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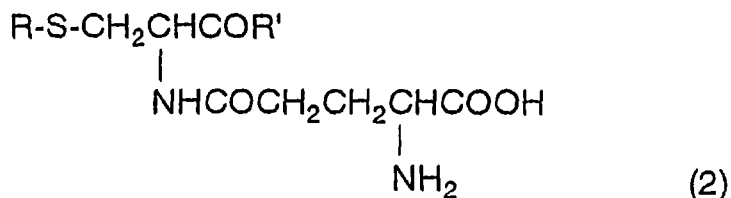
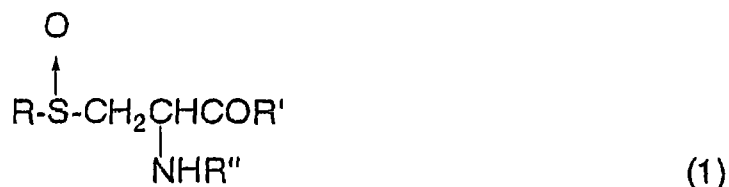
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# DESCRIPTION

## METHOD FOR PRODUCING DRIED INSTANT SOUP OR SAUCE

### Technical Field

The present invention relates to a novel method for producing a dried instant soup, sauce or the like in which at least one compound selected from the sulfur-containing compounds represented by the following general formulas (1) and (2):



is added thereto whereby the flavor proper (inherent) to vegetables, mushrooms, spices and/or the like contained in the soup, sauce or the like may be fortified (enhanced) and maintained for prolonged time (over a long time), and to a food composition and the like obtained by this method. The sulfur-containing compound(s) may also be in the form



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of a salt. In the above formulas, R denotes a hydrogen atom, a saturated or unsaturated aliphatic hydrocarbon group with 1 to 3 carbon atoms or a carboxyalkyl group, R' denotes a hydroxyl group or a carboxymethylamino group, and R'' denotes a hydrogen atom or a  $\gamma$ -glutamyl group, respectively.

#### Background Art

Recently, the demand for dried instant soup persists by reason of its simplicity in use. In particular, due to a boom for healthy foods, there is general preference to healthy soup containing vegetables and mushrooms in large quantities. Moreover, because of the general liking to the ethnic food, there is also a general preference to spicy soup. The dried instant soup is excellent in preservation because it is a dried food and frequently has its effective tasting time period set to a longer time. However, the starting components contained in the powdered soup, especially vegetables, mushrooms and spices are rapidly deteriorated in flavor on drying or during storage, thus presenting the problem of the deteriorated commercial value of the dried instant soup during its storage.

As for preventing of deterioration of the flavor proper to spices, there is proposed in Japanese Patent Kokai Publication JP-A-9-75042 a method for preparing a seasoning sauce in which a starting material is previously heated under degassing and tight sealing to prevent

deterioration of the spices ascribable to heating sterilization during the producing process. However, the heating processing frequently is not provided in the producing method for the powdered soup. If such processing is provided, the method proposed in the above-mentioned publication is in need of enormous investment costs and hence is difficult to effectuate in view of constraints on the production cost.

As the effect on the flavor of the sulfur-containing compound, there have so far been known an instance (1) of fortifying the flavor of meat in foods, especially canned food, by using the Maillard reaction, in employing sugars and amino acids in combination, as disclosed in Japanese Patent Kokoku Publication JP-B-42-22194, Japanese Patent Kokoku Publication JP-B-49-35149 and in Japanese Patent Kokoku Publication JP-B-53-28977, and an instance (2) of fortifying "kokumi" (thickness, mouthfulness and continuity) taste of the food by conjunctive use of components having "Umami" taste, as disclosed in Japanese Patent Kokoku Publication JP-B-63-13661. However, the precise effect of these on the flavor of the food containing sulfur-compounds containing the vegetables, mushrooms spices and the like is not known.

#### Object of Invention

It is an object of the present invention to provide a dried (dry) instant soup, sauce or the like in which the

flavor proper to the vegetables, mushrooms, spices and / or the like in the soup, sauce or the like obtained therefrom is fortified (enhanced) and maintained in stability for prolonged time so that the dried instant soup, sauce or the like has improved taste and commercial value after prolonged storage.

#### Disclosure of Invention

As a result of our (the present inventors') perseverant researches towards achieving the above object, the present inventors have found that (a) by adding specified components in the preparation of the dried instant soup, it is possible to fortify the flavor proper to the vegetables, mushrooms, spices or the like added into the dried instant soup and to maintain the flavor in stability for prolonged time (over a long time) and that (b) there exists a specified preferable ratio in the effective adding amounts of the components.

Moreover, the present inventors have conducted retrieval and research into a wide range of components that meet the above requirements, and found that (c) the sulfur-containing compounds having the above formulas (1) or (2) are most proper and that (d) in addition, the adding effect of the sulfur-containing compounds represented by the above formulas is valid for all dried instant soups containing vegetables, such as Chinese cabbage, cabbage, tomatoes, eggplants, broccoli sprouts, kidney beans, corns,

bean sprouts, onions, Welsh onions or the like, and edible mushrooms, such as velvet shank (enoki mushrooms ), shiitake mushrooms, shimeji mushrooms, common mushrooms, pine tree mushrooms ( matutake mushrooms ) or the like, or essences thereof. The present inventors have also found that the adding effect of the sulfur-containing compounds is valid for all dried instant soups containing edible spices such as anise, allspice, cardamon, basil, caraway, nutmegs, dill, fennel, cinnamon, clove, ginger, pepper, Chinese pepper (red-pepper), mustard, prickly ash pepper, garlic, turmeric, lemongrass, coriander or the like, or essences thereof. The adding effect gives rise to an accentuated flavor proper to these components and to improved preservation stability.

The present inventors have also found that the similar and same effects as above can be also obtained in the dried (dry) sauce as well.

The present invention has been brought to completion based on the above findings and informations.

The present invention is directed to a method for producing a dried instant soup, sauce or the like, wherein at least one compound selected from the sulfur-containing compounds, including salt forms thereof, represented by the formulas (1) and (2) mentioned above, is added to a feedstock composition in any step (stage) during the production process of dried (dry) instant soup, sauce or the like containing vegetable(s), mushroom(s) and/or

spice(s). In the above formulas, R denotes a hydrogen atom, a saturated or unsaturated aliphatic hydrocarbon group with 1 to 3 carbon atoms or a carboxyalkyl group, R' denotes a hydroxyl group or a carboxymethylamino group, and R'' denotes a hydrogen atom or a  $\gamma$ -glutamyl group, respectively. Said carboxyalkyl group is the group preferably with 2 to 5 carbons, such as carboxymethyl, carboxyethyl, and carboxypropyl and carboxybutyl. For the salt form thereof, the sodium salt, the calcium salt and the like may be exemplified.

The sulfur-containing compound(s) used in the present invention can also be used in the form of mixture containing the compound(s).

The soup, sauce or the like herein means at least one of various soups and various sauces, inclusive of dressings, and equivalents thereof.

These various sauces mean all sorts of foods that give wetness, flavor or luster to the cooking and that render the cooking easier to eat and those which may be eaten in any countries in the world. The sauces also mean those that are served either hot or cold.

The various soups which may be eaten in any countries in the world include all sorts of broths served for dinner, no matter whether they are served cold or hot. The broths may be clarified or thick and turbid. The broths may contain ingredients.

If it is desired to realize the effect of the present

invention, that is that of augmenting the flavor of the vegetables and mushrooms and/or spices in the dried instant soup, sauce or the like to improve its preservation properties, the sulfur-containing compound represented by the formula (1) and (2) is preferably a compound selected from the group consisting of glutathione (GSH), glutamyl cystein ( $\gamma$ -GC) and the salt thereof.

The present invention also is directed to the following contents:

1. The producing method as defined above in which the sulfur-containing compound(s) used in the present invention is mixed or added thereto in the form of a mixture containing (including) the sulfur-containing compound(s) of its higher concentration, such as yeast extract, garlic extract, beef extract, chicken extract and the like.
2. The producing method as defined above in which the vegetable(s) is at least one selected from edible vegetables, inclusive of components, ingredients or essences thereof, such as Chinese cabbage, cabbage, tomatoes, eggplants, broccoli sprouts, kidney beans, corns, bean sprouts, onions, Welsh onions and the likes, and preferably from Chinese cabbage, onions, Welsh onions, cabbage, tomatoes, for augmenting the flavor, in which the mushroom(s) is at least one selected from edible mushrooms, such as velvet shank (enoki mushrooms), shiitake mushrooms, shimeji mushrooms, common mushrooms, pine tree mushrooms

(matutake mushrooms) and the likes, inclusive of components, ingredients or essences thereof, and preferably from shiitake mushroom, common mushroom and pine tree mushroom, for augmenting the flavor, and in which the spice(s) is at least one selected from edible spices, such as anise, allspice, cardamon, basil, caraway, nutmegs, dill, fennel, cinnamon, clove, ginger, pepper, Chinese pepper (red-pepper), mustard, prickly ash pepper, garlic, turmeric, lemongrass, coriander and the likes, and preferably from pepper, garlic, ginger, coriander and basil, for augmenting and enhancing the flavor.

3. The producing method as defined above wherein the sulfur-containing compound(s) (used in the present invention) is contained in a solution of soup, sauce or the like at the time of eating or drinking in an amount of not less than 0.00005% for obtaining the effects sufficient in the present invention, preferably in an amount of not less than 0.0005%, and wherein preferably for not impairing the inherent flavor, the sulfur-containing compound(s) is contained therein in an amount not more than 0.1% and desirably not more than 0.001% and more desirably in an amount of approximately 0.00005 to 0.1% or 0.0005 to 0.001%, expressed in weight % of the element sulfur content of the sulfur-containing compound(s) per the solution (aqueous solution) of soup, sauce or the like when eating and drinking.

4. The producing method as defined above wherein the sulfur-containing compound(s) (used in the present invention) is contained in the dried instant soup, sauce or the like produced in an amount preferably, for obtaining the effects sufficient in the present invention, of not less than 0.0005%, more preferably not less than 0.005%, and wherein, for not impairing the inherent flavor, the sulfur-containing compound(s) is contained therein in an amount not more than 1% and preferably not more than 0.01%, desirably in an amount of approximately 0.0005 to 1% and more desirably in an amount of approximately 0.005 to 0.01% , expressed in weight % of the element sulfur content of the sulfur-containing compound(s) per the dried instant soup, sauce or the like produced.

5. A dried instant soup, sauce or the like composition comprising the composition and sulfur-containing compound(s) (used in the present invention), or a food comprising or employing it wherein the composition can be produced in accordance with the above any producing methods.

6. The dried instant soup, sauce or the like composition or the food as defined above wherein the sulfur-containing compound(s) (used in the present invention) is or may be contained in a solution of soup, sauce or the like at the

time of eating or drinking in an amount preferably, for obtaining the effects sufficient in the present invention, of not less than 0.00005 wt. %, preferably not less than 0.0005%, and in an amount preferably, for not impairing the inherent flavor, of not more than 0.1% and further preferably of not more than 0.001% and further more preferably (desirably) about 0.00005 to 0.1 % or about 0.0005 to 0.001 %, expressed in weight % of the element sulfur content of the sulfur-containing compound(s) per the (aqueous) solution of (dried instant) soup, sauce or the like when eating and drinking.

#### Embodiments of Invention

The present invention is directed to a method for producing a dried (dry) instant soup, sauce or the like, particularly containing vegetable(s), mushroom(s) and/or spice(s) in which the flavor proper (inherent) to the vegetable(s), mushroom(s) and/or spice(s) can be fortified (enhanced) and maintained in stability for prolonged time (over a long time), particularly, to a method for producing a dried instant soup, sauce or the like containing vegetable(s), mushroom(s) and/or spice(s), comprising the step of adding at least one sulfur-containing compound selected from the compounds represented by the above general formulas (1) and (2), which may be in the salt forms, to a feedstock composition in any step (stage) during the production of dried (dry) instant soup, sauce or the like

containing vegetable(s), mushroom(s) and/or spice(s).

And, the invention is also directed to the composition obtained by the method and the food comprising or using them.

The sulfur-containing compound(s) defined from the formulas (1) and (2) according to the present invention may be prepared by any of the fermentation method, enzymatic method, the chemical synthesis method or the like, and which compounds can be eaten or added to the food.

The sulfur-containing compound(s) used in the present invention may be in the mixture thereof, for example the composition configured to contain one or more compounds other than those shown in the above formulas (1) or (2). At least one of the compound selected from the above formulas (1) and (2) is used for the present invention, therefore two or more of the compounds of the above formulas can be used for the present invention. It is possible for only a portion or the totality of the sulfur-containing compound(s) used in the present invention to be in the salt form. In case that two or more of the compounds of the above formulas (1) and (2) as the sulfur-containing compounds may be added in the present invention, only a portion of the sulfur-containing compound(s) may be in the salt form.

In adding the sulfur-containing compound(s) used in the present invention, the sulfur-containing compound(s) may be added in a form of mixture thereof, that is the mixture containing the sulfur-containing compound(s).

Thus it is possible to substitute a material containing yeast extracts, garlic extracts, beef extracts or chicken extracts, containing such the sulfur-containing compound(s) used in the present invention in a higher concentration, for a portion or the totality of the required sulfur-containing compound(s) used in the present invention.

Of the sulfur-containing compounds represented by the above general formulas, at least one compound selected from the group consisting of glutathione (GSH), glutamylcysteine ( $\gamma$ -GC) and salts thereof are particularly effective for the present invention and are highly effective to augment the flavor of the vegetables, mushrooms and / or spices in the dried instant soup, sauce and the like to improve their storage performance.

The adding of the sulfur-containing compounds is effective in all of the vegetables, such as Chinese cabbage, cabbage, tomatoes, eggplants, broccoli sprouts, kidney beans, corns, bean sprouts, onions, Welsh onions or the like, and edible mushrooms, such as velvet shank (enoki mushrooms), shiitake mushrooms, shimeji mushrooms, ordinary mushrooms (common mushrooms), pine tree mushrooms (matutake mushrooms), or the like. However, insofar as the flavor augmenting effect is concerned, the sulfur-containing compounds are particularly effective for Chinese cabbages, onions, Welsh onions, cabbages and tomatoes, as vegetables, and shiitake mushroom, ordinary

mushroom and pine tree mushroom, as mushrooms. Similar effects are noticed for vegetable extracts and mushroom extracts. The adding effect is noticed in all spices that can be used in the dried instant soup, such as anise, allspice, cardamon, basil, caraway, nutmegs, dill, fennel, cinnamon, clove, ginger, pepper, Chinese pepper (red-pepper), mustard, prickly ash pepper, garlic, turmeric, lemongrass, coriander or the like. However, insofar as the flavor augmenting effect is concerned, the adding effect is most outstanding for pepper, garlic, ginger, coriander and basil. Similar effects are noticed for spice extracts, such as oleoresin or the like.

As for the dried instant soup, sauce or the like containing the sulfur-containing compound(s) used in the present invention, it is sufficient if it contains at least one selected from the group consisting of vegetables, mushrooms and spices. The dried instant soup, sauce or the like may contain one or more substance selected from vegetables, one or more substance selected from mushrooms, and / or one or more substance selected from spices, they may be in the form of ingredients or essences thereof.

A product similar to the dried instant soup or the like may be enumerated by Chinese vegetable soup, asparagus cream soup, pot-au-feu, broccoli cream soup, bean soup, consomme soup, potage soup, chicken soup, Tom-Yam-Kun soup and Chinese noodle soup. The present invention is also effective for dried instant sauce or the like containing

vegetables, mushrooms or spices, such as dressings.

The dried instant soup, sauce or the like may be in the form of powder, granules, cubes etc. that can be served instantly.

The dried instant soup, sauce or the like may be prepared by any suitable producing methods, such as the methods of mixing of dried starting materials, spray drying, freeze drying, vacuum drying, freeze vacuum drying or granulation. Such producing method known per se may also be used.

There is no limitation to the adding time of the sulfur-containing compound(s) selected by the compounds represented by the formulas (1) and (2). However, for preventing decomposition of the sulfur-containing compound(s) used in the present invention and the consequent decrease in the adding effect, the sulfur-containing compound(s) are preferably added in the later period of the producing process.

The adding of the sulfur-containing compound(s) used in the present invention may be conducted at a time or in plural fractions.

There is no particular limitation to the adding form in adding the sulfur-containing compound(s) used in the present invention, such that the sulfur-containing compound(s) may be added in the form of crystals, powders and in the other forms, such as a diluted mass and solution containing both the crystals and powders. In this case,

any optional adding methods, such as a method consisting in adding and subsequently drying the components if required, may be used. It is desirable that the sulfur-containing compound(s) and the like which have been added therein be homogeneously distributed at the end of adding them in the starting material of the dried instant soup, sauce or the like product.

An experimental example, in which the amount of addition of GSH to the vegetable extracts and spices has been investigated, is now explained.

(Experimental Example)

Evaluation in a Simple Aqueous Solution System

Using 1g/dl of the commercial powdered mix vegetable or 1g/dl of the commercial powdered mix spice as a control or comparison material, 0.00005 to 1.0 g/dl of GSH deodorized with activated charcoal was added to the comparison material. By paired comparison test with the control, the strength of flavor was evaluated by a evaluation panel of twenty people. The results are shown in Tables 1 and 2.

Table 1

| Sample    | Formulation                     |               | strength<br>of<br>vegetabl<br>e flavor* | Desirab<br>leness*<br>* |
|-----------|---------------------------------|---------------|-----------------------------------------|-------------------------|
|           | mix<br>vegetab<br>les<br>(g/dl) | GSH<br>(g/dl) |                                         |                         |
| (Control) | 1                               | -             | +                                       | 5                       |
| A         | "                               | 0.00005       | +                                       | 6                       |
| B         | "                               | 0.0005        | ++                                      | 7                       |
| C         | "                               | 0.001         | ++                                      | 9                       |
| D         | "                               | 0.005         | +++                                     | 9                       |
| E         | "                               | 0.01          | +++                                     | 8                       |
| F         | "                               | 0.1           | +++                                     | 8                       |
| G         | "                               | 1.0           | +++                                     | 6                       |

\* Control group is +, with the evaluation being in four stages from - up to +++.

\*\* Evaluation for control group is set to 5 (bad for 1 and good for 10).

Table 2

| Sample    | Formulation            |               | strength<br>of spice<br>flavor* | Desirable<br>ness** |
|-----------|------------------------|---------------|---------------------------------|---------------------|
|           | mix<br>spice<br>(g/dl) | GSH<br>(g/dl) |                                 |                     |
| (Control) | 1                      | -             | +                               | 5                   |
| A         | "                      | 0.00005       | +                               | 6                   |
| B         | "                      | 0.0005        | ++                              | 8                   |
| C         | "                      | 0.001         | ++                              | 9                   |
| D         | "                      | 0.005         | +++                             | 10                  |
| E         | "                      | 0.01          | +++                             | 8                   |
| F         | "                      | 0.1           | +++                             | 7                   |
| G         | "                      | 1.0           | +++                             | 6                   |

\*: Control group is +, with the evaluation being in four stages from - up to +++.

\*\*: Evaluation for control group is set to 5 (bad for 1 and good for 10).

As may be seen from Tables 1 and 2, addition of not less than 0.0005 wt. % of GSH based on the weight of the soup solution leads to significantly intensified flavor of vegetable(s) and spice(s). On the other hand, addition of GSH in excess of 1.0 wt. % leads to unique and specified flavor to impair the flavor proper to the vegetable(s) and spice(s).

Similar check was made of other sulfur-containing compounds of the formulas (1) and (2) than GSH, such as glutamylcysteine. It was found that the flavor reinforcing effect is common to these sulfur-containing compounds, its effect being proportional to the weight ratio of the element sulfur contained.

From these results, the content of the sulfur-containing compound(s) used in the present invention to the product of the dried instant soup, sauce or the like containing vegetables mushrooms and / or spices in the range from not less than 0.00005 % to not more than 0.1% and preferably from not less than 0.0005% to not more than 0.001% per solution of the soup, sauce or the likes, expressed in wt. % of the element sulfur contained in the sulfur-containing compound(s) used in the present invention. If the adding amount is less than 0.00005%, sufficient effects can not be obtained. If the adding amount exceeds 0.1%, strange odor is intensified to detract from the inherent flavor.

Further check based on the above results have revealed that the following range of the content of the sulfur-containing compound(s) used in the present invention in the dried instant soup, sauce or the like is desirable.

The adding amount of the sulfur-containing compound(s) to the dried instant soup, sauce or the like product containing the vegetables, mushrooms and / or spices is in a range from not less than 0.0005% to not more than 1.0% and preferably from not less than 0.005% to not more than 0.01% in terms of wt% of the element sulfur content of the sulfur-containing compound(s) in the present invention. If the adding amount is less than 0.0005%, sufficient flavor occasionally can not be obtained, whereas, if the adding amount exceeds 1.0%, strange odor

occasionally becomes strong to detract from the inherent flavor.

#### Preferred Embodiments

The present invention will be explained with reference to the following Examples which are not intended to limit its scope. In these Examples, "%" denotes weight/weight %, unless otherwise specified. "MSG" denotes sodium L-glutamate, and "IN" denotes sodium 5'-inosinate, respectively.

(Example 1)

#### Effect of Addition to Tomato Cream Soup

A powder of tomato cream soup of the following composition:

| <u>Components</u>  | <u>composition</u> |
|--------------------|--------------------|
| wheat powders      | 25.0%              |
| starch             | 16.0%              |
| milk powders       | 13.0%              |
| cream powders      | 5.5%               |
| onion powders      | 2.5%               |
| white pepper       | 0.3%               |
| table salt         | 6.0%               |
| disodium phosphate | 0.2%               |
| dextrin            | 2.0%               |
| beet powders       | 2.5%               |
| tomato powders     | 27.0%              |

was dissolved in hot water at a rate of 5.5g/dl to prepare a tomato cream soup. To this tomato cream soup, GSH was added in an amount of 0.01% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the vegetables with a GSH non-addition group as a control group. It is seen from Table 3 that the tomato cream soup with addition of GSH exhibited the flavor proper to the vegetables stronger than that of the control group thus testifying to significant desirableness of the GSH addition group.

Table 3

| Items for Valuation Tests    | Control group | GSH addition group |
|------------------------------|---------------|--------------------|
| Strength of vegetable flavor | 1             | 19***              |
| Desirableness of flavor      | 4             | 16**               |

N=20

\*\*\* There is a significant difference with a level of significance of 0.1%.

\*\* There is a significant difference with a level of significance of 1%.

(Example 2)

Effect of Addition in Chinese noodle soup

The powders of Chinese noodle soup having the following composition:

| <u>Components</u> | <u>composition</u> |
|-------------------|--------------------|
| garlic powders    | 21.0%              |
| MSG               | 24.0%              |
| dextrin           | 6.0%               |
| onion powders     | 3.5%               |
| white pepper      | 3.2%               |
| black pepper      | 2.3%               |
| table salt        | 36.0%              |
| sugar             | 3.0%               |
| chicken flavor    | 1.0%               |

was dissolved in hot water at a rate of 5 g/dl to prepare a Chinese noodle soup. To this Chinese noodle soup, GSH was added in an amount of 0.01% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the spice with a non-addition group as a control group. It is seen from Table 4 that the Chinese noodle soup with addition of GSH exhibited the flavor proper to the spices stronger than that of the control group thus testifying to significant desirableness of the GSH addition group.

Table 4

| Items for Valuation Tests | control group | GSH addition group |
|---------------------------|---------------|--------------------|
| strength of spice flavor  | 4             | 16**               |
| Desirableness of flavor   | 5             | 15*                |

N=20

\*\* There is a significant difference in a level of significance of 1%.

\* There is a significant difference in a level of significance of 5%.

(Example 3)

Effect of Addition in Powdered Tomato Sauce

The powders of a powdered tomato sauce having the following composition:

| <u>Components</u>    | <u>composition</u> |
|----------------------|--------------------|
| Tomato powders       | 56.0%              |
| wine vinegar powders | 10.0%              |
| table salt           | 5.0%               |
| granule sugar        | 15.0%              |
| Guar gum powders     | 3.0%               |
| white pepper         | 0.5%               |
| MSG                  | 3.0%               |
| IN                   | 1.0%               |
| dextrin              | 5.5%               |

|               |      |
|---------------|------|
| citric acid   | 0.5% |
| tomato flavor | 0.5% |

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was dissolved in hot water at a rate of 12 g/dl to prepare a tomato sauce. To this tomato sauce, GSH was added in an amount of 0.02% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the vegetables and mushrooms with a non-addition group as a control group. It is seen from Table 5 that the tomato sauce with addition of GSH exhibited the flavor proper to the vegetables and mushrooms stronger than that of the control group thus testifying to significant desirableness of the GSH addition group.

Table 5

| Items for Valuation Tests    | control group | GSH addition group |
|------------------------------|---------------|--------------------|
| strength of vegetable flavor | 1             | 19***              |
| Desirableness of flavor      | 5             | 15*                |

N=20

\*\*\* There is a significant difference in a level of significance of 0.1%.

\* There is a significant difference in a level of significance of 5%.

(Example 4)

Effect of Addition in Onion Soup

The powder of a powdered onion soup having the following composition:

| <u>Components</u>       | <u>composition</u> |
|-------------------------|--------------------|
| onion powders           | 2.0%               |
| garlic powders          | 0.6%               |
| dried onion             | 30.0%              |
| chicken extract powders | 30.0%              |
| chicken powders         | 8.0%               |
| white pepper            | 0.5%               |
| thyme powders           | 2.4%               |
| white wine powders      | 2.0%               |
| chicken fat             | 2.0%               |
| MSG                     | 8.0%               |
| IN                      | 0.5%               |
| table salt              | 6.0%               |
| dextrin                 | 8.0%               |

was dissolved in hot water at a rate of 6 g/dl to prepare an onion soup. To this onion soup, GSH was added in an amount of 0.02% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the spice with a GSH non-addition group as a control group. It is seen from Table 6 that the powdered onion soup with addition of GSH exhibited the flavor proper to the spice stronger than that of the control group thus testifying to significant desirableness of the GSH addition group.

Table 6

| Items for Valuation Tests | control group | GSH addition group |
|---------------------------|---------------|--------------------|
| strength of spice flavor  | 4             | 16**               |
| Desirableness of flavor   | 5             | 15*                |

N=20

\*\*\* There is a significant difference in a level of significance of 1%.

\* There is a significant difference in a level of significance of 5%.

(Example 5)

#### Effect of Addition in Instant Pea Soup

A pea soup was prepared by dissolving pea powder having the following composition:

| <u>Components</u> | <u>composition</u> |
|-------------------|--------------------|
| wheat powders     | 30.0%              |
| dextrin           | 17.5%              |
| fat powders       | 5.0%               |
| table salt        | 6.0%               |
| white pepper      | 0.5%               |
| pea powders       | 7.0%               |
| pea granules      | 5.0%               |
| dried peas        | 28.0%              |
| herb powders      | 1.0%               |

in hot water at a rate of 8 g/dl. To this pea soup,  $\gamma$ -GC was added in an amount of 0.05% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the vegetables with a non-addition group as a control group. It is seen from Table 7 that the pea soup with addition of  $\gamma$ -GC exhibited the flavor proper to the vegetables stronger than that of the control group thus testifying to significant desirableness of the GSH addition group.

Table 7

| Items for Valuation Tests     | control group | $\gamma$ -GC addition group |
|-------------------------------|---------------|-----------------------------|
| Strength of vegetables flavor | 2             | 18***                       |
| Desirableness of flavor       | 5             | 15*                         |

N=20

\*\*\* There is a significant difference in a level of significance of 0.1%.

\* There is a significant difference in a level of significance of 5%.

(Example 6)

#### Effect of Addition in Tom-Yam-Kun Soup

A Tom-Yam-Kun soup was prepared by dissolving Tom-Yam Kun soup powder having the following composition:

| <u>Components</u>      | <u>composition</u> |
|------------------------|--------------------|
| table salt             | 40.0%              |
| granule sugar          | 12.5%              |
| MSG                    | 10.5%              |
| Shrimp extract         | 5.0%               |
| Num-pla powders        | 3.0%               |
| IN                     | 0.2%               |
| citric acid            | 0.5%               |
| dried shrimp           | 9.0%               |
| dried common mushroom  | 13.0%              |
| lemongrass powders     | 2.0%               |
| coriander powders      | 3.0%               |
| Chinese pepper powders | 1.3%               |

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In hot water at a rate of 4 g/dl. To this Tom-Yam-Kun soup,  $\gamma$ -GC was added in an amount of 0.05% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the spices with a non-addition group as a control group. It is seen from Table 8 that the Tom-Yam-Kun soup with addition of  $\gamma$ -GC exhibited the flavor proper to the spices stronger than that of the control group thus testifying to significant desirableness of the spice flavor.

Table 8

| Items for Valuation Tests | Control group | $\gamma$ -GC addition group |
|---------------------------|---------------|-----------------------------|
| strength of spice flavor  | 2             | 18***                       |
| Desirableness of flavor   | 4             | 16**                        |

N=20

\*\*\* There is a significant difference in a level of significance of 0.1%.

\*\* There is a significant difference in a level of significance of 1%.

(Example 7)

#### Effect of Addition in *Shiitake*-Mushroom Soup Powder

A *shiitake*-mushroom soup was prepared by dissolving *shiitake*-mushroom soup powder having the following composition:

| <u>Components</u>                        | <u>composition</u> |
|------------------------------------------|--------------------|
| table salt                               | 5.0%               |
| MSG                                      | 3.8%               |
| IN                                       | 0.2%               |
| dried seed of Chinese matrimony vine     | 25.0%              |
| dried <i>shiitake</i> -mushroom          | 35.5%              |
| soy sauce powders                        | 8.0%               |
| <i>shiitake</i> -mushroom extract powder | 22.5%              |

in hot water at a rate of 5 g/dl. To this *shiitake*-mushroom

soup, GSH was added in an amount of 0.03% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the mushroom with a non-addition group as a control group. It is seen from Table 9 that the *shiitake*-mushroom soup with addition of GSH exhibited the flavor proper to the mushroom stronger than that of the control group thus testifying to significant desirableness of the *shiitake*-mushroom soup added with GSH.

Table 9

| Items for Valuation Tests   | control group | GSH addition group |
|-----------------------------|---------------|--------------------|
| strength of mushroom flavor | 1             | 19***              |
| desirableness of flavor     | 5             | 15*                |

N=20

\*\*\* There is a significant difference in a level of significance of 0.1%.

\* There is a significant difference in a level of significance of 5%.

(Example 8)

#### Effect of Addition in Consomme Soup

A consomme soup was prepared by dissolving consomme soup powder having the following composition:

| <u>Components</u> | <u>composition</u> |
|-------------------|--------------------|
| table salt        | 35.0%              |

|                                |       |
|--------------------------------|-------|
| MSG                            | 18.0% |
| IN                             | 0.2%  |
| white pepper powder            | 0.3%  |
| black pepper powder            | 0.5%  |
| beef extract powder            | 8.0%  |
| white wine powder              | 3.0%  |
| celery powder                  | 2.0%  |
| Chinese cabbage extract powder | 8.0%  |
| onion extract powder           | 2.5%  |
| lactose                        | 22.5% |

---

in the hot water at a rate of 5 g/dl. To this *consomme* soup,  $\gamma$ -GC acid was added in an amount of 0.03% and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the spice with a non-addition group as a control group. It is seen from Table 10 that the *consomme* soup with addition of  $\gamma$ -GC acid exhibited the flavor proper to the spice stronger than that of the control group thus testifying to significant desirableness of the *consomme* soup added with  $\gamma$ -GC acid.

Table 10

| Items for Valuation Tests | Control group | $\gamma$ -GC addition group |
|---------------------------|---------------|-----------------------------|
| strength of spice flavor  | 2             | 18***                       |
| desirableness of flavor   | 4             | 16**                        |

N=20

\*\*\* There is a significant difference in a level of significance of 0.1%.

\*\* There is a significant difference in a level of significance of 1%.

(Example 9)

Effect of Addition in leek Cream Soup Powder

A leek cream soup having the following composition was prepared.

| <u>Components</u>  | <u>composition</u> |
|--------------------|--------------------|
| wheat powder       | 32.0%              |
| starch             | 15.0%              |
| milk powder        | 16.0%              |
| cream powder       | 5.0%               |
| onion powder       | 4.0%               |
| vegetable oil      | 7.5%               |
| table salt         | 8.0%               |
| sugar              | 2.5%               |
| disodium phosphate | 0.2%               |
| white pepper       | 0.2%               |

|                   |      |
|-------------------|------|
| white wine flavor | 0.2% |
| leek flavor       | 3.0% |
| dried leek        | 5.0% |
| MSG               | 1.0% |
| IN                | 0.4% |

---

This leek cream soup was added high GSH content yeast extract (GSH content: 8.0% by weight) in an amount of 0.05% to the leek cream soup and dissolved in water. The resulting solution was freeze-dried to form an addition group. The dried leek cream soup, thus prepared, was dissolved in hot water at a rate of 5.6 g/dl to prepare a leek cream soup and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the vegetables with a non-addition group as a control group. It is seen from Table 11 that the leek cream soup containing a high GSH containing yeast extract exhibited the flavor proper to the vegetables stronger than that of the control group thus testifying to significant desirableness of the GSH addition group.

Table 11

| Items for Valuation Tests    | Control group | GSH addition group |
|------------------------------|---------------|--------------------|
| Strength of vegetable flavor | 3             | 17**               |
| Desirableness of flavor      | 3             | 17**               |

N=20

\*\* There is a significant difference in a level of significance of 1%.

(Example 10)

#### Effect of Addition in Chile sauce

A Chile sauce having the following composition was prepared.

| <u>Components</u>   | <u>compositions</u> |
|---------------------|---------------------|
| tomato powder       | 45.0%               |
| Chile powder        | 4.0%                |
| onion powder        | 5.0%                |
| glucose             | 26.0%               |
| table salt          | 8.0%                |
| MSG                 | 3.5%                |
| IN                  | 0.2%                |
| Guar gum powder     | 5.5%                |
| wine vinegar powder | 2.8%                |

---

This Chile sauce was added high GSH content yeast extract (GSH content: 8.0% by weight) in an amount of 0.05% to the Chile sauce and dissolved in water. The resulting solution was freeze-dried to form an addition group. The dried Chile sauce, thus prepared, was dissolved at a rate of 30 g/dl in hot water to prepare a Chile sauce and sensory tests were conducted by paired comparison test as to the strength and desirableness of the flavor of the spices with a non-addition group as a control group. It is seen from

Table 12 that the Chile sauce containing a high GSH content yeast extract exhibited the flavor proper to the spice stronger than that of the control group thus testifying to significant desirableness of the spice flavor of the GSH addition group.

Table 12

| Items for Valuation Tests | control group | GSH addition group |
|---------------------------|---------------|--------------------|
| Strength of spice flavor  | 2             | 18***              |
| Desirableness of flavor   | 4             | 16**               |

N=20

\*\*\* There is a significant difference in a level of significance of 0.1%.

\*\* There is a significant difference in a level of significance of 1%.

(Example 11)

Effect of Addition in Cream Soup of Broccoli and Cauliflower

A 0.01% GSH addition group and a GSH non-addition group of the cream soup of powdered broccoli and cauliflower having the following composition:

| <u>Components</u> | <u>composition</u> |
|-------------------|--------------------|
| wheat powder      | 32.0%              |
| starch            | 14.0%              |

|                    |       |
|--------------------|-------|
| milk powder        | 17.0% |
| cream powder       | 6.0%  |
| onion powder       | 1.5%  |
| vegetable oil      | 8.0%  |
| table salt         | 6.5%  |
| sugar              | 1.5%  |
| white pepper       | 0.4%  |
| white wine flavor  | 0.8%  |
| cauliflower flavor | 3.0%  |
| broccoli flavor    | 3.5%  |
| dried cauliflower  | 3.5%  |
| dried broccoli     | 2.3%  |

---

were prepared and 5 g each of the addition group and the non-addition group was packed in a three-layer aluminium pouch and preserved at 24°C. For a control group, a 5°C preserved GSH addition group and 5°C preserved GSH non-addition group were used. The preserved samples were dissolved in hot water at the rate of 4g/ dl and a sensory test was conducted by paired comparison test of the addition group 24°C versus the addition group 5°C with the non-addition group 24°C versus the non-addition group 5°C by 5-stage evaluation with the strength of the flavor of the vegetables in the control group (the sample preserved at 5°C) set to 5. As may be seen from Table 13, the cream soup of broccoli and cauliflower, containing the GSH, was superior in vegetable flavor preservation properties in

comparison with the non-addition group.

Table 13

| preservation<br>period (months) | GSH addition<br>group | non-addition<br>group |
|---------------------------------|-----------------------|-----------------------|
| 0                               | 5                     | 5                     |
| 3                               | 5                     | 4.4                   |
| 6                               | 4.8                   | 3.1                   |
| 12                              | 4.4                   | 0.5                   |

N=20

\* The evaluation was conducted in five point rating scale of from 1 to 5 with the strength of the flavor directly after manufacture set to 5 (N=20).

(Example 12)

#### Effect of Addition in Italian Salad Dressing

A 0.01% GSH addition group of an Italian salad dressing and a GSH non-addition group of an Italian salad dressing, each having the following composition:

| <u>Components</u> | <u>composition</u> |
|-------------------|--------------------|
| Guar gum powder   | 1.5%               |
| sugar             | 57.7%              |
| table salt        | 30.0%              |
| citric acid       | 5.0%               |
| trisodium citrate | 1.5%               |
| white pepper      | 1.3%               |

|                            |      |
|----------------------------|------|
| paprika                    | 0.7% |
| Rosemary powder            | 0.3% |
| dry dill powder            | 0.4% |
| red wine vinegar powder    | 0.8% |
| wine brandy vinegar powder | 0.8% |

---

were prepared and 5 g each of the addition group and the non-addition group was packed in a three-layer aluminium (aluminum) pouch and preserved at 24°C. For a control group, the GSH non-addition group was used. The preserved samples were dissolved in hot water at the rate of 2g/ dl and a sensory test was conducted by paired comparison test of the addition group and the non-addition group by evaluation with the strength of spice flavor and desirableness of the flavor. As may be seen from Table 14, the Italian salad dressing, containing the GSH, was superior in spice flavor preservation properties in comparison with the non-addition group.

Table 14

| Items for<br>Valuation Tests | Non-addition<br>group | GSH addition<br>group |
|------------------------------|-----------------------|-----------------------|
| strength of spice<br>flavor  | 2                     | 18***                 |
| desirableness of<br>flavor   | 4                     | 16**                  |

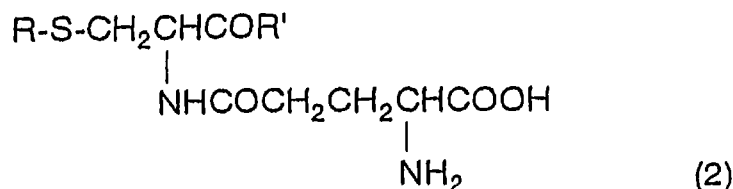
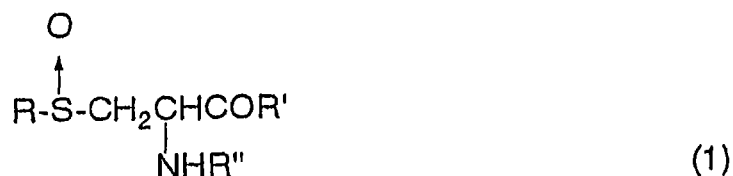
N=20

\*\*\* There is a significant difference in a level of significance of 0.1%.

\*\* There is a significant difference in a level of significance of 1%.

## CLAIMS

1. A method for producing dried instant soup, sauce or the like comprising the step of adding at least one sulfur-containing compound selected from the compounds represented by the following general formula<sup>s</sup> (1) and (2) to a feedstock composition in any stage during the production of dried instant soup, sauce or the like containing vegetable(s), mushroom(s) and / or spice(s):



wherein R denotes a hydrogen atom, a saturated or unsaturated aliphatic hydrocarbon group having carbons 1 to 3, or a carboxyalkyl group; R' denotes a hydroxyl group or a carboxymethylamino group; and R'' denotes a hydrogen atom or a  $\gamma$ -glutamyl group, and wherein said compound(s) may be in the salt form.

2. The method according to claim 1, wherein said at least one sulfur-containing compound to be added is in the form of mixture including said at least one sulfur-containing compound.

3. The method according to claim 1 or 2, wherein said vegetable(s) is one or more edible vegetables selected from Chinese cabbage, cabbage, tomatoes, eggplants, broccoli sprouts, kidney beans, corns, bean sprouts, onions, welsh onions and the likes, and the ingredients or essences thereof, said mushroom(s) is one or more edible mushrooms selected from velvet shank, shiitake mushroom, shimeji mushroom, common mushroom, matsutake mushroom and the likes, and the ingredients or the essences thereof, and said spice(s) is one or more edible spices selected from anise, allspice, cardamon, basil, caraway, nutmeg, dill, fennel, cinnamon, clove, ginger, pepper, red-pepper, mustard, prickly ash pepper, garlic, turmeric, lemongrass, coriander and the likes, and the ingredients or the essences thereof.

4. The method according to any one of claims 1 to 3, wherein said at least one sulfur-containing compound to be added is or may be contained in a solution of soup, sauce or the like in the percentage of 0.00005~0.1 % or 0.0005~0.001 %, expressed in weight % of the element sulfur content of the sulfur-containing compound(s) per a

solution of the dried instant soup, sauce or the like when eating or drinking.

5. The method according to any one of claims 1 to 3, wherein said at least one sulfur-containing compound is contained therein such that its sulfur content is or may be in the percentage of  $0.0005 \sim 1.0 \%$  or  $0.005 \sim 0.01 \%$ , expressed in weight % of the element sulfur content of the sulfur-containing compound(s) per the dried instant soup, sauce or the like produced.

6. A dried instant soup, sauce or the like composition having a sulfur-containing compound, comprising a composition which can be obtained by the method according to claim 1, or a food obtained by using or containing said composition.

7. The dried instant soup, sauce or the like composition or the food obtained by using or containing said composition according to claim 6, wherein at least one sulfur-containing compound is or may be in the percentage of  $0.00005 \sim 0.1 \%$  or  $0.0005 \sim 0.001 \%$ , expressed in weight % of the element sulfur content of the sulfur-containing compound(s) per a solution of the dried instant soup, sauce or the like when eating or drinking.