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## PATENTS FOR SULFORAPHANE EXTRACTION / PURIFICATION / SYNTHESIS

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**CN105949098**

### **Method for extracting sulforaphane from broccoli**

Inventor(s): QIU YINGYING; MENG HAOYING +

The invention relates to a method for extracting sulforaphane from broccoli, and belongs to the field of sulforaphane. The method comprises the following steps: performing variation on escherichia coli to obtain escherichia coli producing a glucosinolate enzyme; culturing variated escherichia coli; performing treatment and ultrasonic extraction on the broccoli to obtain an extracting solution; performing enzymolysis, adding sodium hydroxide, normal hexane and the like to remove impurities of oil grease, metal ions, proteins and the like so as to obtain a glucose sulforaphane glycoside solution; fermenting the escherichia coli; adding glucose sulforaphane glycoside into the fermentation liquor for reacting; performing centrifugal separation, CO<sub>2</sub> ultra-critical extraction, normal-pressure distillation and low-temperature vacuum freeze drying to obtain sulforaphane. The prepared sulforaphane has high yield and high purity, and can be applied to large-scale production, compared with the conventional method, the production time is shortened by 6-8 hours, and the purity is over 95 percent.

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**CN105246339**

### **Method for producing broccoli having increased sulforaphane content and use of broccoli produced therefrom**

Inventor(s): CHOI HYUK-JOON; CHOI KYOUNG-SOOK; JEONG JUNG-KY; KIM GEON; LEE DONG-UN +

种类	电场 (kV/cm)	频率 (Hz)	处理时间 (秒)	处理 次数	萝卜硫素 (mg/100g)	感官评价 (9 分的分值尺 度)
比较						
例 1	-	-	-	-	37.4	9
1-1	0.1	20	10	1	77.1	9
1-2	1.0	20	10	1	82.4	9
1-3	2.0	20	10	1	138.8	9
1-4	5.0	20	10	1	132.1	8
1-5	10.0	20	10	1	145.1	6
1-6	100.0	20	10	1	107.0	7

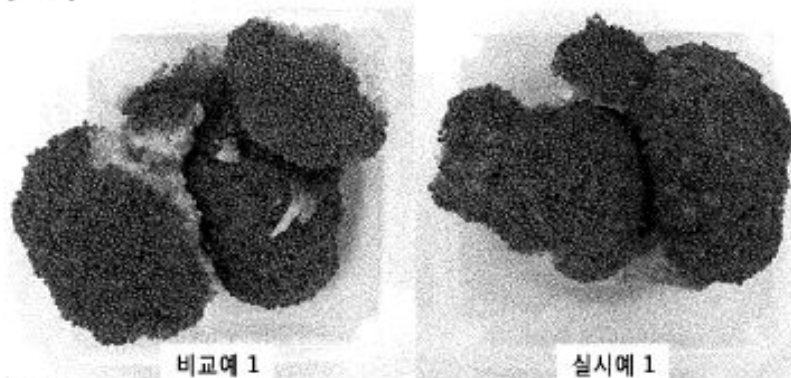
1-0	100.0	20	10	1	107.0	5
2-1	2.0	0.5	10	1	90.5	9
2-2	2.0	5	10	1	119.2	9
2-3	2.0	50	10	1	151.4	6
2-4	2.0	100	10	1	155.0	4
3-1	2.0	5	0.5	1	66.3	9
3-2	2.0	5	5	1	58.2	9
3-3	2.0	5	50	1	121.1	7
3-4	2.0	5	300	1	103.5	4
3-5	2.0	5	600	1	99.8	2
4-1	2.0	5	5	2	49.4	9
4-2	2.0	5	5	10	88.2	8
4-3	2.0	5	5	30	82.1	6
4-4	2.0	5	5	60	56.2	4

The present invention relates to a method for producing broccoli having increased sulforaphane content by using **high voltage pulsed electric field treatment**, which enables the consumption of broccoli having increased sulforaphane content in a form of an original material or a cut material cut into a proper size without pulverizing the broccoli and enables the extraction of sulforaphane from the broccoli, as a material, having increased sulforaphane content. The broccoli having increased sulforaphane content and sulforaphane extracted therefrom can be utilized as active ingredients for food, feed, or cosmetic compositions so as to exhibit functions of sulforaphane, such as antioxidative and anti-inflammatory properties.

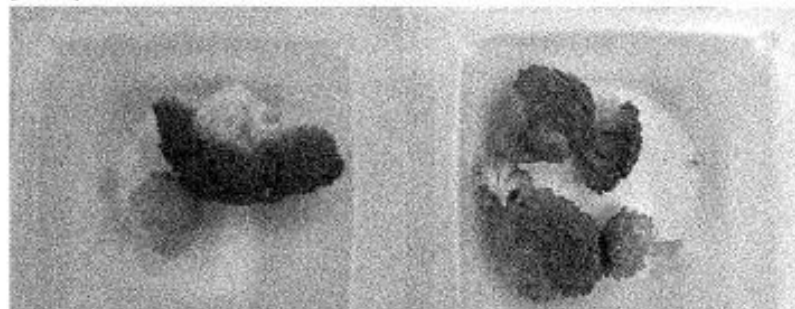
## WO2015160124

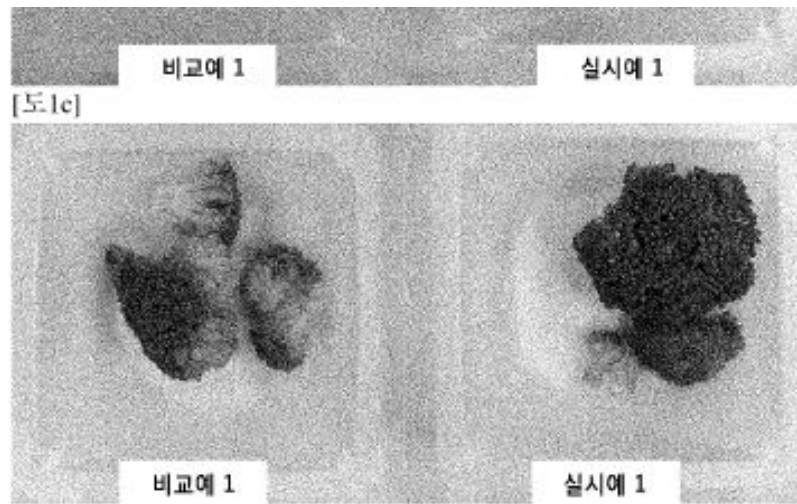
### METHOD FOR PRODUCING BROCCOLI HAVING INCREASED SULFORAPHANE CONTENT AND USE OF BROCCOLI PRODUCED THEREFROM

[도1a]



[도1b]





Inventor(s): CHOI HYUK JOON [KR]; CHOI KYOUNGSOOK [KR]; JEONG JUNG-KY [KR]; KIM GEON [KR]; LEE

The present invention relates to a method for producing broccoli having increased sulforaphane content by using high voltage pulsed electric field treatment, which enables the consumption of broccoli having increased sulforaphane content in a form of an original material or a cut material cut into a proper size without pulverizing the broccoli and enables the extraction of sulforaphane from the broccoli, as a material, having increased sulforaphane content. The broccoli having increased sulforaphane content and sulforaphane extracted therefrom can be utilized as active ingredients for food, feed, or cosmetic compositions so as to exhibit functions of sulforaphane, such as antioxidative and anti-inflammatory properties.

**CN104800270**

**Preparation method for broccoli sprout extract capsule**

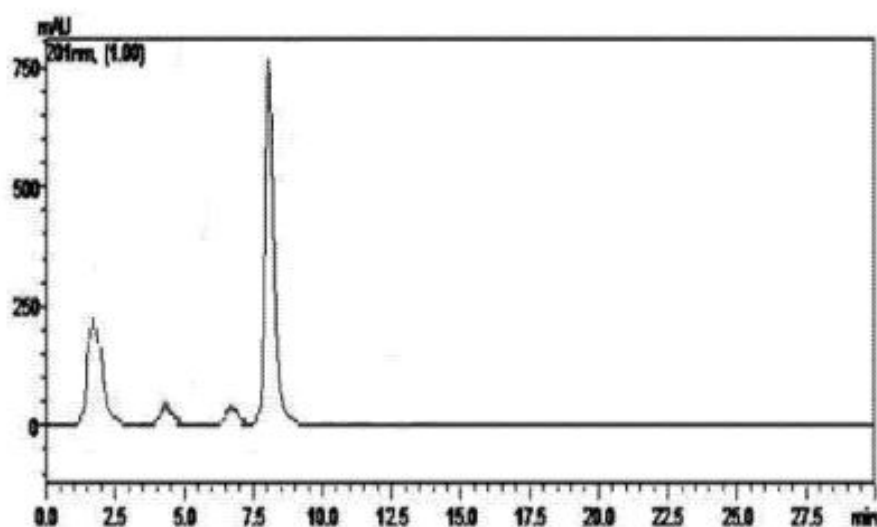


图 1



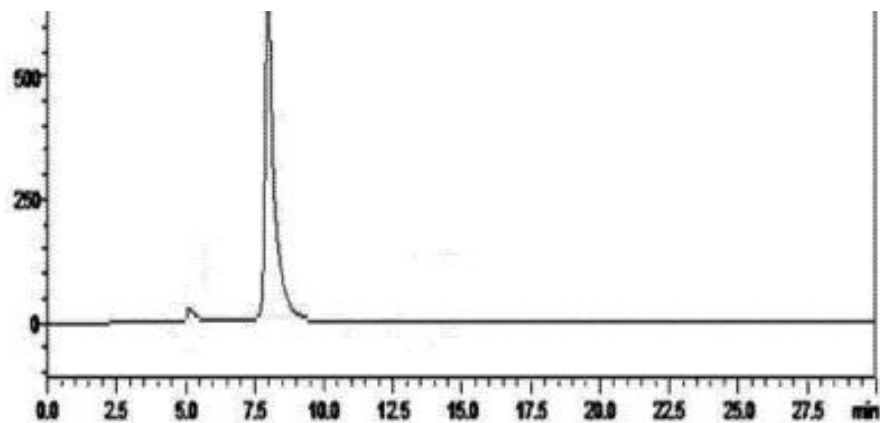


图 2

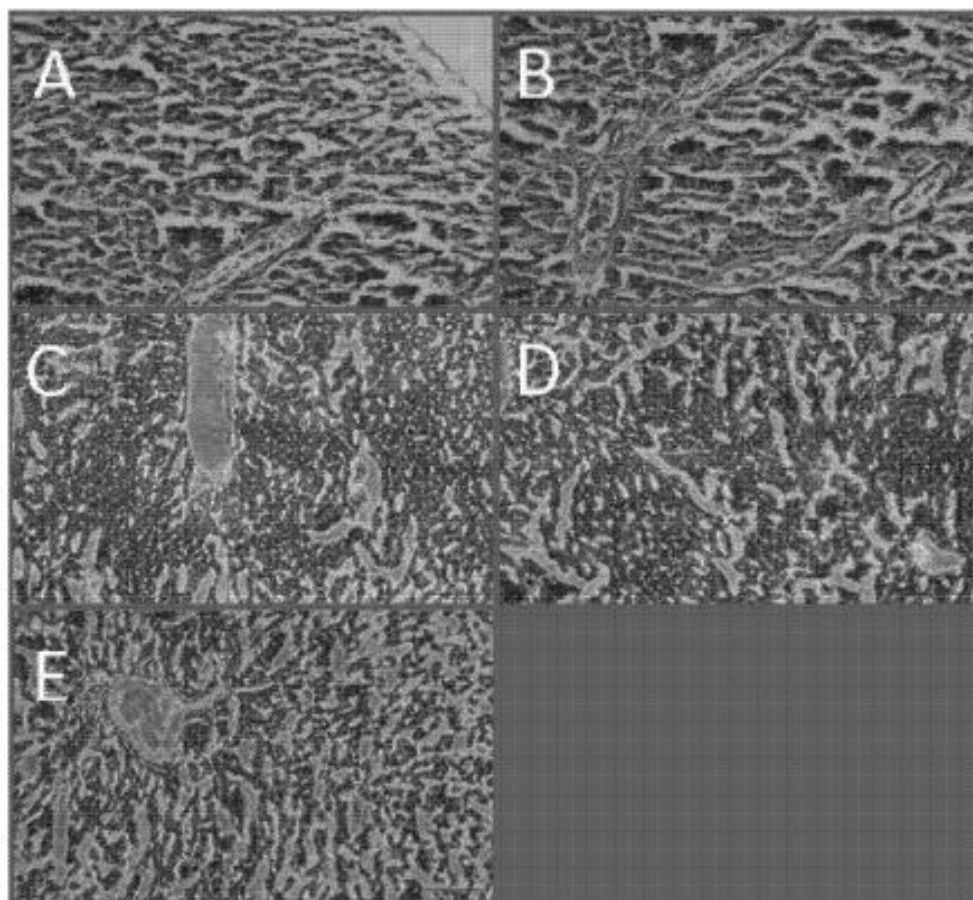


图 3

Inventor(s): LIU XIAOPING; WANG TIANHENG; CHEN YAJUAN; CHEN GUANGHAI; LIU DINGFENG +

The invention discloses a preparation method for a broccoli sprout extract capsule. The steps are as follows: (1) after the soilless culture of broccoli seeds, sprouts which emerge for 3 days are taken out, dried under low temperature, crushed and screened; (2) Vit.C is added into sprout powder, deionized water is used for regulating the ratio of liquid to material as 1:3, PH is regulated as 5, and the cells of the sprouts are broken by ultrasonic oscillation; (3) the mixed solution is added with acetone, and is oscillated under magnetic stirring until sufficient enzymolysis; (4) after ultrasonic oscillation extraction, suction filtration, rotary evaporation concentration and freeze-drying, broccoli sprout extract powder is obtained; (5) according to

the proportion of 1(powder):4(starch):4(sucrose):1(microcrystalline cellulose), the broccoli sprout extract powder is produced into granules with alcohol as wetting agent; (6) afterfilling, the broccoli sprout extract capsule is obtained. Compared with the prior art, the preparation method is easy to operate, and is low in cost, moreover, the extract capsule contains 2mg of DL-sulforaphane as an active ingredient, and therefore has functions such as anticancer and antioxidation functions, and the broccoli sprout extract capsule has a good application prospect.

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**US2015190443**  
**Broccoli Based Nutritional Supplements**

Inventor(s): ASHURST KEAN

A nutritional supplement is provided containing two broccoli based components that are combined and, when ingested, react in the intestines to provide sulforaphane. Processes for producing the broccoli components of the nutritional supplement are also provided. The broccoli components are treated separately using supercritical fluid extraction to remove oils. The temperature and pressure of the supercritical extraction processes are controlled to provide broccoli components having the desired properties for the nutritional supplement.

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**CN104402787**  
**Method for separation and purification of sulforaphane**

Inventor(s): LIU XUESONG; LUAN LIANJUN; LI XIAODONG; TAN MANLIANG; LI YERUI; YANG YINGSHI; JING

The invention discloses a method for separation and purification of sulforaphane. The method comprises the steps of: (1) hydrolysis extraction; (2) coarse separation and impurity removal; (3) multistage membrane separation and purification; and (4) concentrating and drying. By means of acid hydrolysis, multistage filtration and concentration, the method overcomes the problems of tedious process, low product yield, high effective component loss rate of the purification and concentration process in existing sulforaphane production methods, and is suitable for industrialized production.

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**CN104152504**  
**New preparation method of 1-isothiocyanic acid-4-methanesulfonyl-(2-ene) butane**

Inventor(s): LIU QINGHAI; YAN LIXIU; ZHOU XIAOHUA; JIANG XIAOQIN; WANG JIANG; YANG ZHIXIONG;

The invention discloses a new preparation method of 1-isothiocyanic acid-4-methanesulfonyl-(2-ene) butane, and particularly relates to a method for the extraction of sulforaphane from radish seeds or broccoli seeds or rape seeds. According to the method, air-dried radish seeds or broccoli seeds or rape seeds are used as a raw material for preparation of a radish seed crushing liquid, an enzyme deactivated broccoli seed or radish seed dispersion liquid, a degreased fine grinding liquid, a fermentation liquid, a protein removal fermentation

liquid, a concentrated liquid, dry polysaccharide powder and high purity sulforaphane freeze-dried powder for preparation of 1-isothiocyanic acid-4-methanesulfonyl-(2-ene) butane with the purity of more than 98%. The production rate of the sulforaphane prepared by the method is high, the operation is simple, and the product has the characteristics of being high in product purity of more than 98%, green, non-pollution and the like. The product prepared by the method can be widely used in medicine and health care industry, and has cancer preventing and resistant function.

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#### **CN104086469**

##### **Method for extracting and purifying sulforaphane from broccoli seeds**

Inventor(s): LUAN LIANJUN; LIU XUESONG; TAN MANLIANG; LI XIAODONG; LI JIE +

The invention discloses a method for extracting and purifying sulforaphane from broccoli seeds. The method comprises the following steps: 1, crushing broccoli seeds, degreasing the crushed broccoli seeds by using a low-polarity reagent in order to remove grease in the broccoli seeds, and drying the degreased broccoli seeds to obtain dry broccoli seed powder; 2, adding water and a pH value adjusting agent to the degreased and dried dry broccoli seed powder to obtain an acidic solution, and hydrolyzing the dry broccoli seed powder to obtain a hydrolysate; 3, adding water to the hydrolysate, carrying out ultrasonic extraction, and filtering the above obtained solution in order to obtain a sulforaphane extract liquid; and 4, adding a water saturated reagent to the sulforaphane extract liquid to carry out extraction, collecting the obtained organic phase, and concentrating the organic phase to form an oily product in order to obtain oily sulforaphane. The method has the advantages of simple technology, low cost, good selectivity and the like, overcomes the preparation scale restriction of small batch and laboratories, and is in favor of the industrial production of sulforaphane.

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#### **CN104086468**

##### **Method for supercritical carbon dioxide extraction of sulforaphane**

Inventor(s): LUAN LIANJUN; LIU XUESONG; LI XIAODONG; TAN MANLIANG; WANG YI +

The invention discloses a method for supercritical carbon dioxide extraction of sulforaphane. The method comprises the following steps: 1, crushing broccoli seeds, degreasing the crushed broccoli seeds in order to remove grease in the broccoli seeds, and drying the degreased broccoli seeds to obtain dry broccoli seed powder; 2, adding water and a pH value adjusting agent to the degreased and dried dry broccoli seed powder to obtain an acidic solution, and hydrolyzing the dry broccoli seed powder; 3, filtering the above obtained hydrolyzed solution containing the broccoli seed powder in order to remove impurities, and drying to obtain a hydrolysate containing the broccoli seed powder; and 4, extracting the hydrolysate by adopting a supercritical carbon dioxide fluid to obtain oily sulforaphane. The method has the advantages of simple technology, low cost, good selectivity and the like, overcomes the preparation scale restriction of small batch and laboratories, and is in favor of improving the

industrial production scale of sulforaphane.

CN103975835

## Cultivation method for broccoli bud rich in sulforaphane

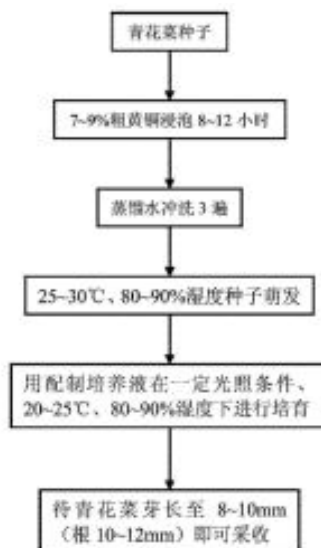


图 1

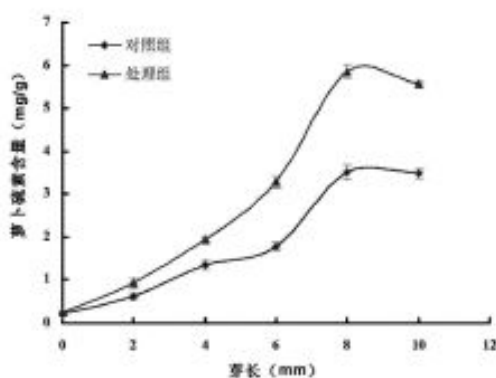


图 2

Inventor(s): XU FENG; WANG HONGFEI; DONG DIDI; SHAO XINGFENG; LI HESHENG; TANG YUECHANG +

The invention discloses a cultivation method for broccoli buds rich in sulforaphane. The cultivation method is characterized by comprising the steps of the extraction of sedum aizoon crude flavonoids, the preparation of a self-made culture solution, the selection and processing of broccoli seeds, the germination of the broccoli seeds, the reveal of the broccoli seeds, the cultivation of the broccoli seeds through using a mode that the revealed broccoli seeds are placed on gauze which is wetted by the self-made culture solution under a certain light condition and an environment with the temperature of 20-25 DEG C and the humidity of 80-90 %, the spraying of the self-made culture solution every other 24 hours, and the harvesting when the broccoli buds grow to 8-10 mm or the broccoli roots are 10-12 mm long to obtain the broccoli buds rich in the sulforaphane. The cultivation method has the advantages that the resistance to corrosion is strong, the yield is high, the content of the sulforaphane is high, the cultivation method is simple, and the effect is rapid.

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**CN103705488**

**Preparation method of sulforaphane capsule**

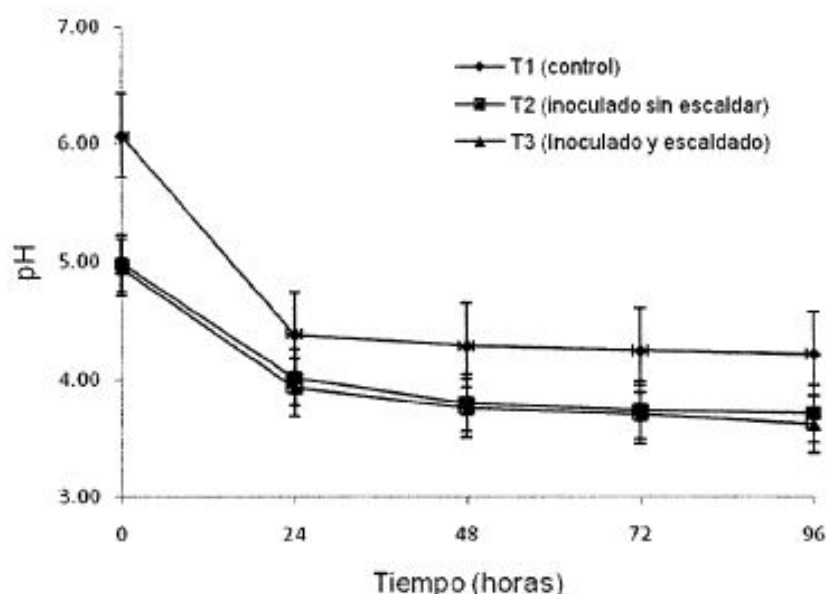
Inventor(s): LI SHENG; MA SHAOYING; TANG BIN; ZHOU WENZHENG; CAO BAOCHENG; HU CUIZHEN; SU LIRONG

The invention relates to a preparation method of a sulforaphane capsule. The method comprises the following steps: (1) dehydrating, drying and smashing a flowering branch of an edible part of fresh broccoli to obtain broccoli dry powder; (2) smashing new harvested mustard seeds, adding distilled water, and carrying out ultrasonic oscillation and suction filtration to obtain crude enzyme; (3) uniformly mixing the broccoli dry powder with the crude enzyme, carrying out enzymolysis and drying to obtain dry broccoli dry powder; (4) adding ethyl alcohol to the broccoli dry powder, carrying out ultrasonic oscillation extraction, sieving and suction filtration to obtain sulforaphane crude extract; (5) concentrating the sulforaphane crude extract to obtain sulforaphane aqueous solution; (6) diluting the sulforaphane aqueous solution to obtain the sulforaphane aqueous solution with the sulforaphane content of 3-5mg/mL; (7) adding the sulforaphane aqueous solution to the dry broccoli powder, and drying after uniform mixing to obtain redried broccoli powder; (8) smashing the redried broccoli powder for capsule filling to obtain the sulforaphane capsule with the sulforaphane content of 6-14mg/g. The preparation method is simple to operate and low in cost.

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**MX2011007850**

**METHOD OF EXTRACTING SULFORAPHANE BY MEANS OF A LACTIC FERMENTATION TREATMENT IN CRUCIFEROUS PLANTS.**



**FIGURA 1**





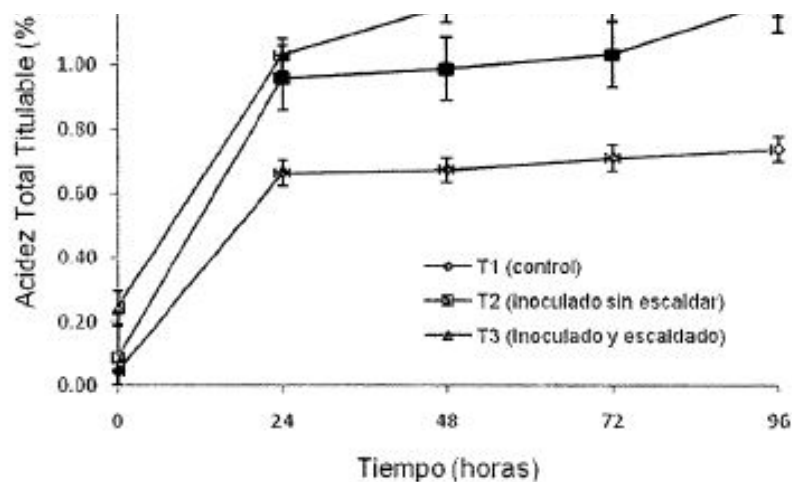


FIGURA 2

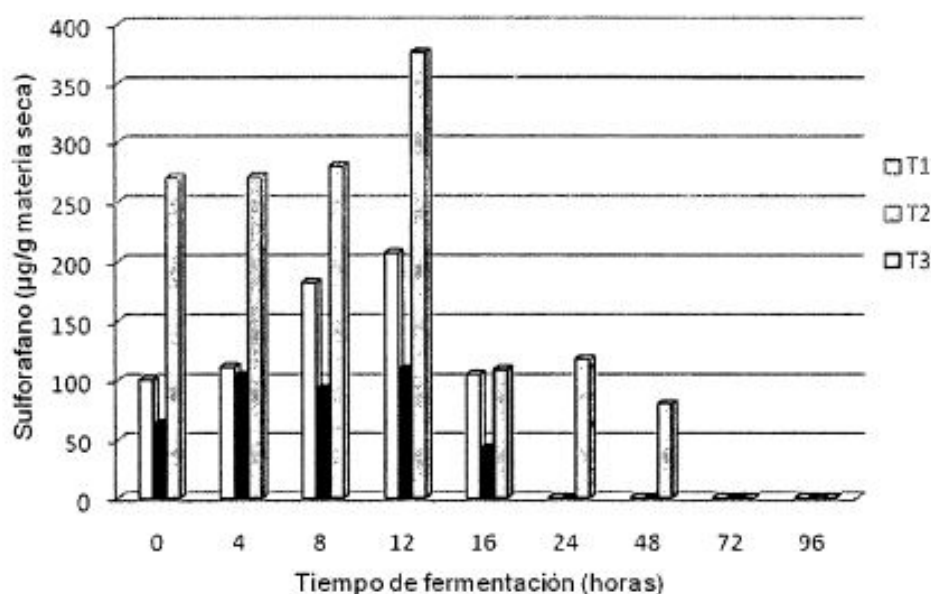


FIGURA 3

Inventor(s): CERVANTES JAIME LOPEZ [MX]; MACHADO DALIA ISABEL SANCHEZ +

The invention relates to the field of biotechnology and to a method for obtaining sulforaphane by means of a process of lactic fermentation of broccoli and the remains of the harvest thereof, which additionally includes the identification and quantification of sulforaphane by high resolution liquid chromatography (HRLC) and the development of a fermented broccoli foodstuff. Said method makes it possible to obtain greater concentrations of sulforaphane in remains of fermented broccoli, especially if scalded, which constitutes an alternative in the development of novel products, since it improves the nutrient composition and the preservation of the vegetable. Likewise, the method also represents an alternative for the integral treatment of agricultural remains of broccoli in order to obtain food derivatives with healthful properties and high added value, such as supplements with a high content of fiber and/or protein, texture improvers or active extracts rich in sulforaphane. The steps of the method are: a) preparation of samples; b) addition of salt, inoculum, water and sugar; c) mixing; d) fermentation; and e) quantification, extraction and purification of the sulforaphane..

**MX2011005064**  
**SULFORAPHANE QUANTIFICATION METHOD BY HIGH  
RESOLUTION LIQUID CHROMATOGRAPHY IN CRUCIFERAE  
PLANTS.**

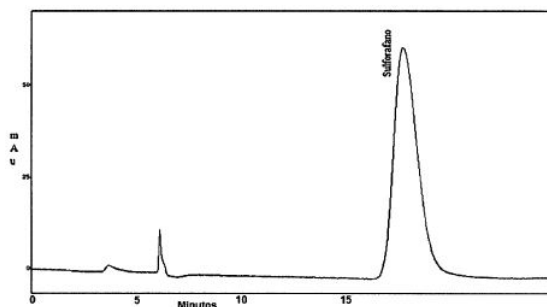


FIGURA 1

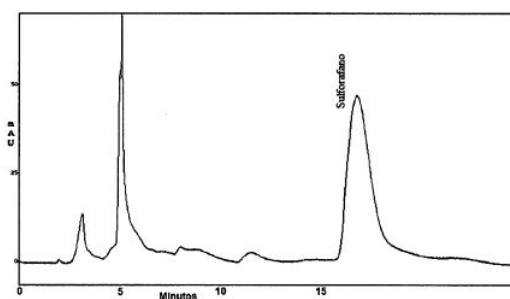


FIGURA 2

Inventor(s): CERVANTES JAIME LOPEZ [MX]; MACHADO DALIA ISABEL SANCHEZ +

Sulforaphane is an isothiocyanate with antimicrobial and anticarcinogenic properties, is found in a wide variety of plants of the genus *Brassica oleracea*, the most important among them being broccoli and cabbage. The present invention describes a method for the extraction, identification and quantification of sulphoraphane edible portions of broccoli and cabbage leaves by high performance liquid chromatography (HPLC). The sample preparation for quantification of sulforaphane includes the conversion of glucoraphanin to sulforaphane (45  $\pm$  2 DEG C for 2.5 h), extracted with dichloromethane, purification of the extract by solid-phase extraction columns, and detection by HPLC-UV. The sulforaphane concentration in broccoli plants was found within the range of from about 196 microg/g DW (whole head) to about 499 microg/g DW (inflorescences). Red cabbage plants showed higher values of sulforaphane ((101.99 microg/g DW) than those of green cabbage plants (7.58 microg/g DW). The characteristic method of the preset invention showed that broccoli inflorescences and cabbage leaves are rich in sulforaphane.

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**CN102871066**  
**Preparation of food-grade natural isorhodanate by application of supercritical CO2  
extraction technology**

Inventor(s): YUAN HAINA

A technology for preparing isorhodanate from Broccoli seed by the application of a supercritical CO<sub>2</sub> extraction technology belongs to the technical field of biochemistry. The main preparation process comprises the following steps of: milling Broccoli seed, degreasing, carrying out enzymatic hydrolysis, carrying out freeze drying, carrying out supercritical CO<sub>2</sub> extraction, and separating to obtain an isorhodanate extract which is rich in benzyl isorhodanate and sulforaphane. The product is safe and nontoxic, has no side-effect, and can be used as a product ingredient of food, health food and medicines. As the supercritical CO<sub>2</sub> extraction technology provided by the invention replaces a traditional solvent extraction technology, the yield of isorhodanate in the obtained extract is 0.513% and is higher than that of a solvent extraction method by 51.8%. In addition, the product safety problem caused by extraction solvent residual is solved. The isorhodanate provided by the invention can be applied in production ingredients of various common food, health food and medicinal products, and has good effects of raising antioxidation and antisenescence of food and preventing and treating tumor.

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**CN102688219**

**Sulforaphane microencapsulation method**

Inventor(s): JIANHUA MA +

The invention discloses a sulforaphane microencapsulation method which comprises the following steps of: I, extraction of sulforaphane: performing digestion of the raw material crucifer to extract the sulforaphane, wherein the extraction concretely comprises the following steps of: A, grinding seeds; B, adding petroleum ether for degreasing; C, adopting phosphate buffer solution with pH value of 7.0; D, performing enzymolysis; E, adding an extractant for extraction; F, adding sodium sulfate and sodium chloride respectively, and filtering; G, performing vacuum concentration to remove the organic solvent; H, fixing the volume to 5,000ml with methanol; I, filtering with a 0.22-micron microfiltration membrane; and J, measuring the content of sulforaphane by liquid chromatography; and II, microencapsulation of sulforaphane: adding monoglyceride and sodium alginate into the composite wall material, adding the deionized aqueous solution, adding the sulforaphane while stirring, spray-drying and collecting the product. In the method disclosed by the invention, the extremely unstable sulforaphane liquid is synthesized into powdery solid particles through a microencapsulation method so as to obtain perfect stability.

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**CN102586352**

**Method for enriching and extracting sulforaphane from brassica vegetable seeds**

Inventor(s): ZHENXIN GU; YINGJUAN GU; QIANGHUI GUO; YONGQI YIN; YONGBIN HAN +

The invention relates to a method for enriching and extracting sulforaphane from brassica vegetable seeds and belongs to the technical field of food biological technology. The method is characterized by comprising the following steps of: taking the sulforaphane brassica

vegetable seeds with germinating ability as raw materials; crushing the raw materials and adding a Tris-HCl buffer solution according to the ratio of the materials to liquid being (w/v) 1:(3-5); adjusting the pH value to 6.0-8.0 to form an incubation buffer; adding vitamin C and  $Zn^{2+}$ , activating endogenous myrosinase in the vegetable seeds and hydrolyzing glucosinolate to form the sulforaphane with an anti-cancer effect;; and extracting the sulforaphane from the incubation buffer with ethyl acetate and carrying out filtering, vacuum concentration, ultrasonic extraction and vacuum condensation to obtain a sulforaphane product. The method disclosed by the invention has the characteristics of wide application range of the raw material, low production cost, high enrichment quantity of the sulforaphane and the like. The method is suitable for health-care food sulforaphane products.

### CN102102113

#### Method for extracting sulforaphane from leaves of cauliflowers



图 1

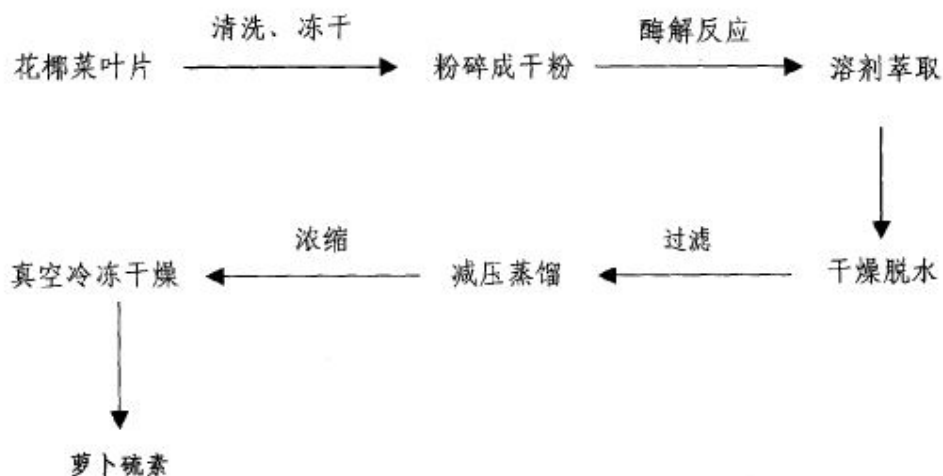


图 2

Inventor(s): YONGJIN QIAO; HAIHONG WANG; ZHAOLIANG CHEN +

The invention relates to a method for extracting sulforaphane from leaves of cauliflowers, which comprises the following steps of: after bulbs of the cauliflowers are harvested, immediately collecting waste leaves, cleaning, and performing freezing treatment in an ultralow temperature refrigerator; performing vacuum freeze drying, uniformly crushing into powder, taking 1 part of powder, adding exogenous myrosinase in an amount which is 6 to 10 times weight of the powder and deionized water in an amount which is 4 to 6 times weight of

the powder, and fully mixing into uniform slurry; and performing enzymolysis reaction, solvent extraction, filtration, concentration, and vacuum freeze drying to obtain high-purity sulforaphane. The raw material sources are rich, the extraction method is simple, and the method is more suitable for industrial production.

**KR20040102621**

# **EXTRACTION OF TURNIP BY INDIRECTLY HEATING CRUSHED TURNIP TO PRESERVE EFFECTIVE COMPONENTS OF TURNIP...**

Inventor(s): KWON KOOK WON; YE HONG SUN +

**PURPOSE:** A method of extracting a turnip(*Brassica rapa* L.) by indirectly heating a crushed turnip to preserve the effective components of the turnip, squeezing with a belt press to remove the residue, saccharifying with an enzyme and then concentrating is provided. The turnip extract produced is mixed with various cereals to produce food. **CONSTITUTION:** A crushed turnip is indirectly heated at 40 to 60deg.C for 2 to 3min to preserve the effective components of the turnip such as vitamin C, tryptophane, lysine, isothiocyanate, disulfide and sulforaphane, squeezed with a belt press while removing the residue, sterilized at 85 to 95deg.C for about 30sec, centrifuged to remove foreign material and pulp and then cooled to 35 to 45deg.C. The cooled turnip is fermented at 53 to 60deg.C, saccharified with an enzyme, concentrated to 7 to 99Brix and then filtered. The turnip extract is mixed with starch, corn flour, rice flour, buckwheat flour, wheat flour or the like to give food such as noodles, cold noodles, bread, confection or the like.

**FR2888235**

# **Extraction of sulforaphane from broccoli seed extract containing glucoraphanin...**

	Quantité	Concentration en SF	Quantité de SF	Pourcentage du SF présent au départ
Graines de départ	203,22 g	0,955 g / 100 g	1,941 g	100,00 %
1 <sup>ère</sup> phase éliminée	1 litre	0,438 mg / ml	0,438 g	22,55 %
2 <sup>ème</sup> phase éliminée	60,53 g	18,13 mg / ml	0,011 g	0,56 %

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**Tableau 1 :** Quantité de SF non extraite et présent dans les phases d'extraction éliminées  
La première phase correspond à celle éliminée après extraction par l'acétate d'éthyle.  
La deuxième phase correspond à celle éliminée après extraction par l'eau.

Quantité ( g )	Concentration en SF ( g/100g )	Quantité de SF ( g )
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<b>Graines de brocoli</b>	805,7	0,955	7,699
<b>Extrait final</b>	5,8	88,2	5,116
<b>Rendement</b>			66,5 %

**Tableau 2** : Calcul du rendement d'extraction

Inventor(s): EFSTATHIOU THEO; NIO CHRISTIAN +

The extraction of sulforaphane from broccoli seed extract containing glucoraphanin, comprises hydrolyzing the extract, and extracting carbohydrates and lipids in the hydrolyzed extract, by a water (1:1 weight ratio) containing sulforaphane. The extraction of carbohydrates and lipids is carried out using an ion exchange resin and a solvent in which the carbohydrates and/or the lipids are not soluble. The extraction of carbohydrates and lipids is carried out by water before evaporation of the higher phase. The evaporation is carried out using a rotary evaporator at 30[deg]C. The extraction of sulforaphane from broccoli seed extract containing glucoraphanin, comprises hydrolyzing the extract, and extracting carbohydrates and lipids in the hydrolyzed extract, by a water (1:1 weight ratio) containing sulforaphane. The extraction of carbohydrates and lipids is carried out using an ion exchange resin and a solvent in which the carbohydrates and/or the lipids are not soluble. The extraction of carbohydrates and lipids is carried out by water before evaporation of the higher phase. The evaporation is carried out using a rotary evaporator at 30[deg]C. The first extraction process comprises adding an ethylacetate (1:1 volume ratio) to the hydrolyzed extract, centrifuging the basic ethylacetate solution to obtain a first supernatant solution and decanting the supernatant solution to obtain a first higher and lower aqueous phase. The second extraction process comprises mixing a base and the lower aqueous phase, adding the ethylacetate (1:1 volume ratio) to the mixture, centrifuging the ethylacetate mixture to obtain a second base and a second supernatant solution, decanting the supernatant solution to obtain second higher and lower aqueous phase, and extracting higher phases to collect the lower phases. The third extraction process comprises mixing the second base and the second lower aqueous phase, adding ethylacetate to the mixture, centrifuging the ethylacetate mixture to obtain a third base and a third supernatant solution and decanting the supernatant solution to obtain a third higher and lower aqueous phase. Freeze-drying and matrix encapsulation of the sulforaphane are obtained from the extraction of carbohydrates and lipids by water. The matrix encapsulation is carried out using gum arabic. Mixing the gum arabic with the sulforaphane before freeze-drying. The mixture of sulforaphane and gum arabic comprises 70% of gum arabic.

**CN102249968**

### **Synthetic method for sulforaphane**

Inventor(s): XIN CHEN; XIAOQIANG SUN; ZHENGYI LI; JIE REN; KUN HU +

The invention provides a synthetic method for sulforaphane and belongs to the field of drug synthesis. The method comprises the following steps that: after amino in 4-amino-1-butanol is protected by Boc groups, hydroxy in 4-amino-1-butanol is changed into methanesulfonyl

ester by methanesulfonyl chloride, and then the resultant reacts with sodium methyl mercaptide to produce 4-methylthio butyl-1-tert-butoxycarbonylamide; Boc protective groups are removed under acidic condition to obtain 4-methylthio-1-butylamine; 4-methylthio-1-butylamine reacts with carbon disulfide for one hour in the presence of triethylamine and p-toluenesulfonyl chloride is added for treatment for half an hour to produce 4-methylthio butyl-1-isothiocyanate; and at last 4-methylthio butyl-1-isothiocyanate is oxidized by m-CPBA to produce sulforaphane. According to the invention, complex hydrazinolysis of phthalimide in aftertreatment is avoided and toxic thiophosgene is not needed in the preparation of isothiocyanate; overall yield of sulforaphane is 64%, substantially higher than the overall yield of 8% reported in literature; the whole preparation process is simple and time-saving and is suitable for large scale production.

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**CN102093273**

**Chemical synthesis method of sulforaphane**

Inventor(s): QIAN XU; WEILIANG CHEN; JINHAO FU; ZHIMIN JIN +

The invention discloses a chemical synthesis method of sulforaphane. The method is characterized by comprising the following steps of: (a) in the presence of a catalyst, heating 1,3-propylene glycol and hydrobromic acid for reacting to obtain 3-bromine-1-propyl alcohol; (b) reacting dimethyl sulfoxide and sodium hydride at normal temperature, after the dimethyl sulfoxide and the sodium hydride completely react, adding the 3-bromine-1-propyl alcohol, and stirring; after the 3-bromine-1-propyl alcohol completely reacts, washing with a small quantity of water; extracting by using dichloromethane, taking an organic layer, and carrying out spin evaporating on the organic layer to obtain white solid 4-methylsulfonyl-1-butanol; (c) dissolving the 4-methylsulfonyl-1-butanol in an organic solvent, adding a chlorinated reagent for a chlorinated reaction to obtain 1-chlorine-4-methylsulfonyl butane; and (d) under the protection of nitrogen, dissolving the 1-chlorine-4-methylsulfonyl butane in an organic solvent, adding a thiocyanide reagent and heating, after the reaction ends, washing with water, extracting by using an organic solvent, and carrying out spin evaporating to remove the solvent to obtain faint yellow oily liquid, i.e. the sulforaphane. The method has the advantages of simpleness of operation, high yield and stable product.

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**BROCCOLI SPROUT DREK**

Inventor(s): PARK GU HONG [KR] +

Provided is a broccoli sprout drink comprising processed extract of broccoli sprout containing a quantity of sulforaphane that is an antioxidant, which is accumulated in body and reinforces an immunity when person eats the drink. The broccoli sprout drink is made by the steps of (i) washing a sprout on third days after sprouting and processing the sprout with mixer to obtain an extract of broccoli sprout, and (ii) mixing 10% 10 g of the extract of broccoli sprout with 0.7% vitamine C, condensed apple juice, 1% citric acid, 0.2% taurine, an antioxidant for preservation of sodium synthesis, and a flavor for drink. The %s are based on 100 mg of content. The drink exhibits an antioxidizing effect in body for 24 hours, increases a protection

mechanism in body by itself, and decreases a sensitivity to carcinogenic substances in body.

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