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(55) Title: MIXTURE FOR OENOLOGICAL USE OF THE TYPE COMPRISING TANNIN AND METHOD FOR THE MANUFACTURE THEREOF

(57) Abstract: The present invention relates to a mixture for oenological use of the type comprising tannin, characterized in that it is in the form of granules of agglomerated particles of powder having a porosity able to convey inside each granule a dissolving liquid, in particular water or wine, for causing instantaneous and complete dissolution of the mixture in said dissolving liquid. This mixture may comprise gum arabic for oenological use in association with tannin. The invention also concerns a method for production of the mixture for oenological use as described above. This method is based on the use of components in powder form and comprises the steps of: adding metered quantities of powder particles of said components into an agglomeration chamber; fluidizing said particles of powder inside said agglomeration chamber; moistening said particles of powder fluidized inside said agglomeration chamber by means of particle-like dispersion of an agglomeration fluid; agglomerating said particles of powder by means of said agglomeration fluid with consequent formation of granules; drying said granules by means of evaporation of said agglomeration fluid inside said agglomeration chamber; extracting said dried granules from said agglomeration chamber.
MIXTURE FOR OENOLOGICAL USE OF THE TYPE COMPRISING TANNIN
AND METHOD FOR THE MANUFACTURE THEREOF

The present invention concerns a mixture for oenological use of the type comprising tannin and a method for the manufacture thereof.

The mixture in question is intended to be used by the food industry and in particular by the wine industry in vinification processes.

The basic component of this mixture - tannin - is fundamental in vinification processes. Tannins nowadays are in fact widely used in wine production and are suitable chosen in order to influence in a specific manner the properties of the wine. As is known, tannins are phenolic compounds (aromatic alcohols) with very complex structures and molecular weights ranging between 500 and 3000. It is widely known that they are able to influence in a significant manner (during vinification of white, red, rosé or sparkling wine) the formation of polyphenols contained in the wine, which are one of the main components responsible for its organoleptic properties and its colour, its stability, its structure and, in particular, its taste.

In reality, the term "tannin" is commonly used to indicate several classes of compounds which, although
they may all be usefully used in vinification processes, have only very few properties in common.

In very broad terms tannins are generally classified as hydrolysable tannins and condensed tannins. The former, which are present in plant species, are in turn divided into gallo-tannins which are particularly pure and contained in the undifferentiated tissues (galls) of plant species such as the oak, chestnut or tara, and into ellagi-tannins, which consist of the tannins released by the wood of barrels and whose use in wine has been well-known for a long time.

The latter, i.e. so-called condensed tannins, are those which are extracted from skins, grape stalks and grape pips and are in turn divided into procyanidin and prodelphinidin.

The individual classes of tannins and the individual various types of tannin, which differ from each other particularly in terms of their origin, are chosen for specific applications.

Hereinbelow we shall describe, purely by way of example, some effects due to the use of tannins, this with the sole aim of documenting the wide use which is made of these substances in vinification processes.

Tannins may be used during the various stages of the vinification processes, in particular for aromatic
refining, stabilisation of the colour extracted during maceration (for example in order to accentuate specific hues and prevent the evolution towards other hues) and improvement of the structure and the body. They are also used for the purposes of clarification and for increasing the intensity of aromas (in particular, for example, nuances of forest fruit aromas), for increasing the complexity of the bouquet, for capturing free radicals, for regulating the redox potential and for protecting polyphenols from oxidation. In an effective manner they are also used for reactions with thiols having unpleasant odours (elimination of mustiness), for reactions with anthocyanins (in particular creating stable coloured compounds), for preventing enzymatic and chemical oxidation, for improving the structure without causing astringency, for precipitating proteins and preventing the action of laccase, for increasing the tannin structure and for reducing the aggressiveness of alcohol.

Obviously each specific vinification operation for white or red wine will usually involve during programmed stages of the process (pressing, maceration, fermentation, racking, storage, refining, clarification, filtration, stabilization, bottling) the use of one or more different classes and types of tannin.

The choice of tannin to be used may be determined by
means of a prior examination, to be carried out during
tasting of wine samples treated with tannins of varying
origin and left to settle for a short period of time. In
this way it is possible to obtain a realistic idea as to
the final effect of the tannin combined with the
polyphenols present in the treated wine.

At present, most of the tannins available on the
market are in the form of powder which is packaged in
special containers or bags.

At the time of use, the tannin powder is firstly
removed from the bag and the required quantity thereof
then weighed (usually about 3-30 g/hl). The said
quantity is then diluted in a liquid fraction of wine, or
water, so as to allow dissolving thereof. Finally the
liquid fraction with the dissolved tannin powder is added
to and mixed with the wine.

As is known, tannin in powder form gives rise to a
few problems of a practical nature during use.

A first drawback arises from the fact that, when
dissolved in the liquid fraction, tannin in powder form
tends to form numerous lumps which must be dissolved
before mixing the solution with the wine to be treated.

A further drawback arises from the fact that, since
tanning powder is particularly fine, the particles tend
to fly away and be dispersed in the atmosphere during
handling (removal from the bag and weighing of the metered amounts) with wastage of product and risk of contaminating the operating personnel.

In order to overcome this problem, tannin products already dissolved on a liquid base in concentrated form, to be mixed directly with the wine or diluted before use, are available on the market. This solution obviously has the drawback that it results in a considerable volume and weight compared to the equivalent amount of tannin in powder form.

In the food industry it is well-known to reduce powders such as cocoa, coffee and the like into agglomerated powders - granules - in order to obtain preparations which are instantaneously dissolvable in water, milk or the like. The same requirement is also widespread in the pharmaceutical industry where numerous granulation methods have been developed.

The main granulation systems of the known type include those which use granulators of the type comprising rotating vanes, extrusion screws, fluid beds, dry systems, rotors, hammers (for mixtures which are not too wet) and blades.

The granulation processes generally involve several stages (metering, mixing, setting, granulation, drying) and are optimised for the individual products to be
obtained. In most cases the conversion of the powder into granules is performed using binding substances such as starch, sugars, gelatins, etc. The need to employ binders depends on the type of process used and the powder which must be treated.

In this situation the problem underlying the present invention is therefore that of eliminating the drawbacks of tannins or generally of powder mixtures comprising tannins of the known type mentioned above, by providing a mixture for oenological use of the type comprising tannin, which can be used in a practical manner in vinification processes.

A further object of the present invention is that of producing a mixture for oenological use which provides tannin and if necessary other substances contained in the mixture in a form which can be easily dissolved and metered.

A further object of the present invention is that of providing a mixture for oenological use in a form such that it cannot be easily dispersed in the environment.

A further object of the present invention is that of providing a method for the manufacture of a mixture for oenological use of the type comprising tannin in a form which can be used in a practical manner.

These and other objects are all achieved by the
mixture for oenological use and by the method for the manufacture thereof, as indicated above, the technical features of which may be clearly determined from the contents of the claims indicated below, and the advantages of the said invention will emerge more clearly from the detailed description which follows, with reference to a purely exemplary and non-limiting embodiment.

The mixture for oenological use according to the present invention is characterized in that it is in the form of granules obtained by means of agglomeration of the powder particles of the components forming the said mixture. The granules have a high porosity which is able to convey inside the said granules the dissolving liquid, in particular water or wine, used to dissolve the mixture. At the time of immersion the liquid penetrates inside the individual granules by means of capillarity through the internal channels of the granules, resulting in the "explosion" and the instantaneous and complete dissolution of the product in the dissolving liquid. The granule dissolution process is assisted by the hydrostatic pressure which gradually forms as the heavy granule reaches the bottom of the container for preparation of the solution.

According to the present invention, the possibility
of complete dissolution of the tannin and any other components results in many advantages.

Avoiding in fact the formation of lumps or concentrations of product in the dissolving liquid results firstly in considerable simplification and speeding-up of the operations for preparing the tannin solution. The dissolution time is drastically reduced and mixing systems, which may also be very costly, are eliminated.

Secondarily the losses of material caused by depositions and encrustations on the walls and on the bottom of containers used for dissolving the product are substantially reduced.

A further advantage also consists in the fact that the operations for cleaning these containers are less frequent and less complex.

The composition of the mixture according to the invention envisages, as its basic component, tannin, to which other components or additives may be added.

Advantageously, in a preferred embodiment, gum arabic for oenological use is added to the tannin, in a percentage amount by weight varying from 20 to 60%. The percentage of gum arabic is determined with respect to the percentage of tannin, depending on the type of wine to be treated with the mixture in question, the
oenological treatment envisaged with the said mixture and the operative requirements of the end user.

As is known, in fact, gum arabic, because of its colloidal action, is traditionally used as a stabiliser both in red wines and in white wines to avoid undesirable flocculation or depositions or to avoid cloudiness due, for example, to "copper casse" or to "white casse" or to similar phenomena which frequently appear in wines after exposure to low temperatures or after filtration of mature wines.

Other effects attributable to the use of gum arabic in wine making, and more or less able to be found in all types of wine enriched with this substance, are an increase in the aromatic fragrance, a greater softness of taste and more prolonged "perlage" in sparkling wines. Moreover, especially in red wines, a marked stabilization of the colour is noticeable owing to a reduction in the precipitation of colouring substances which remain in colloidal form.

The association of tannin and gum arabic in a mixture according to the invention therefore results in a product for oenological use which is very versatile and which may allow simplification and optimization of the wine treatment processes, simultaneous addition of the two substances being possible.
In another preferred embodiment of the invention the granules of the mixture for oenological use in question essentially consist of tannin without the addition of other components, this resulting in an oenological product which can be used in those treatments where the addition of pure tannin is envisaged or preferable.

Advantageously, the addition of specific binding substances to the composition of the mixture in question is not strictly necessary, as will become clear from the description of the method for the manufacture thereof. Mixtures of granules consisting solely of particles of tannin powder or mixtures of granules consisting of both particles of tannin powder and particles of gum arabic powder may therefore be formed.

Advantageously, the presence of gum arabic favours significantly the granulation of the mixture, allowing the formation of granules which are mechanically stronger and less prone to pulverisation during transportation.

The method for producing a mixture for oenological use according to the invention is based on the use of components in powder form and envisages using an agglomeration chamber. The method comprises the steps of:

- adding metered quantities of powder particles of the components into the agglomeration chamber;
- fluidizing the particles of powder inside the agglomeration chamber;
- moistening the particles of powder fluidized inside the agglomeration chambers by means of particle-like dispersion of an agglomeration fluid;
- agglomerating the particles of powder by means of said agglomeration fluid with consequent formation of granules;
- drying the granules by means of evaporation of the agglomeration fluid inside the agglomeration chamber;
- extracting the dried granules from the agglomeration chamber.

Advantageously the method according to the invention may be performed in a fluid-bed granulator (not shown since of a type known per se). All the variants of the abovementioned granulator necessary for implementing said method are understood as being adequately described in the following description for a person skilled in this particular sector.

With this granulation system it is possible to obtain, in the case of this specific application, granules which are characterized by a low density and therefore high porosity and in addition characterized by small dimensions - in the region of 0.1 to 0.5 μm to a maximum of 2-3 mm - without having to use spray
granulators which may require more costly management. A high porosity favours rapid dissolution of the mixture in a manner similar to an "explosion", while small-size granules allow finer metering thereof in the dissolving liquid, also for carrying out laboratory tests or trials.

Mixing of the various powder components of the mixture in question may be performed prior to implementing the method or directly during the metering step. Depending on the desired composition of the mixture it is possible to introduce into the agglomeration chamber only tannin powder or add in predetermined percentages tannin powder and gum arabic powder.

The mass of powders added into the agglomeration chamber forms an uncompacted layer and fluidization of this mass may be performed using a blower with direct blowing-in of gaseous fluid underneath this layer.

If one wishes to avoid using a blower, fluidization of the powders may also be performed by means of a suction system connected to the top part of the agglomeration chamber.

With the suction system a continuous gaseous flow is created in any case and is forced inside the agglomeration chamber, passing through the mass of powders and causing fluidization thereof.
If the gaseous fluid is air, prior to filtering, it may be drawn from the external environment; in the where, however, it is preferred to use nitrogen it is drawn from the associated tank.

The gaseous fluid which emerges from the agglomeration chamber may be forced to pass through filtering systems, such as for example sleeve filters, so as to recover, and not disperse together with the gaseous fluid, the particles of powder which may be entrained.

As regards agglomeration of the powder particles, it is performed when the layer of powders is fluidized and therefore necessarily in conjunction with the fluidization step. Continuous moistening of the fluidized particles is performed by means of particle-like dispersion of an agglomeration fluid: during the turbulent fluidization movement the fluid droplets encapsulate various powder particles, creating a coagulated body which, for as long it is kept suspended in the fluidized mass by the gaseous fluid, captures other particles of powder by means of collision and increases in size.

The agglomeration fluid which can be used may be water or an aqueous solution containing dissolved binding substances. Advantageously an aqueous solution of gum arabic for oenological use may be employed as
agglomeration fluid, thus avoiding introducing into the mixture substances which may negatively alter the organoleptic properties of the wine.

The use of binding substances added to the water is preferable in the case where it is required to obtain a particle size distribution of the granules which is close to the maximum size limit obtainable with a fluid-bed granulator.

The agglomeration fluid may be introduced and dispersed substantially inside the top part of the agglomeration chamber, by means of atomizers or sprayers which are arranged so as to be able to moisten in a uniform manner the fluidized mass of powders which, either by means of direct blowing-in from the bottom or suction from the top, occupies the whole of the agglomeration chamber with a turbulent movement.

Advantageously, before entering into the agglomeration chamber, the gaseous fluid is preheated to a temperature of between 150 and 210°C so as to be able to perform drying of the granules. As a result of the hot gaseous flow, in fact, it is possible to achieve evaporation of the agglomeration fluid and consequently the formation of channels inside the granules. These channels, left free by the fluid, form the internal porosity of the granules.
The method according to the present invention may advantageously be implemented in a continuous or discontinuous manner.

When implementing the method continuously, several agglomeration chambers connected in series may be envisaged. The powder components are continuously introduced into the chambers, while the dried granules are extracted either directly from the bottom of the individual chambers or from a chamber which is specially provided for this purpose and connected to the agglomeration chambers.

When implementing the method in a discontinuous manner, the powder components are added into the agglomeration chamber as a single charge and extraction of the dried granules is performed at the end of the process.

The invention thus conceived therefore achieves the predefined objects.
CLAIMS

1. Mixture for oenological use of the type comprising tannin, characterized in that it is in the form of granules of agglomerated powder particles having a porosity able to convey inside each granule a dissolving liquid, in particular water or wine, for producing instantaneous and complete dissolution of the mixture in said dissolving liquid.

2. Mixture according to Claim 1, characterized in that it comprises solely tannin.

3. Mixture according to Claim 1, characterized in that it comprises also gum arabic.

4. Mixture according to Claim 3, in which said gum arabic is present in a percentage amount by weight in the range of 20% to 60%, said percentage amount being chosen depending on the type of wine to be treated with said mixture and the oenological treatments envisaged with said mixture.

5. Mixture according to Claim 2, characterized in that said granules comprise particles of tannin powder agglomerated together without specific binding substances.

6. Mixture according to Claim 3, characterized in that said granules comprise particles of tannin powder and particles of gum arabic powder agglomerated together,
said gum arabic being in particular able to improve agglomeration of said particles of powder in the form of granules.

7. Mixture according to any one of the preceding claims, characterized in that said granules substantially explode as they rapidly dissolve in said dissolving liquid, assisted by the hydrostatic pressure of said liquid.

8. Method for producing a mixture for oenological use comprising tannin, which comprises the steps of:

- adding metered quantities of the components of said mixture in the form of particles of powder inside an agglomeration chamber;

- fluidizing said particles of powder inside said agglomeration chamber;

- moistening said particles of powder fluidized inside said agglomeration chamber by means of particle-like dispersion of an agglomeration fluid;

- agglomerating said particles of powder by means of said agglomeration fluid with consequent formation of granules;

- drying said granules by means of evaporation of said agglomeration fluid inside said agglomeration chamber;

- extracting said dried granules from said
agglomeration chamber.

9. Method according to Claim 8, characterized in that said mixture is composed substantially of tannin in powder form, as the sole component.

10. Method according to Claim 8, characterized in that said mixture also comprises gum arabic in powder form.

11. Method according to Claim 10, characterized in that, during metering, said gum arabic is added in a percentage amount by weight ranging from 20% to 60%, the residual fraction being composed substantially of tannin.

12. Method according to any one of Claims 8 to 11, characterized in that it is implemented using a fluid-bed granulator.

13. Method according to anyone of Claims 8 to 12, characterized in that said agglomeration step takes place during said fluidization step.

14. Method according to any one of Claims 8 to 13, characterized in that said agglomeration fluid is water.

15. Method according to any one of Claims 8 to 13, characterized in that said agglomeration fluid is an aqueous solution comprising at least one binding substance.

16. Method according to Claim 15, characterized in that said binding substance is gum arabic.
17. Method according to any one of Claims 8 to 16, characterized in that said agglomeration fluid is dispersed substantially in the top part of the agglomeration chamber.

18. Method according to any one of Claims 8 to 17, characterized in that drying of the granules is obtained by blowing in a gaseous fluid and provides the granules with an internal porosity.

19. Method according to Claim 18, characterized in that said gaseous fluid is air or nitrogen.

20. Method according to Claims 18 or 19, characterized in that blowing-in of said gaseous fluid occurs via the bottom of said agglomeration chamber.

21. Method according to any one of Claims 18 to 20, characterized in that, before entering said agglomeration chamber, the gaseous fluid is pre-heated to a temperature varying from 150 to 210°C.

22. Method according to any one of Claims 8 to 21, characterized in that it is continuous, the step of metering said powder being performed at the same time as extraction of the granules.

23. Method according to any one of Claims 8 to 21, characterized in that it is discontinuous, extraction of the granules being performed after the step of metering said powder.
# INTERNATIONAL SEARCH REPORT

## A. CLASSIFICATION OF SUBJECT MATTER

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According to international Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC, PAJ, WPI Data, FSTA, BIOSIS, COMPENDEX

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of box C.

Patient family members are listed in annex.

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### Date of the actual completion of the international search

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Name and mailing address of the ISA

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Authorized officer

Koch, J
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