:1) in, under 120 °C of the temperature,, obtain molecular-weight average and be 276 yellow humic acid degradation products through directed DeR 90min.

With the 1mol yellow humic acid degradation products, the kojic acid extract (containing the 0.5mol kojic acid) that makes with reference example is at microwave frequency 2450Hz, and under the microwave power 200W, reaction 30min through medical activated carbon absorption impurity elimination, promptly makes yellow humic acid modifier of the present invention again.

#### Embodiment 3

100g through 10 days natural peat yellow humic acid of 15 °C of natural air dryings, under the ultrasonic wave of 800KHz, is being contained  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  The aqueous solution (150ml, total concn 10wt%,  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  Mass ratio be 5:1) in, under 100 °C of the temperature,, obtain molecular-weight average and be 420 yellow humic acid degradation products through directed DeR 50min.

With the 1mol yellow humic acid degradation products, the kojic acid extract (containing the 0.8mol kojic acid) that makes with reference example is at microwave frequency 915Hz, and under the microwave power 550W, reaction 30min through medical activated carbon absorption impurity elimination, promptly makes yellow humic acid modifier of the present invention again.

#### Embodiment 4

100g through 3 hours natural peat yellow humic acid of 50 °C of oven dry of thermostatic drying chamber, under the ultrasonic wave of 460KHz, is being contained  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  The aqueous solution (50ml, total concn 20wt%,  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  Mass ratio be 8:1) in, under 100 °C of the temperature,, obtain molecular-weight average and be 390 yellow humic acid degradation products through directed DeR 120min.

The kojic acid extract (containing the 1mol kojic acid) that 1mol yellow humic acid degradation products and reference example are made is at microwave frequency 2450Hz, and under the microwave power 550W, reaction 20min through medical activated carbon absorption impurity elimination, promptly makes yellow humic acid modifier of the present invention again.

#### Embodiment 5

100g through 1 hour natural peat yellow humic acid of 75 °C of oven dry of thermostatic drying chamber, under the ultrasonic wave of 460KHz, is being contained  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  The aqueous solution (60ml, total concn 30wt%,  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  Mass ratio be 3:1) in, under 110 °C of the temperature,, obtain molecular-weight average and be 139 yellow humic acid degradation products through directed DeR 180min.

The kojic acid extract (containing the 2mol kojic acid) that 1mol yellow humic acid degradation products and reference example are made is at microwave frequency 1500Hz, and under the microwave power 500W, reaction 20min promptly makes yellow humic acid modifier of the present invention.

#### Embodiment 6

With 100g natural peat yellow humic acid, under the ultrasonic wave of 460KHz, containing  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  The aqueous solution (80ml, total concn 40wt%,  $\text{HNO}_3$  And  $\text{H}_2\text{SO}_4$  Mass ratio be 6:1) in, under 80 °C of the temperature,, obtain molecular-weight average and be 275 yellow humic acid degradation products through directed DeR 60min.

With the 1mol yellow humic acid degradation products, the kojic acid extract (containing the 1.7mol kojic acid) that makes with reference example is at microwave frequency 2450Hz, and under the microwave power 500W, reaction 10min passes through the activated carbon column impurity elimination again, promptly makes yellow humic acid modifier of the present invention.

#### Embodiment 7

With 100g natural peat yellow humic acid, under the ultrasonic wave of 600KHz, containing 15wt%  $\text{HNO}_3$  The aqueous solution (100ml) in, under 70 °C of the temperature,, obtain molecular-weight average and be 285 yellow humic acid degradation products through directed DeR 150min.

With the 1mol yellow humic acid degradation products, with the 1.2mol kojic acid at microwave frequency 1500Hz, under the microwave power 400W, the reaction 25min, promptly make yellow humic acid modifier of the present invention.

#### Embodiment 8

With 100g natural peat yellow humic acid, under the ultrasonic wave of 520KHz, containing acetic acid and  $\text{H}_2\text{O}_2$  The aqueous solution (1000ml, total concn 30wt%, acetic acid and  $\text{H}_2\text{O}_2$  Mass ratio be 1.2:1) in, under 50 °C of the temperature,, obtain molecular-weight average and be 310 yellow humic acid degradation products through directed DeR 10min.

At microwave frequency 1500Hz, under the microwave power 500W, reaction 5min through medical activated carbon absorption impurity elimination, promptly makes yellow humic acid modifier of the present invention again with 1mol yellow humic acid degradation products and 1.3mol kojic acid.

#### Embodiment 9

With 100g natural peat yellow humic acid, containing acetic acid and  $\text{H}_2\text{O}_2$  The aqueous solution (500ml, total concn 30wt%, acetic acid and  $\text{H}_2\text{O}_2$  Mass ratio be 2:1) in, under 125 °C of the temperature,, obtain molecular-weight average and be 130 yellow humic acid degradation products through directed DeR 30min.

The kojic acid extract (containing the 0.8mol kojic acid) that 1mol yellow humic acid degradation products and reference example are made is at microwave frequency 1500Hz, and under the microwave power 500W, reaction 20min through medical activated carbon absorption impurity elimination, promptly makes yellow humic acid modifier of the present invention again.

#### Effect embodiment

Get 30 of kunming mice (available from China Medical University), set up trial model with reference to the method for following document: (1) Li Zhenyu, Xu Kailin, Pan Xiuying etc., the structure of HIV-I lentiviral vectors and structure of modification, Chinese Journal of Hematology, 2004,25,9,571-572; (2) Sang Wei, Xu Kailin, Pan Xiuying etc., the RNA of shRNA mediation disturbs the reticent effect to mouse T lymphocyte CD28 gene, Chinese Journal of Hematology, 2007,28,12,808 ~ 810.

Mouse is divided into greatly at random, in, small dose group and control group, give the 0.6g/kg body weight respectively, 0.4g/kg body weight, 0.2g/kg the yellow humic acid modifier of body weight (embodiment 1), inculcated continuously 7 days, broken end is got blood examination and is surveyed t lymphocyte subset group (TLS after 7 days, adopt BeckmanCoulter Epics XL flow cytometer, CD4+-FITC/CD8+-PE/CD3+-PECYS three fluorescence traget antibody, measuring method reference: citrine, lymphocytic detection of early syphilis serum immobilized patients and meaning, China's skin cypridology magazine, 2008,22,9,546 ~ 547; Nicolini G, et al, Effect of trans-resveratrolon signal transduction pathways involved inpaclitaxel-induced apoptosis inhuman neuroblastoma SH.SY5 Y cells, Neurochemistry Int, 2003,42,5,419), the result is shown in table 1 and 2.

Table 1 couple kunming mice LgT<sub>1</sub> Influence

Table 2 couple kunming mice L<sub>3</sub>T<sub>4</sub> Influence

By table 1 and 2 as seen, yellow humic acid modifier of the present invention has the effect of significant raising HIV infecting mouse immunizing power, and good dose-effect relationship is arranged.

Patent Citations (1)

Publication number	Priority date	Publication date	Assignee	Title
CN1213665A *	1998-08-25	1999-04-14	祝亚勤	Prepn. method of medicinal-grade peat sodium fulvic acid
Family To Family Citations				

\* Cited by examiner, † Cited by third party

Cited By (2)

Publication number	Priority date	Publication date	Assignee	Title
CN103720717A *	2013-12-20	2014-04-16	广州东送能源集团有限责任公司	Application of modified fulvic acid in preparation of anti-arthritis medicament
CN103720716A *	2013-12-20	2014-04-16	广州东送能源集团有限责任公司	Application of modified fulvic acid in preparation of antitumor drugs
Family To Family Citations				

\* Cited by examiner, † Cited by third party, ‡ Family to family citation

Similar Documents

Publication	Publication Date	Title
Signoretto et al.	2019	Catalytic production of levulinic acid (LA) from actual biomass
CN101058097B	2011-04-06	Resource using method for food and drink garbage
CN101619107B	2011-06-29	Astragalus polysaccharide extraction method
CN101781669B	2013-07-17	Method for preparing high-purity xylo-oligosaccharide by adopting straws
CN103333267A	2013-10-02	Enteromorpha se-polysaccharide with biological activity as well as preparation method and application of enteromorpha se-polysaccharide
CN100512652C	2009-07-15	Method for preparing tea saporin pool-cleaning agent using tea dreg as raw material
CN106167812A	2016-11-30	Utilize the method that feces of livestock and poultry produces alcohol fuel
CN103012615A	2013-04-03	Method for efficiently extracting sepia acidic polysaccharose
CN104784210A	2015-07-22	Preparation method and application of skipjack extract with uric acid reduction effect
CN105859545A	2016-08-17	Preparation method of furfural and levulinic acid
Kerton et al.	2017	Fuels, Chemicals and Materials from the Oceans and Aquatic Sources
CN102674916A	2012-09-19	Bio-organic fertilizer
CN109355321A	2019-02-19	A method of microalgae grease yield is improved using walnut shell extract
CN110787192B	2021-10-26	Application of soluble dietary fiber in kelp in preparing hypoglycemic drugs and functional foods
CN101475605B	2013-06-05	Modification method of yellow humic acid, product obtained therefrom, and use thereof in preparation of immunity improving or HIV preventing medicaments
CN100431424C	2008-11-12	Preparation method and use of a fish toxic made of tea saponin
CN108624636A	2018-10-09	A kind of preparation method of lentinan
CN101899120B	2012-09-26	Method for refining jujube polysaccharide
CN101463050B	2013-06-05	Modification method of humic acid, product obtained therefrom, and use thereof in skin-protection health products or medicaments preparation
CN106236808A	2016-12-21	A kind of stevia rebaudiana phenol extract and the application in antiinflammatory goods thereof
CN103045481A	2013-04-17	Method for promoting growth of Nannochlorisoculata and increasing contents of chlorophyll and mycoprotein of Nannochlorisoculata
CN101023756A	2007-08-29	Traditional Chinese medicine preparation for preventing and controlling ginger nematode disease and preparing method
CN107987856A	2018-05-04	Method for preparing biological fuel gas, activated carbon and products thereof
CN110200290A	2019-09-06	A kind of extracting method of Chinese yam polypeptide
CN104306455B	2016-06-22	A kind of Plumula Nelumbinis chloroform extract and its production and use

Priority And Related Applications

Priority Applications (1)

Application	Priority date	Filing date	Title
CN2008102051106A	2008-12-30	2008-12-30	Modification method of yellow humic acid, product obtained therefrom, and use thereof in preparation of immunity improving or HIV preventing medicaments

Applications Claiming Priority (1)

Application	Filing date	Title
CN2008102051106A	2008-12-30	Modification method of yellow humic acid, product obtained therefrom, and use thereof in preparation of immunity improving or HIV preventing medicaments

Legal Events

Date	Code	Title	Description
2009-07-08	C06	Publication	
2009-07-08	PB01	Publication	
2009-09-02	C10	Entry into substantive examination	
2009-09-02	SE01	Entry into force of request for substantive examination	
2013-06-05	C14	Grant of patent or utility model	
2013-06-05	GR01	Patent grant	
2013-10-30	EE01	Entry into force of recordation of patent licensing contract	<b>Application publication date:</b> 20090708  <b>Assignee:</b> YUNNAN ZHONGDIAN NEW ENERGY CO., LTD.  <b>Assignor:</b> Shiping County Agricultural Science and Technology Bureau East China University of Science and Technology  <b>Contract record no.:</b> 2013310000112  <b>Denomination of invention:</b> Modification method of yellow humic acid, product obtained therefrom, and use thereof in preparation of immunity improving or HIV preventing medicaments  <b>Granted publication date:</b> 20130605  <b>License type:</b> Exclusive License  <b>Record date:</b> 20130905
2013-10-30	LICC	Enforcement, change and cancellation of record of contracts on the licence for exploitation of a patent or utility model	
2016-08-03	EC01	Cancellation of recordation of patent licensing contract	<b>Assignee:</b> YUNNAN ZHONGDIAN NEW ENERGY CO., LTD.  <b>Assignor:</b> Shiping County Agricultural Science and Technology Bureau East China University of Science and Technology  <b>Contract record no.:</b> 2013310000112  <b>Date of cancellation:</b> 20160704
2016-08-03	LICC	Enforcement, change and cancellation of record of contracts on the licence for exploitation of a patent or utility model	
2021-12-10	CF01	Termination of patent right due to non-payment of annual fee	
2021-12-10	CF01	Termination of patent right due to non-payment of annual fee	<b>Granted publication date:</b> 20130605

## Concepts



machine-extracted

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Name	Image	Sections	Count	Query match
■ humic acid		title,claims,abstract,description	113	0.000
■ Simian-Human immunodeficiency virus		title,claims,abstract,description	21	0.000
■ drug		title,claims,abstract,description	19	0.000
■ preparation method		title,abstract,description	7	0.000
■ immunity		title,abstract	4	0.000
■ modification method		title	1	0.000
■ Kojic acid		claims,abstract,description	72	0.000
■ kojic acid		claims,abstract,description	36	0.000
■ degradation product		claims,abstract,description	35	0.000
■ acetic acid		claims,abstract,description	33	0.000
■ catabolic process		claims,abstract,description	21	0.000
■ degradation		claims,abstract,description	21	0.000
■ degradation reaction		claims,abstract,description	21	0.000
■ chemical substances by application		claims,abstract,description	19	0.000
■ extract		claims,abstract,description	17	0.000
■ raw material		claims,abstract,description	12	0.000
■ effects		claims,abstract,description	10	0.000
■ water		claims,abstract,description	9	0.000
■ carbon		claims,description	24	0.000
■ modifier		claims,description	22	0.000
■ peat		claims,description	18	0.000
■ chemical reaction		claims,description	14	0.000
■ immunization		claims,description	11	0.000
■ absorption reaction		claims,description	9	0.000
■ product		claims,description	7	0.000
■ coal		claims,description	4	0.000
■ lignite		claims,description	4	0.000
■ vaccines		claims,description	4	0.000
■ adjuvant		claims,description	2	0.000
■ adjuvant		claims,description	2	0.000
■ charcoal		claims,description	2	0.000
■ toxic side effect		abstract,description	2	0.000
■ substance		abstract	4	0.000
■ nitric acid		abstract	2	0.000
■ Drug tolerance		abstract	1	0.000
■ Sulfuric acid		abstract	1	0.000
■ hydrogen peroxide		abstract	1	0.000
■ sulphuric acid		abstract	1	0.000

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