C/2025/1829

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List and description of the files of the OIV Code of Oenological Practices referred to in Article 3(2) of Commission Delegated Regulation (EU) 2019/934 ([1])

(C/2025/1829)

Article 3(2) of Commission Delegated Regulation (EU) 2019/934 provides that the Commission shall publish the files of the OIV code of Oenological Practices referred to in column 2 of Table 1 and in column 3 of Table 2 of Part A of Annex I to that Regulation in the *Official Journal of the European Union*, C series. This is the purpose of this publication which includes all the OIV files referred to in Commission Delegated Regulation (EU) 2019/934, as amended by Commission Delegated Regulation (EU) 2024/3085 ([2]).

To be noted: In case of differences between Commission Delegated Regulation (EU) 2019/934 and the OIV files as regards in particular the categories of products covered (categories mentioned in column 3 of Table 1 and column 8 of Table 2 of Part A of Annex I), Commission Delegated Regulation (EU) 2019/934 prevails.

Also to be noted: Where clarifications to OIV files have been deemed necessary, footnotes have been added to such files.

([1]) Commission Delegated Regulation (EU) 2019/934 of 12 March 2019 supplementing Regulation (EU) No 1308/2013 of the European Parliament and of the Council as regards wine-growing areas where the alcoholic strength may be increased, authorised oenological practices and restrictions applicable to the production and conservation of grapevine products, the minimum percentage of alcohol for by-products and their disposal, and publication of OIV files (OJ L 149, 7.6.2019, p. 1, ELI: http://data.europa.eu/eli/reg_del/2019/934/oj).

([2]) Commission Delegated Regulation (EU) 2024/3085 of 30 September 2024 amending Delegated Regulation (EU) 2019/934 supplementing Regulation (EU) No 1308/2013 of the European Parliament and of the Council as regards authorised oenological practices (OJ L, 2024/3085, 9.12.2024, ELI: http://data.europa.eu/eli/reg_del/2024/3085/oj).

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1.7. **CARBONIC MACERATION (16/70)**

Definition

Process in which whole grapes are placed for a few days in a closed tank whose atmosphere comprises carbon dioxide. This gas results either from an external source, or from the respiration of grapes and the fermentation of a part of the crushed berries, or from both.

Objective

Production of red wine or rosé which is more supple, less acidic, fresher and with a better expression of varietal aromas.

Prescriptions

a) A device for venting the gas formed should be provided so that the internal pressure does not exceed atmospheric pressure.

b) The grapes, once removed from the tank, are crushed and pressed, and the separated must is fermented in the absence of solid matter.

1.8. **MACERATION AFTER HEATING THE HARVESTED GRAPES (16/70)**

Definition

Process of heating whole, crushed or de-stemmed grapes, before the start of fermentation, to temperatures chosen according to the desired goal, and maintaining them at these temperatures for a certain period of time.

Objectives

a) More rapid and more complete extraction of colour and other substances contained in skins.

b) Prevention of enzymatic processes.

Prescriptions

a) The must may ferment either in contact with or in the absence of solids.

b) The process must not lead either to a concentration, or to a dilution. Consequently:

— excess heating is to be avoided,

— heating by injection of steam is forbidden.

1.11. **TREATMENT WITH ASCORBIC ACID (OENO 10/01)**

Classification

Ascorbic acid: additive

Erythorbic acid: additive

Definition

Addition of ascorbic acid to grapes.

Objective

Protect the aromatic substances of the grape, through the antioxidant properties of the product, against the influence of oxygen in the air.

Prescriptions

a) It is recommended to add ascorbic acid before the grape's crushing.

b) The dose used must not exceed 250 mg/kg.

c) It is advisable to use ascorbic acid with sulfur dioxide.

d) The ascorbic acid must comply with the prescriptions of the *International Oenological Codex*.

1.12. **SULFITING (OENO 3/04)**

Classification

Sulphur dioxide: additive

Ammonium hydrogen sulphite: additive

Potassium anhydrous sulphite: additive

Definition

Addition of solution of sulphur dioxide, or potassium hydrogen sulphite, potassium anhydrous sulphite, ammonium sulphite or ammonium hydrogen sulphite to grapes.

Objectives

Obtain microbiological control of grapes by limiting and/or preventing the propagation of yeasts and bacteria and technologically undesirable microorganisms.

Implement an antioxidant.

Prescriptions

a) The addition of sulphur dioxide prior to alcoholic fermentation should be limited as much as possible because the combining with acetaldehyde will render the solution with no antiseptic or antioxidant effects in resulting wine.

b) The total sulphur dioxide contents when marketed must at least comply with the limits set by Annex C of the *Compendium of International Methods of Analysis of wine and musts*.

c) The products used must comply with the prescriptions of the *International Oenological Codex*.

1.13. **USE OF ENZYMES TO IMPROVE THE GRAPE MACERATION PROCESS, THE EXTRACTION OF JUICE AND OTHER GRAPE COMPOUNDS (OENO 13/04, OENO 498-2013, OENO 682-2021)**

Definition

Addition to grapes of enzymatic preparations containing activities catalysing the degradation of structural macromolecules of the cell wall of the grape, such as cellulose, pectins with their side chains, hemicellulose, glycoproteins, and various protein fractions.

Enzyme activities involved in the maceration of grapes notably include polygalacturonases, pectin lyases, pectinmethylesterases, arabinanases, rhamnogalacturonases, cellulases and hemicellulases.

Objectives

a) To facilitate operations for obtaining musts such as draining and pressing.

b) To facilitate racking operations.

c) To facilitate the extraction of colouring matter and polyphenols.

d) To facilitate the extraction of aromas and aromatic precursors from grape berry skin.

Prescription:

The enzymes must comply with the prescriptions of the *International Oenological Codex*.

1.14. **PREFERMENTATIVE COLD MACERATION FOR MAKING WHITE WINES (OENO 11/05)**

Definition

Procedure involving the cold maceration of white grapes, destemmed or crushed and whole clusters. The mixture is held at a temperature for a period of time adapted to the sought after objective prior to pressing and fermentation.

Objective

To promote the release of skin compounds, notably aroma precursors using a diffusional and enzymatic procedure in order to increase the aromatic and gustatory complexity of wine.

Prescriptions

a) Evaluate the health condition and maturity of grapes in order to determine the technique or diffusional, enzymatic or biochemical procedure sought after,

b) Manage oxidative phenomena through appropriate means,

c) Prevent a significant extraction of phenolic compounds from excessive sulphiting at too high a temperature or for a too lengthy maceration period,

d) Prevent microbial activity through appropriate hygiene and at an adapted controlled temperature,

e) Determine length of maceration time based on grape characteristics and the sought after wine type.

1.15. **PREFERMENTATIVE COLD MACERATION FOR MAKING RED WINES (OENO 12/05)**

Definition

Procedure involving the cold maceration of red grapes, destemmed and/or crushed whole clusters at a temperature for a period of time adapted to the sought after objective prior to onset of fermentation.

Objectives

Promote the release of skin compounds using a diffusional and enzymatic procedure in order to increase the aromatic and gustatory complexity of wine and to improve the colour characteristics.

Prescriptions

a) Evaluate the health condition and maturity of grapes in order to determine the interest of the technique,

b) Manage oxidative phenomena through adapted dispositions,

c) Prevent microbial activity through appropriate hygiene and controlled temperature, and an adapted maceration time,

d) Determine length of maceration based on grape characteristics and sought after wine type.

1.17. **TREATMENT OF CRUSHED GRAPES WITH ULTRASOUND TO PROMOTE THE EXTRACTION OF THEIR COMPOUNDS (OENO 616-2019)**

Definition

Usage of ultrasound for a rapid extraction of grape compounds.

Objective

To stimulate extraction of grape compounds during prefermentation maceration, after destemming and crushing, by using ultrasound, with the following aims:

— To obtain a must with a higher concentration of phenolic compounds and other grape compounds

— To obtain wines with an adequate and stable phenolic composition, reducing the maceration time compared to a traditional process

— To limit the release of tannins present in the seeds (since maceration time is decreased), mainly when the treated grapes have a low phenolic maturation

— To accelerate the grape processing

Prescriptions

a) The treatment must be carried out on destemmed and crushed grapes in order to increase the performance of the treatment

b) In order to avoid a temperature increase in the bulk of crushed grapes this treatment should be done with the bulk in movement

c) To boost an efficient cavitation process, the solid/liquid proportion in the bulk of crushed grapes must be adequate.

1.18. **TREATMENT BY DISCONTINUOUS HIGH PRESSURE PROCESSES (OENO 594A-2019)**

Definition

Process that consists in the reduction of indigenous organisms in grapes by the use of discontinuous high pressure processes, with pressures higher than 150 MPa (1 500 bar).

Objective

a) To reduce the microbial loads of indigenous microorganisms, especially yeasts,

b) To reduce SO_2 levels used in winemaking,

c) To accelerate maceration in red winemaking.

Prescriptions

a) The high hydrostatic pressure (HHP) technique relates to the use of pressure levels higher than 150 MPa (1 500 bar) during a discontinuous process.

b) The elimination of yeasts in grapes and musts requires pressure levels of 200-400 MPa.

c) The elimination of bacterial cells needs pressure levels of 500-600 MPa.

d) The treatment time range is 2-10 minutes.

e) If necessary, the increase in temperature may be controlled by supplementary refrigeration.

f) The increase in temperature and the techniques used should not entail any alteration in the appearance, colour, flavour or taste of the wine.

2.1.1. **OXYGENATION (OENO 545A/2016)**

Classification

Oxygen: processing aid

Definition

Addition of oxygen or air to must

Objectives

a) To accelerate the oxidation process in musts in white or rosé winemaking with the aim of provoking browning reactions in phenolic compounds, which are formed by polymerisation, then precipitate and are removed during clarification of musts, to improve the stability of wines in relation to oxidation. This practice, which provides for the addition of high levels of oxygen to musts, equivalent to several saturations, is called 'hyperoxygenation'.

b) To contribute to the reduction of aromas compounds related to vegetal sensory character and the disappearance of reductive aromas.

c) To ensure alcoholic fermentation occurs smoothly and to avoid stuck fermentations.

Prescriptions

a) In the case of reduction of the level of phenolic compounds involved in browning phenomena, oxygen should be added before clarification of must.

b) In the case of management of fermentation kinetics, the addition of oxygen at the recommended dose of 5-10 mg/l is sufficient provided that this is carried out at the end of the yeast growth phase, namely after the reduction of the sugar concentration of the must by around 50 g/l.

c) The aim of oxygenation should not be a reduction in sulphite of musts containing excess sulphur dioxide.

2.1.2. **SULPHITING (5/87)**

Classification

Sulphur dioxide: additive

Ammonium hydrogen sulphite: additive

Potassium anhydrous sulphite: additive

Definition

Addition to crushed grapes or to must of gaseous sulphur dioxide, aqueous sulphur dioxide solution, or potassium disulphite ([3]), ammonium sulphite or ammonium disulphite.

Objectives

a) Put into action:

— an antiseptic against problems due to the growth of microorganisms,

— an antioxidant,

— a selective factor for yeasts,

— a product facilitating settling,

— a product favouring the extraction of anthocyanins.

b) Regulate and control the fermentation.

c) Produce preserved musts.

Prescriptions

a) Sulphiting should take place during crushing or immediately after.

b) Distribute the product evenly in the crushed grapes or the must.

c) Ammonium sulphite and disulphite also introduce in the must ammonium ions that constitute growth activators for yeasts (see Activation of alcoholic fermentation).

d) Products used shall comply with the prescriptions of the *International Oenological Codex*.

2.1.3.1.1. **CHEMICAL ACIDIFICATION (OENO 3/99, OENO 13/01)**

Definition

Increasing the titration acidity and the actual acidity (decreasing pH) by adding organic acids.

Objectives:

a) Produce balanced wines from the gustatory point of view

b) Favour a good biological evolution and good maturation of wine

c) Remedy insufficient natural acidity caused by:

— climatic conditions in the viticulture region, or

— oenological practices which lead to a decrease in natural acidity.

Prescriptions

a) Lactic acids, L(-) or DL malic acid and L(+) tartaric acid are the only acids that can be used.

b) The addition of acids should not be done to conceal fraud.

c) The addition of mineral acids is forbidden.

d) Chemical acidification and chemical de-acidification are mutually exclusive.

e) The acids used must conform to the *International Oenological Codex* standards.

f) Acids can be only be added to musts under condition that the initial acidity content is not raised by more than 54 meq/l (i.e. 4 g/l expressed in tartaric acid).

When must and wine are acidified, the net cumulative increase must not exceed 54 meq/l (or 4 g/l expressed in tartaric acid).

([3]) Potassium disulphite is synonymous with potassium metabisulphite.

2.1.3.1.1.1. **CALCIUM SULFATE (OENO 583/2017)**

Classification

Calcium sulphate: additive

Definition

Addition of calcium sulphate ($CaSO_4.2H_20$) to the must prior to fermentation in combination with tartaric acid for the elaboration of liqueur wines.

Objectives

a) Produce balanced liqueur wines from the gustatory point of view.

b) Favour a good biological evolution and good storage of liqueur wine.

c) Remedy insufficient natural acidity of liqueur wines caused by:

— climatic conditions in the viticulture region,

— oenological practices which lead to a decrease in natural acidity.

Prescriptions

a) The use of calcium sulphate is used in combination with lower tartaric acid level.

b) It is suggested to make laboratory preliminary tests to calculate the doses of calcium sulphate and tartaric acid needed to reduce the pH required.

c) The dose must not exceed 2 g/l of calcium sulphate because it allows to reach the adequate Tel. 3,2 in the winemaking of these musts and to obtain equilibrated wines even in years of adverse weather conditions.

d) The residual level of sulphates in wines must not exceed the OIV limit.

e) The practice should not be done to conceal fraud.

f) Chemical acidification and chemical de-acidification are mutually exclusive.

g) Calcium sulphate used must comply with the prescription of the *International Oenological Codex* standards.

2.1.3.1.3. **ACIDIFICATION BY ELECTROMEMBRANE TREATMENT (BIPOLAR MEMBRANE ELECTRODIALYSIS) (OENO 360/2010)**

Definition

Physical ionic must extraction method under action of electric field using permeable cation membranes and bipolar membrane giving rise to increased titratable acidity and actual acidity (decrease in pH).

Objectives

a) Increase titration acidity and actual acidity (decrease in pH).

b) Promote good biological characteristics and favour good vinification.

c) Favour good maturation of wine.

d) Remedy insufficient natural acidity caused by:

— climatic conditions in the viticulture region, or

— oenological practices which lead to a decrease in natural acidity.

Prescriptions

a) See the general sheet on separative techniques used in the treatment of musts and wines ([4]) and the sheet concerning the use of membrane techniques applied to musts ([5]).

b) Acidification by electro-membrane treatment should not be done to conceal fraud.

c) Cationic membranes shall be made in such a way as to only enable them to be adapted to the extraction of cations only and in particular cations K+.

d) Bipolar membranes are impermeable to anions and cations of musts.

e) Acidification by bipolar electrodialysis must only be carried out provided that initial must acidity is not increased more than 54 meq/l (that being 4 g/l expressed in tartaric acid). When musts and wine are acidified, the net accumulated increase must not be over 54 meq/l (that being 4 g/l expressed in tartaric acid).

f) The implementation of the process will be under the responsibility of an oenologist or a qualified technician.

g) The membranes shall comply with the prescriptions of the *International Oenological Codex*.

2.1.3.1.4. **ACIDIFICATION BY CATION EXCHANGER TREATMENT (OENO 442/2012)**

Definition

Physical partial extraction of cations of the musts to increase titration acidity and actual acidity (decrease in pH) through a cation exchanger.

([4]) OIV files 2.0 and 3.0. SEPARATIVE TECHNIQUES USED IN THE TREATMENTS OF MUSTS AND WINES:
- a) The objectives can be achieved by different techniques alone or in combination:
  - — Membrane techniques
  - — Evaporative techniques (such as distillation and vacuum distillation)
  - — Other separative techniques
- b) The wine or must to be treated must comply with OIV's definitions and limits.
- c) These techniques cannot be used to cover fraudulent acts.
- d) Fractions, untreated or treated by oenological practices approved by the OIV must be blended exclusively with must or wine fractions, obtained by separative techniques, derived from the same original product. Fractions used as wine based products as defined in the International Code of Oenological Practices are the only exception.
- e) Recombination must occur within the shortest possible time and in the same place when it is possible.
- f) The techniques, membranes and equipment used, and the practices implemented in the additional procedures must comply with the provisions stated in the OIV *International Code of Oenological Practices*.
- g) Treatments of the fractions must comply with the OIV *International Code of Oenological Practices.*

([5]) OIV file 2.0.1. APPLICATION OF MEMBRANE TECHNIQUES:
- a) See the general sheet on treatments of musts and wines with separative techniques used in the treatment of wine and must.
- b) The above-mentioned objectives can be reached by applying these techniques, for example, for:
  1. the partial deshydratation of must,
  2. the reduction of sugar concentration,
  3. the adjustment of acidity or pH of musts,
  4. the reduction of the concentration of certain organic acids.
- c) There are different types of membrane techniques, alone or in combination, depending on the sought after objectives including:
  1. microfiltration,
  2. ultrafiltration,
  3. nanofiltration,
  4. membrane contactor,
  5. reverse osmosis,
  6. electromembranes,.
  7. other membrane techniques.
- d) The use of membrane techniques to obtain opposite features is not allowed.
- e) This practice must be carried out by an oenologist or a qualified technician.
- f) The membranes and material, in addition to techniques used in complementary procedures, as stated in point C, shall be consistent with the provisions of the *International Code of Oenological Practices* and the *International Oenological Codex*.

Objectives

a) Increase titration acidity and actual acidity (decrease in pH).

b) Produce balanced wines from a sensory point of view.

c) Promote good biological characteristics and good keeping quality of the wine.

Prescriptions

a) The treatment will be performed using cation exchange resins regenerated in the acid cycle.

b) The treatment must be limited to the elimination of excess cations.

c) To avoid the production of fractions of must, the treatment will be performed continuously, with in-line incorporation of the treated must into the original must.

d) As an alternative, the resin could be directly introduced into the tank of must, in the quantities required, then separated by all appropriate technical methods.

e) The acidification must be carried under condition that the initial acidity is not raised by more than 54 meq/l. When must and wine are acidified, the cumulative net increase must not exceed 54 meq/l.

f) All operations will be placed under the responsibility of an oenologist or qualified technician.

g) The resins shall comply with the prescriptions of the *International Oenological Codex*.

2.1.3.2.2. **CHEMICAL DE-ACIDIFICATION (6/79)**

Definition

Decrease of the acidity and the actual acidity (increase of the pH) by addition of neutral potassium tartrate, potassium hydrogen carbonate or calcium carbonate containing possibly small quantities of the calcium double salt of L(+) tartaric and L(-) malic acids.

Objectives

a) See 2.2 ([6]).

b) To favour biological de-acidification.

Prescriptions

a) The wine produced from a de-acidified must shall contain at least 1 g/l tartaric acid.

b) The process of the formation of the double salt (neutral calcium salts of tartaric and malic acids) should be applied in the case of musts very rich in malic acid for which precipitation of the tartaric acid alone does not provide a satisfactory reduction of the titratable acidity.

c) The aim of chemical de-acidification shall not be to conceal fraud.

d) Chemical de-acidification and chemical acidification are mutually exclusive.

e) The products added shall comply with the prescriptions of the *International Oenological Codex*.

2.1.3.2.3. **MICROBIOLOGICAL DE-ACIDIFICATION (OENO 3/03, OENO 546/2016, OENO 611/2019)**

Definition

Lowering of total acidity and real acidity (increase in pH) by using yeasts or lactic acid bacteria.

Objective

See sheet 2.1.3.2 'De-acidification' ([7])

([6]) 2.2 Preservation of musts.
([7]) OIV file 2.1.3.2 DE-ACIDIFICATION.
Objective: Production of balanced wines from a sensory point of view.

Prescriptions

In order to achieve this objective, microbiological de-acidification by microorganisms is carried out by inoculation of selected strains.

Recommendation of the OIV

See sheets:

2.1.3.2.3.1 'De-acidification by yeasts (Saccharomyces and non-Saccharomyces)' and / or

2.1.3.2.3.2 'De-acidification by lactic acid bacteria'.

2.1.3.2.3.1. **DE-ACIDIFICATION BY YEASTS (OENO 5/02) (OENO 546/2016, OENO 611-2019)**

Definition

Lowering of total acidity and real acidity (increase in pH) by using selected yeasts (*Saccharomyces* and non-*Saccharomyces*)

Objectives

a) To make balanced wine from a gustatory sensation point of view;

b) To obtain a partial or total breakdown of malic acid by a biological pathway.

Prescriptions:

Biological decrease of malic acid by yeasts can operate:

a) On musts (see file 2.1.3.2.3.).

b) The objective under b) can be achieved during alcoholic fermentation using selected Saccharomyces or non-Saccharomyces strains. Strains of Saccharomyces genus are known for their partial breakdown capabilities. Strains of Schizosaccharomyces pombe are known for their total malic acid breakdown capabilities.

c) The use of Schizosaccharomyces yeasts has shown its efficiency for obtaining a rapid breakdown, whether partial or complete, of L-malic acid in musts and wines. Due to the great decrease of titratable acidity and the concentration of hydrogen ions, induced by the activity of these yeasts, their development can be undesirable for certain wines. So precautions should be taken to avoid contamination of the vats for which the development of these yeasts is undesirable.

d) Yeasts must comply with the prescriptions of the *International Oenological Codex*.

2.1.3.2.3.2. **DE-ACIDIFICATION BY LACTIC ACID BACTERIA (OENO 611-2019)**

Definition

Reduction of the total acidity and real acidity (increase in pH) through the use of lactic acid bacteria of the *Lactobacillus*, *Leuconostoc*, *Pediococcus* and *Oenococcus* genera.

Objectives

a) To develop balanced wines in terms of taste sensations;

b) to obtain the total or partial degradation of malic acid by biological means.

Prescriptions

a) To achieve the objective, de-acidification by lactic acid bacteria is conducted by addition of at least 10^6 CFU/mL of selected strains of lactic acid bacteria to must, which may or may not be in the process of alcoholic fermentation.

b) The selected strains must comply with the prescriptions of the *International Oenological Codex*.

2.1.3.2.4. **DE-ACIDIFICATION USING AN ELECTROMEMBRANE PROCESS (OENO 483-2012)**

Definition

Physical method of ionic extraction from the must under the action of an electric field using permeable membranes with anions on the one part and bipolar membranes on the other. The combination of permeable membranes with anions and bipolar membranes is used to manage a reduction in titratable acidity and the actual acidity (increase in the pH).

Objectives

a) Correct excess natural acidity caused by climate conditions in the wine region by reducing titratable acidity and actual acidity (increase in the pH)

b) Develop balanced wines in terms of taste

c) Promote a smooth wine maturing operation

Prescriptions

a) Refer to the general file on separative techniques used in the processing of musts and wines ([8]) and the file on the application of membrane techniques to musts ([9]).

b) De-acidification using an electromembrane process should not be intended to hide a fault.

c) The anionic membranes must be composed in such a way that they only allow the extraction of anions and in particular the organic acids from the must.

d) The bipolar membranes are impermeable to anions and cations in the must.

e) The wine from a de-acidified must should contain at least 1g/l of tartaric acid.

f) De-acidification by membrane process and acidification are mutually exclusive.

g) An oenologist or qualified technician will be responsible for implementing the process.

h) The membranes used must comply with the prescriptions contained in the *International Oenological Codex*.

2.1.3.2.5. **TREATMENT WITH POTASSIUM CARBONATE (OENO 580-2017)**

Classification

Processing aids

Definition

Decrease of the acidity and the actual acidity (increase of the pH) by addition of neutral potassium tartrate, potassium hydrogen carbonate, potassium carbonate or calcium carbonate containing possibly small quantities of the calcium double salt of L(+) tartaric and L(-) malic acids.

Objective

a) See 2.1.3.2 ([10]).

b) For de-acidification of must.

Prescriptions

a) The wine produced from a de-acidified must should contain at least 1 g/l tartaric acid for wine quality reasons.

b) The process of the formation of the double salt (neutral calcium salts of tartaric and malic acids) should be applied in the case of musts very rich in malic acid for which precipitation of the tartaric acid alone does not provide a satisfactory reduction of the titratable acidity.

c) The aim of chemical de-acidification shall not be to conceal fraud.

d) Chemical de-acidification and chemical acidification are mutually exclusive.

e) The products added shall comply with the prescriptions of the *International Oenological Codex*.

2.1.4. **USE OF ENZYMES FOR THE CLARIFICATION (OENO 11/04, OENO 498-2013, OENO 682-2021)**

Classification

Arabinanases: processing aid

Cellulases: processing aid

([8]) See footnote 3.
([9]) See footnote 4.
([10]) OIV file 2.1.3.2 Objective: Production of balanced wines from a sensory point of view.

Pectin lyases: processing aid

Pectinemethylesterase: processing aid

Polygalacturonases: processing aid

Hemicellulases: processing aid

Definition

Addition to must of enzymatic preparations containing activities catalysing the degradation of grape macromolecules which went into the must during the juice extraction operations, as well as beta-glucans produced by the fungus *Botrytis cinerea*.

Enzyme activities involved in the clarification of musts notably include polygalacturonases, pectin lyases, pectinmethylesterases, and to a lesser extent arabinanases, rhamnogalacturonases, cellulases and hemicellulases as well as β-glucanases if the musts come from botrytised grapes.

Objective

To facilitate the clarification of musts.

Prescription

The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

2.1.6. **GELATIN TREATMENT (OENO 5/97)**

Definition

Addition of gelatin to the must.

Objectives

a) Reduction of polyphenolic compounds in the must, in order to decrease must astringency before fermentation.

b) Reduction of the particles which are insoluble in the must.

Prescription

This gelatin must conform to the prescriptions of the *International Oenological Codex*.

2.1.7. **TANNIN ADDITION (16/70; OENO 612-2019)**

Definition

Addition of tannin to must.

Objectives

a) To facilitate the subsequent stabilisation of wines by partial precipitation of excess proteinaceous matter in musts;

b) to facilitate the fining of musts in conjunction with protein-type fining agents and prevent over-fining;

c) to contribute to the antioxidant and antioxidasic protection of compounds of the must;

d) to promote the expression of colour in red wines obtained from musts to which tannins have been added.

Prescription

a) To facilitate rapid incorporation into must, tannins may be added immediately after harvesting;

b) the tannins used shall comply with the prescriptions of the *International Oenological Codex*.

2.1.8. **TREATMENT WITH BENTONITES (16/70)**

Classification

Bentonites: processing aid

Definition

Addition of bentonites to must.

Objective

Preventive treatment for protein and copper hazes.

Prescription

The substances used shall comply with the prescriptions of the *International Oenological Codex*.

2.1.9. **TREATMENT WITH CARBON (16/70), (OENO 3/02)**

Classification

Oenological carbon: processing aid

Definition

Addition of carbon to musts.

Objectives

a) To correct organoleptic characteristics of wine coming from musts affected by fungi such as grey rot or oïdium.

b) To eliminate possible contaminants.

c) To correct the colour of:

— white musts derived from the white juice of red grapes,

— very yellow musts derived from white grape varieties,

— oxidised musts.

Prescriptions

a) The quantity of dry carbon used shall be less than 100 g/hl of must.

b) The carbon added shall comply with the prescriptions of the *International Oenological Codex*.

2.1.10. **TREATMENT WITH SILICON DIOXIDE (1/91)**

Definition

Addition to must of a colloidal solution of silicon dioxide coupled with the addition of a gelatin solution.

Objective

To achieve the flocculation of the gelatin with a view to clarification.

Prescriptions

a) The product is added to the must.

b) Preliminary tests are necessary to determine optimal doses of colloidal silicon dioxide and of gelatin.

c) The products added shall comply with the prescriptions of the *International Oenological Codex*.

2.1.11. **FILTRATION (16/70)**

Classification

Perlite: processing aid

Definition

Physical process by which must is passed through appropriate filters that retain particles in suspension.

Objective

Clarification of the must.

Prescriptions

a) Filtration is practised with or without additives.

b) Additives used, such as diatomaceous earth and cellulose paste and powder, shall comply with the prescriptions of the *International Oenological Codex*.

2.1.11.1. **FILTRATION ON A FILTER BED (1/90)**

Classification

Diatomite: processing aid

Definition

Filtration of the must through a bed of auxiliary filter material.

Objective

See 2.9

Prescriptions

The filtration can be undertaken:

a) by continuous deposition of the bed on appropriate supports;

b) on a filter bed formed on a rotary drum under vacuum with continuous elimination of the external skin containing the filtered particles.

Auxiliary filter materials, such as diatomaceous earth, perlite and cellulose, are chosen as a function of the degree of clarification desired. They shall comply with the prescriptions of the *International Oenological Codex*.

2.1.12. **PARTIAL DEHYDRATATION OF MUSTS (OENO 2/98)**

Definition

Process consisting in the elimination of a certain quantity of water in grape must.

Objectives

a) To increase the sugar level of a must intended to be fermented;

b) To produce caramelized musts;

c) To produce concentrated musts;

d) To prepare grape sugar.

Prescriptions

a) The objectives can be reached by various techniques called subtractive richness techniques:

   — cold concentration,

   — reverse osmosis,

   — partial evaporation by vacuum,

   — partial evaporation by atmospheric pressure.

b) For objective under a), concentration cannot lead to a reduction of more than 20 % of initial volume nor increase more than 2 % of the initial, potential alcoholic strength of the must.

c) The elimination of water in the must cannot be cumulated with the elimination of water in the corresponding wine (only for objective a).

2.1.12.1. **CONCENTRATION OF MUST BY REVERSE OSMOSIS (OENO 1/93)**

Definition

Process consisting of concentrating must by elimination of part of the water through specific membranes under the action of a pressure greater than the osmotic pressure of the must.

Objective

To obtain an enrichment of the must, especially in sugars.

Prescriptions

a) The concentration can be performed on all or part of the must.

b) The concentration shall not be undertaken to reduce the initial volume of the must by more than 20 % nor to increase the initial potential alcohol content of the must by more than 2 % (vol.).

c) Since this procedure entails a concentration of all must constituents, its application shall be limited to musts where its use is justified. It should not be used to modify the type of wine produced.

d) The procedure shall be conducted under the responsibility of an oenologist or a specialist technician.

e) The membranes used shall comply with the prescriptions of the *International Oenological Codex*.

2.1.12.2. **PARTIAL EVAPORATION UNDER VACUUM (OENO 1/01)**

Definition

Prescriptions to concentrate musts at a moderate temperature by evaporation of a portion of the water in the thermal exchanger under a high vacuum.

Objective

See the sheet on 'Partial dehydration of musts'.

Prescriptions

a) Select a continuous, rather than a re-circulating, unit;

b) The prescription concentrates all ingredients and should thus be limited to must justifying this technique and should not modify the type of wine produced;

c) This prescription is not recommended for musts from grape varieties with significant free varieties of odour;

d) A volume counter will measure the amount of water eliminated.

2.1.12.3. **PARTIAL EVAPORATION UNDER ATMOSPHERIC PRESSURE (OENO 3/98)**

Definition

Process consisting in eliminating a certain quantity of water from grape must in an evaporational system under atmospheric pressure.

Objectives

See 2.1.12. b, c, and d.

Prescriptions

a) Evaporation may be done in open cauldrons, with or without stirring, heated:

— by direct fire, or

— by steam sleeves or in another calorific fluid.

b) These processes must be conducted in such a way as to obtain the desired degree of concentration and caramelization of sugar without obtaining undesirable changes in taste.

2.1.12.4. **CONCENTRATION OF MUST BY COLD (CRYOCONCENTRATION) (OENO 4/98)**

Definition

Process consisting in concentrating must by partial freezing and elimination of the ice thus formed.

Objective

See 2.1.12 a and c.

Prescriptions

A light sulfiting of the must before freezing is recommended.

2.1.14. **FLOTATION (OENO 2/99, OIV-OENO 708-2022)**

Definition

An operation consisting of injecting gas into a must in such a way as to cause particles or microorganisms to rise to its surface.

Objectives

a) Obtain rapid clarification with or without adding clarifying agents.

b) Reduce the indigenous population of microorganisms prior to alcoholic fermentation for the subsequent use of selected yeasts.

c) Continuously clarify in order to regularize the quantity of items to eliminate.

d) And possibly, enhance oxygenation during clarification.

Prescriptions

Clarification can be done:

a) protected from air by using nitrogen or argon, or with compressed air to encourage the oxidation of oxidable compounds and render the colour of the wine more stable;

b) at ambient temperature, after chilling or by using continuous systems which allow real-time control of clarifying agents and clarification speed;

c) or in a static manner using appropriate containers;

d) the products used must conform to the *International Oenological Codex* standards.

2.1.15. **TREATMENT WITH POTASSIUM CASEINATE (OENO 4/04)**

Classification

Potassium caseinate: processing aid

Definition

Addition of potassium caseinate to musts in the form of a colloidal suspension or in association with other fining agents.

Objective

Eliminate oxidized polyphenolic compounds or those compounds likely to oxidize.

Prescription

Potassium caseinate must comply with prescriptions of the *International Oenological Codex*.

2.1.16. **TREATMENT WITH CASEIN (OENO 5/04)**

Classification

Casein (calcium caseinate): processing aid

Definition

Addition of casein to musts in the form of a colloidal suspension or in association with other fining products.

Objective

Elimination of polyphenolic compounds or those susceptible to oxidation.

Prescription

The casein used must comply with the prescriptions of the *International Oenological Codex*.

2.1.17. **FINING USING PROTEINS OF PLANT ORIGIN (OENO 7/04)**

Objectives

Use of protein matter of plant origin for the fining of musts in order to improve their clarity, stability and taste.

Prescriptions

1. The dose to be used is determined after a preliminary test trial. The maximum usage dose should be less than 50 g/hl. The dose retained corresponds to the sample which produces the sought after clarity and gives a better result for tasting.

2. Protein matter of plant origin can be used with other admitted products such as tannins, bentonite, silica gel…

3. Protein matter of plant origin must comply with the prescriptions of the *International Oenological Codex*.

2.1.18. **USE OF ENZYMES FOR IMPROVING THE FILTERABILITY (OENO 14/04, OENO 499-2013, OENO 682-2021)**

Classification

Arabinanases: processing aid

Cellulases: processing aid

Pectin lyases: processing aid

Pectinemethylesterase: processing aid

Polygalacturonases: processing aid

Hemicellulases: processing aid

Definition

Addition to must of enzymatic preparations containing activities catalysing the degradation of plugging macromolecules of grapes which went into the must during the juice extraction operations.

Enzyme activities involved in improving the filterability of musts notably include polygalacturonases, pectin lyases, pectinmethylesterases, and to a lesser extent arabinanases, rhamnogalacturonases, cellulases, hemicellulases, as well as β-glucanases if the musts come from botrytised grapes.

Objective

To improve the filterability of musts by specific hydrolysis of colloids.

Prescription

The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

2.1.19. **USE OF ENZYMES FOR THE RELEASE OF FLAVOURING SUBSTANCES (OENO 16/04, OENO 498-2013)**

Classification

Glycosidases: processing aid

Glucosidases: processing aid

Definition

Addition to must of enzymatic preparations containing activities catalysing the hydrolysis of the saccharide portion of the glycosylated aromatic substances (flavour precursors) of the grape, such as glycosylated terpenes.

Enzyme activities involved in the release of flavouring substances are glycosidases and glucosidases. Depending on the degree of inhibition by glucose, these enzymes may become active only after the fermentation has concluded.

Objective

To enhance the aromatic potential of the must.

Prescription

The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

2.1.20. **ADSORBANT COPOLYMER TREATMENT PVI/PVP (OENO 1/07, OENO 262-2014)**

Definition

The addition of polyvinylimidazole – polyvinylpyrrolidone copolymers (PVI/PVP) in order to reduce copper, iron and heavy metal contents.

Objectives

a) To prevent defects caused by too high metal contents (for example ferric casse).

b) To reduce undesirable high concentration of metals due to:

— must contaminated by metal cations (for example by residues from phytosanitary products containing copper),

— metal cation contamination during must treatment from winemaking equipment.

Prescriptions

a) The amount used should be less than 500 mg/l.

b) When musts and wine are treated with PVI/PVP copolymers, the accumulated dosage should be less than 500 mg/l.

c) The copolymers should be eliminated by filtration no later than two days after the addition taking into account the precautionary principle. In the case of cloudy musts, the copolymer must be added no earlier than a maximum of two days before filtration.

d) The adsorbant copolymers used should comply with the prescriptions of the *International Oenological Codex* and in particular monomers limits.

e) The implementation of the procedure shall be placed under the responsibility of an oenologist or a specialised technician.

2.1.21. **TREATMENT WITH D,L-TARTARIC ACID (OENO 3/08)**

Classification

D,L-tartaric acid: processing aid

Definition

Addition of D,L-tartaric acid or the potassium-salts of D,L-tartaric acid in must

Objectives

Reduction of excessive levels of calcium

Prescriptions

a) The treatment yields particularly insoluble salts. The use of D,L-tartaric acid is subject to certain regulations.

b) The treatment will be placed under the responsibility of an oenologist or a specialist technician.

c) The products added shall comply with the prescriptions of the *International Oenological Codex*.

2.1.22. **FINING USING CHITOSAN (OIV-OENO 336A-2009)**

Definition

Addition of chitosan of fungal origin for the purpose of fining musts

Objectives

To facilitate settling and clarification.

To carry out a treatment to prevent protein haze.

Prescriptions

a) The doses to be used are determined after preliminary testing. The recommended dose used should be less than or equal to 100 g/hl.

b) Chitosan must comply with the requirements of the *International Oenological Codex*.

2.1.23. **FINING USING CHITIN-GLUCAN (OIV-OENO 336B-2009)**

Definition

Addition of chitin-glucan of fungal origin for the purpose of fining musts

Objectives

a) To facilitate settling and clarification.

b) To carry out a treatment to prevent protein haze.

Prescriptions

a) The doses to be used are determined after preliminary testing. The recommended dose used should be less than or equal to 100 g/hl.

b) Chitin-glucan complex must comply with the requirements of the *International Oenological Codex*.

2.1.24. **FINING USING YEAST PROTEIN EXTRACTS (OENO 416-2011)**

Classification

Yeast protein extracts: processing aid

Definition

Addition of yeast protein extracts for fining musts

Objectives

a) Facilitate racking of musts.

b) Reduce turbidity of musts by precipitating suspended particles.

c) Reduce quantity of tannin.

d) Improve filtrability of wine derived from fined musts.

Prescriptions

a) The doses used are determined beforehand by laboratory trials (fining point).

b) Maximum dose to be used, determined by a test of efficiency in laboratory must not exceed 30 g/hl.

c) The yeast protein extracts can be used alone or associated with other authorised fining products.

d) The deposits from the fining of musts are eliminated from the musts by physical processes.

e) The yeast protein extracts must comply with the prescriptions of the *International Oenological Codex*.

2.1.26. **TREATMENT BY DISCONTINUOUS HIGH PRESSURE PROCESSES (OENO 594A-2019)**

Definition

Process that consists in the reduction of indigenous organisms in musts by the use of discontinuous high pressure processes, with pressures higher than 150 MPa (1 500 bar).

Objective

a) To reduce the microbial loads of indigenous microorganisms, especially yeasts,

b) To reduce SO_2 levels used in winemaking,

c) To accelerate maceration in red winemaking.

Prescriptions

a) The high hydrostatic pressure (HHP) technique relates to the use of pressure levels higher than 150 MPa (1 500 bar) during a discontinuous process.

b) The elimination of yeasts in grapes and musts requires pressure levels of 200-400 MPa.

c) The elimination of bacterial cells needs pressure levels of 500-600 MPa.

d) The treatment time range is 2-10 minutes.

e) If necessary, the increase in temperature may be controlled by supplementary refrigeration.

f) The increase in temperature and the techniques used should not entail any alteration in the appearance, colour, flavour or taste of the wine.

2.1.27. **TREATMENT OF GRAPES BY PULSED ELECTRIC FIELDS (PEF) (OENO 634-2020)**

Definition

A process that consists in the application of sufficiently high pulsed electric fields (PEF) to destemmed and crushed grapes that causes the permeabilization of the cell membranes especially of the grape skins.

Objective

a) Treatment of red grapes destemmed and crushed by PEF in order to

— Facilitate and increase the extraction of valuable substances such as polyphenols, yeast available nitrogen, aroma compounds including precursors, and other substances located inside the grape cells

— Reduce maceration time

b) Treatment of white grapes destemmed and crushed by PEF in order to

— Facilitate and increase the extraction of valuable substances such as yeast available nitrogen, aroma compounds including precursors, and other substances located inside the grape cells.

Prescriptions

The technique consists in the application of pulsed electric fields in the range of nanoseconds to milliseconds which are sufficiently high to permeabilize the cell membranes. The destemmed and crushed grapes are treated in at least one treatment chamber with at least one pair of electrodes.

2.1.28. **USE OF SELECTIVE PLANT FIBRES IN MUST (OIV-OENO 684B-2022)**

Definition

Use in musts of a selective adsorbent composed of plant fibres.

Objective

a) To reduce the ochratoxin A levels in musts;

b) To reduce the number and levels of phytosanitary product residues in musts.

Prescriptions

a) Selective plant fibres are to be incorporated into must, or during fermentation;

b) The dose to be used is to be determined depending on the must and levels of molecules to be adsorbed, and should not exceed 200 g/hL;

c) Selective plant fibres are to be removed by racking after sedimentation, by centrifugation or by filtration;

d) Selective plant fibres are to be used in musts in compliance with the applicable authorisations and limits for phytosanitary product residues;

e) Selective plant fibres should comply with the prescriptions of the *International Oenological Codex*.

2.2.3. **PRESERVATION BY ADDITION OF CARBON DIOXIDE TO MUST OR CARBONATION OF MUST (16/70)**

Definition

Addition of carbon dioxide under pressure to must, so as to hinder its fermentation.

Objectives

a) Preservation of must destined for the manufacture of juice.

b) Slowing or stopping fermentation without other intervention.

Prescription

The gas used shall comply with the prescriptions of the *International Oenological Codex*.

2.2.4. **PASTEURISATION (5/88)**

Definition

Heating must to a specified temperature for a given time.

Objectives

a) To inhibit the activity of microorganisms present in the must at the moment of treatment.

b) To inactivate enzymes present in the must.

Prescriptions

a) Pasteurisation is performed in bulk by passing the must through a heat exchanger followed by rapid cooling.

b) The increase in temperature and the techniques used shall cause no alteration in the appearance, colour, odour or taste of the must.

2.2.5. **PROTECTION UNDER INERT ATMOSPHERE (16/70)**

Classification

Nitrogen: processing aid

Argon: processing aid

Definition

Operation consistent with creating an inert atmosphere using nitrogen, carbon dioxide and/or argon.

Objective

To keep the must protected from air to avoid oxidation and the growth of aerobic organisms.

Prescriptions

The nitrogen, carbon dioxide and argon shall comply with the prescriptions of the *International Oenological Codex*.

2.2.6. **LYSOZYME TREATMENT (OENO 6/97)**

Definition

Addition of lysozyme to the must.

Objectives

a) Control of the growth and activity of the bacteria responsible for malolactic fermentation of the must.

b) Reduction of the rate of sulphur dioxide.

Prescriptions

a) According to experiments, the maximum dose of 500 mg/l appears to be sufficient to control the growth and the activity of the bacteria responsible for malolactic fermentation during alcoholic fermentation.

b) Lysozyme cannot totally substitute itself to SO_2 which possesses antioxidant properties. A SO_2 + lysozyme association provides more stable wines.

c) When must and wine are treated with lysozyme, the accumulated dose must not exceed 500 mg/l.

d) The product must conform to the prescriptions of the *International Oenological Codex*.

2.2.7. **TREATMENT WITH ASCORBIC ACID (OENO 11/01)**

Classification

Ascorbic acid: additive

Erythorbic acid: additive

Definition

Addition of ascorbic acid to must.

Objectives

1. Protect the aromatic substances of the grape, through the antioxidant properties of the product, against the influence of oxygen in the air.

2. Limit the formation of ethanal during alcoholic fermentation, through the combination with sulphur dioxide.

3. Limit the formation of hydrogen sulphide and volatile thiols of fermentation origin.

Prescriptions:

a) It is recommended to add ascorbic acid immediately after the grape's crushing.

b) The dose used, cumulated if necessary, with that used on the grapes, shall not exceed 250 mg/l.

c) It is advisable to use ascorbic acid with sulphur dioxide.

d) The ascorbic acid shall comply with the prescriptions of the *International Oenological Codex*.

2.2.9. **TREATMENT USING INACTIVATED YEASTS WITH GUARANTEED GLUTATHIONE LEVELS (OIV-OENO 532/2017)**

Classification ([11])

Definition

Addition of inactivated yeasts whose cells have guaranteed reduced-glutathione levels.

Objectives

a) To limit the oxidation of certain varietal aromatic compounds revealed by the metabolism of yeasts (particularly thiols).

b) To promote yeast metabolism through the provision of naturally-occurring nutritional compounds.

Prescriptions

a) The addition of inactivated yeasts with guaranteed glutathione levels at the start or during the alcoholic fermentation is recommended, ensuring that the assimilable nitrogen level is sufficient to avoid the use of glutathione by the fermentative yeasts.

b) The dose of glutathione used, whether supplied directly or via yeasts with guaranteed glutathione levels, should not exceed 20 mg/l, in order to avoid any risk of reduction and the emergence of a yeast taste.

c) The inactivated yeasts with guaranteed glutathione levels should contain a reduced form of glutathione; this may be accompanied by the presence of its precursors (cysteine and particularly gamma-glutamylcysteine).

d) The inactivated yeasts with guaranteed glutathione levels should comply with the prescriptions of the *International Oenological Codex*.

2.2.10. **TREATMENT BY CONTINUOUS HIGH PRESSURE PROCESSES (OENO 594B-2020)**

Definition

Operation for the elimination of wild microorganisms in musts by high pressure processing (above 200 MPa or 2 000 bar) in continuous. In UHPH, the pressure is usually ranging 300-400 MPa.

([11]) As at the date of publication of the present document, the substance is not classified by the OIV. It is authorised in the EU only as a processing aid according to column 6 of line item 4.9 of Table 2 of Part A of Annex I to Commission Delegated Regulation (EU) 2019/934. Consequently, objective a) of OIV file 2.2.9 is not relevant for the EU.

Objectives

— To reduce or eliminate the load of wild microorganisms, mainly yeasts, preserving the organoleptic quality.

— To reduce the amount of SO_2 used in winemaking.

— To reduce or inactivate the activity of oxidative enzymes.

— To get grape must stable from the microbiological point of view.

— To obtain partially fermented musts.

Prescriptions

a) The ultra high pressure homogenization technique (UHPH) consists in the application of pressures higher than 200 Mpa (2 000 bar) by continuous pumping.

— UHPH: continuous process that could be better integrated in the pretreatment of musts.

b) To eliminate the yeasts of the musts, pressures of 200-400 Mpa are needed.

c) To eliminate bacteria, pressures of 200-400 Mpa are needed.

d) The treatment speed can range from 40 L/h to 40 000 L/h.

e) If necessary, the increase in temperature can be controlled with additional refrigeration.

f) Neither the increase in temperature nor the techniques used should produce significant alterations in the appearance, colour, smell or taste of the wine.

g) The procedures must conform to the specifications of the *International Oenological Codex*.

2.2.11. **TREATMENT OF MUSTS USING ADSORBENT STYRENE-DIVINYLBENZENE BEADS (OENO 614A-2020)**

Definition

Physical process of reduction or elimination of organoleptic deviations characterised as 'earthy-musty' by the appropriate and controlled percolation of musts at a high flow rate through adsorbent styrene-divinylbenzene beads.

Objectives

a) To eliminate the perception of organoleptic deviations characterised as 'earthy-musty' by the reduction in concentration or elimination of one of the main molecules responsible, geosmine.

Prescriptions

a) Treatment should be carried out on clarified musts with turbidities of less than 30 NTU (nephelometric turbidity units). With regard to red grapes, a preliminary treatment separating the liquid phase from the solid parts should be envisaged.

b) The quantity of adsorbent beads to be used in the column and the must flow rate are to be determined based on the initial geosmine content.

c) The adsorbent beads are placed in a column that is compliant with standards for food contact materials.

d) The adsorbent beads implanted and the condition of their use should comply with the prescriptions of the *International Oenological Codex*.

2.2.12. **USE OF ASPERGILLOPEPSIN I TO REMOVE HAZE-FORMING PROTEINS (OENO 541A-2021)**

Definition

The addition to grape must of Aspergillopepsin I from *Aspergillus* spp. to remove haze-forming proteins.

Objective

To prevent protein haze in still white, rosé wines and sparkling wines.

Prescription

a) Addition of Aspergillopepsin I preparation to must prior to initiation of fermentation.

b) After addition of Aspergillopepsin I preparation, one short-term must heating must be applied as it contributes to the unfolding of haze-forming proteins and facilitates their enzymatic degradation by proteases, as well as leads to a denaturation of the protease itself.

This single heat treatment must take into account:

— the activity of Aspergillopepsin I preparation as regards the temperature,

— the quantity of Aspergillopepsin I used,

— the minimum temperature of treatment, which should be at or above the denaturation temperature of the proteins, generally comprised between 60 and 75 °C,

— the heating time, generally around 1 minute. Too long heating time could induce negative organoleptic impact.

This loss of three-dimensional conformation of TLPs (Thaumatin Like Proteins) is reversible, so the heating has to be simultaneous to the addition of enzymes for optimal efficiency.

c) The must is cooled to an appropriate temperature prior to yeast inoculation.

d) A filtration must be performed to remove the residual proteins (including added proteases and other proteins).

e) The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

2.3.1. **INOCULATION WITH YEASTS (16/70, ECO 3/03) (OENO 546/2016)**

Definition

Inoculation of a must, before or during its fermentation, with the help of a starter inoculum prepared either from indigenous yeasts or from selected yeasts.

Objectives

a) To initiate, regulate and accelerate fermentation, especially in the case of vinifications, which are proceeding too slowly.

b) To re-activate an interrupted fermentation.

c) To facilitate the depletion of glucose and fructose.

d) To change the wine acidity by synthesis or breakdown of organic acids.

e) To produce less volatile acidity, especially in the case of musts with high sugar levels.

f) To impact on the wine's sensorial properties (aromas, mouthfeel).

Prescriptions

a) Use the yeast or mixture of yeasts appropriate for the objective pursued.

b) In the case of non-*Saccharomyces*, the addition occurs before or at the same time as for the *Saccharomyces*.

c) The commercial starters added may be pure cultures or blends of *Saccharomyces* strains and non-*Saccharomyces* strains.

d) Where active, selected yeasts (Saccharomyces and non-Saccharomyces) are used, these shall comply with the prescriptions of the *International Oenological Codex*.

2.3.2. **FERMENTATION ACTIVATORS (OENO 7/97; 14/05; OENO 633-2019)**

Classification

Yeast autolysates: processing aid

Microcrystalline Cellulose: processing aid

Food-grade cellulose: processing aid

Inactivated yeasts: processing aid

Fatty acid mono- and diglycerides: processing aid

Definition

Addition to the harvest or the must, before or during the alcoholic fermentation, of fermentation activators.

Objective

Favour the beginning or the completion of alcoholic fermentation:

a) by enriching the environment with nutritive elements (ammoniacal nitrogen, aminated and peptidic nitrogen) and growth factors (thiamine, long chain fat acids),

b) in detoxifying the environment by rapid release of carbon dioxide at the start of alcoholic fermentation and/or by adsorption of yeast inhibitors such as medium chain fat acids (supporting role of inactivated yeasts, food-grade cellulose).

Prescriptions

a) The activators can be microcrystalline cellulose, food-grade cellulose, ammoniacal salts, thiamine or products coming from the degradation of yeasts (autolysates, cell skins, inactivated yeasts).

b) Fermentation activators must conform to the prescription of the *International Oenological Codex*.

2.3.3. **TREATMENT WITH THIAMIN (6/76)**

Classification

Thiamine hydrochloride: processing aid

Definition

Addition of thiamin to must.

Objectives

a) To accelerate the alcoholic fermentation.

b) To reduce the formation, during the alcoholic fermentation, of substances capable of combining with sulphur dioxide and also to allow a reduction in the dose.

Prescriptions

a) According to experiments conducted to date, a dose of 60 mg/hl proves sufficient.

b) The product shall comply with the prescriptions of the *International Oenological Codex*.

2.3.4. **TREATMENT WITH YEAST GHOSTS (5/88)**

Classification

Yeast hulls: processing aid

Definition

Addition to the must, to the fermenting must or to the wine of a preparation of yeast ghosts.

Objectives

a) To prevent sticking of the alcoholic fermentation.

b) To facilitate the completion of slow fermentations.

c) To treat 'stuck' fermentations.

Prescriptions

a) Yeast ghosts are added before or at the start of fermentation for objective (a); at the end of the fermentation for objective (b); before the yeast inoculation for objective (c).

b) The doses used shall not be greater than 40 g/hl.

c) The yeast ghosts shall comply with the prescriptions of the *International Oenological Codex*.

2.3.6. **INTERRUPTION OF ALCOHOLIC FERMENTATION BY PHYSICAL PROCEDURES (5/88)**

Definition

Arresting the alcoholic fermentation.

Objective

To obtain a product containing endogenous sugar.

Prescriptions

a) Only the physical techniques: heat, cold, filtration and centrifugation may be used.

b) The product obtained shall remain fermentable.

2.3.9. **WARM POST FERMENTATION MACERATION OF RED GRAPES CALLED WARM FINAL MACERATION (OENO 13/05)**

Definition

Procedure involving the prolonging of fermentative maceration using a warm post-fermentation maceration.

Objectives

a) Complete the release of skin compounds carried out by pre-fermentative and fermentative maceration.

b) Improve the polyphenolic structure of wine and colour characteristics.

Prescriptions

a) Advise against using this technique during harvests with deficiencies in health status.

b) Ensure that alcoholic fermentation is completely finished.

c) Protect from oxidative phenomena, notably during the wine heating phase by carbon dioxide.

d) Bring the temperature of blends of wine to 40 to 45 °C.

e) Determine length of warm maceration according to grape characteristics and sought after wine type.

f) Cool blends of wine prior to devatting and pressing.

3.1.1. **ACIDIFICATION (6/79, OENO 361/2010)**

Classification

Malic acid (D,L-, L-): additive

Lactic acid: additive

Tartaric acid: additive

Citric acid, monohydrate: additive

Definition

Increase of the titratable acidity and the actual acidity (decrease of the pH).

Objectives

a) Production of wines with good sensory balance.

b) To promote good biological characteristics and good keeping quality of the wine.

Prescriptions

The objectives can be achieved:

a) By blending with wines of elevated acidity

b) With the help of strong cation exchangers in the free form

c) By the use of chemical procedures (see *Chemical acidification*)

d) By electromembrane treatement, see Acidification by electromembrane treatment (bipolar membrane electrodialysis)

3.1.1.1. **CHEMICAL ACIDIFICATION (OENO 4/99, OENO 14/01)**

Definition

Increasing the titration acidity and the actual acidity (decreasing pH) by adding organic acids.

Objectives

a) Produce balanced wines from the gustatory point of view.

b) Favour a good biological evolution and good maturation of wine.

c) Remedy insufficient natural acidity caused by:

— climatic conditions in the viticulture region, or

— oenological practices which lead to a decrease in natural acidity.

Prescriptions

a) Lactic acids, L(-) or DL malic acid and L(+) tartaric and citric acids are the only acids that can be used;

b) Citric acid content in wine after this procedure should not exceed the limit established in Annex C of the *International Collection of Methods for Wine and Must Analysis*;

c) The addition of acids should not be done to conceal fraud;

d) The addition of mineral acids is forbidden;

e) Chemical acidification and chemical de-acidification are mutually exclusive;

f) The acids used must conform to the *International Oenological Codex* standards;

g) Acids can be only be added to wine under condition that the initial acidity is not increased by more than 54 meq/l (i.e. 4 g/l expressed as tartaric acid).

When musts and wine are acidified, the cumulated dose must not exceed a net cumulative increase of 54 meq/l (or 4 g/l expressed as tartaric acid).

3.1.1.4. **ACIDIFICATION BY ELECTROMEMBRANE TREATMENT (BIPOLAR MEMBRANE ELECTRODIALYSIS) (OENO 361/2010)**

Definition

Physical method for ionic extraction in wine under the action of an electric field using membranes permeable only to cations on the one hand, and bipolar membranes on the other hand, and enabling an increase of titratable acidity and actual acidity (decrease of the pH).

Objectives

a) Increase of titratable acidity and actual acidity (decrease of the pH).

b) Obtaining wines with balanced taste characteristics.

c) Promote a good biological evolution and proper storage of the wine.

d) Remedy insufficient natural acidity caused by:

— climatic conditions in the viticulture region, or

— oenological practices which lead to a decrease in natural acidity.

Prescriptions

a) See the general sheet pertaining to separative techniques used in the treatment of wines and musts ([12]) and the sheet pertaining to the use of membrane techniques applied to musts ([13]).

b) Acidification by electro-membrane treatment should not be done to conceal fraud.

c) Cationic membranes shall be made in such a way as to be only adapted to the extraction of cations only and in particular cations K+.

d) Bipolar membranes are impermeable to anions and to wine cations.

([12]) See footnote 3.
([13]) See footnote 4.

e) The acidification by bipolar electrodialysis can only be carried out if initial must acidity has not been increased more than 54 meq/l.

f) When must and wine are acidified, the total increased acidity must not exceed 54 meq/l.

g) The implementation of the process will be under the responsibility of an oenologist or a qualified technician.

h) The membranes shall comply with the prescriptions of the *International Oenological Codex*.

3.1.1.5. **ACIDIFICATION BY CATION EXCHANGER TREATMENT (OENO 443-2012)**

Definition

Physical partial extraction of cations from the wine to increase titration acidity and actual acidity (decrease in pH) through cation exchanger

Objectives

a) Increase titration acidity and actual acidity (decrease in pH).

b) Produce wines with good sensory balance.

c) Promote good biological characteristics and good keeping quality of the wine.

Prescriptions

a) The treatment will be performed using cation exchange resins regenerated in the acid cycle.

b) The treatment must be limited to the elimination of excess cations.

c) To avoid the production of fractions of wine, the treatment will be performed continuously, with in-line incorporation of the treated wine into the original wine.

d) As an alternative, the resin could be directly introduced into the tank of must, in the quantities required, then separated by all appropriate technical methods.

e) The acidification must be carried under condition that the initial acidity is not raised by more than 54 meq/l. When must and wine are acidified, the cumulative net increase must not exceed 54 meq/l.

f) All operations will be placed under the responsibility of an oenologist or qualified technician.

g) The resins shall comply with the prescriptions of the *International Oenological Codex* ([14]).

3.1.2. **DE-ACIDIFICATION (6/79)**

Definition

Reduction of the titratable acidity and the actual acidity (increase of the pH).

Objective

Production of wines of better sensory balance

Prescriptions

The objective can be achieved:

a) spontaneously, whether by precipitation of the tartaric acid in the form of potassium bitartrate [see *Physical de-acidification; Prescriptions* (b) ([15])], or by degradation of malic acid (see *Microbiological de-acidification by lactic bacteria* ([16])),

([14]) — The treatment must not decrease the concentration of metallic cations in the wine below 300 mg/l.
— The treatment must not lower the wine's pH below 3,0. The decrease in pH should not exceed 0,3 pH units.

([15]) OIV file 3.1.2.1 PHYSICAL DE-ACIDIFICATION (6/79)
Prescriptions
The precipitation of potassium bitartrate and calcium tartrate occurs:
[…] b) As the result of chilling the wine.

([16]) See OIV file 3.1.2.3 below.

b) by blending with less acidic wines (see *Blending* ([17])),

c) by the use of physical procedures [see *Physical de-acidification: Prescription* (b) and *Cold Treatment: Objective* (a), and prescriptions corresponding to this objective (a) ([18])] and/or physico-chemical procedures [see *Treatment with ion exchangers;* objective b ([19])],

d) by the use of chemical procedures (see *Chemical de-acidification* ([20])),

e) by the use of microbiological procedures (see *Microbiological De-acidification by lactic acid bacteria*).

3.1.2.1. **PHYSICAL DE-ACIDIFICATION (6/79)**

Definition

Reduction of the titratable acidity by use of physical procedures.

Objective

To produce wines:

a) See 3.1.2

b) Stable with regard to precipitation of excess potassium bitartrate and calcium tartrate.

Prescriptions

The precipitation of potassium bitartrate and calcium tartrate occurs:

a) Either spontaneously during storage of the wine at low temperature, or

b) As the result of chilling the wine (see Cold Treatment)

3.1.2.2. **CHEMICAL DE-ACIDIFICATION (6/79)**

Classification

Potassium L(+) tartrate: processing aid

Potassium hydrogen tartrate: processing aid

Calcium carbonate: processing aid

Potassium hydrogen carbonate: processing aid

([17]) OIV file 3.5.3 BLENDING AND MIXING OR PREPARATION OF THE CUVEE (3/85)
Definition
Operation consisting of blending different wines.
Objectives
a) For wines with a geographical indication (for example Recognised Designation of Origin and Recognised Geographical Indication).
— To produce wines of optimal qualitative characteristics representative of each geographical indication.
— For wines without geographical indication:
— to produce wines with the analytical, sensory and qualitative characteristics desired,
— to produce wines having new and/or better balanced characteristics,
— to produce wines having the desired price.
Prescriptions
a) In no case shall this operation be conducted to conceal a microbiological or chemical alteration of wines.
b) The composition of the wine after this operation shall conform to the definitions of the present Code and to the requirements of Annex C of the *Recueil of International Methods of Analysis for Wines and Musts*.

([18]) See OIV file 3.3.4 below.

([19]) OIV file 3.1.1.3 TREATMENT WITH ION EXCHANGERS (6/76)
Objectives
[…] b) Treatment with anion exchangers:
1. To reduce the titratable acidity,
2. To de-sulphite wines,
3. To reduce the sulphate content.

([20]) See OIV file 3.1.2.2 below.

Definition

Reduction of the acidity and the actual acidity (increase of the pH) by addition of neutral potassium tartrate, potassium hydrogen carbonate or calcium carbonate possibly containing a small quantity of the calcium double salt of L(+) tartaric and L(-) malic acids

Objectives

a) To produce wines of better sensory balance.

b) To favour biological de-acidification.

Prescriptions

a) The de-acidified wine shall contain at least 1 g/l tartaric acid.

b) The process of the formation of double salt (neutral calcium salt of tartaric and malic acids) is intended to produce a greater reduction in titratable acidity, when the wine has a high malic acid content and the precipitation of tartaric acid alone does not prove sufficient.

c) Chemical de-acidification should be performed in such a way that the wines obtained do not lack acidity, taking account of a possible subsequent malolactic fermentation.

d) The aim of chemical de-acidification shall not be to conceal fraud.

e) The elimination of excess carbon dioxide can be achieved, if necessary, by flushing with nitrogen.

f) Chemical acidification and chemical de-acidification are mutually exclusive.

g) The products used shall comply with the prescriptions of the *International Oenological Codex*.

3.1.2.3. **MICROBIOLOGICAL DE-ACIDIFICATION BY LACTIC ACID BACTERIA (4/80)**

Definition

Reduction of the titratable acidity and the actual acidity (increase of the pH) by malolactic fermentation.

Objective

To produce wines:

a) See 3.1.2.

b) Biologically more stable.

Prescriptions

To achieve the objectives, the microbiological de-acidification by lactic acid bacteria can be performed either in a spontaneous manner or by inoculation of selected strains.

a) The sulphur dioxide content should be limited, lactic acid bacteria being very sensitive to the presence of this compound.

b) It is desirable that malolactic fermentation takes place at the end of the alcoholic fermentation, to avoid bacterial degradation of sugars.

c) The wine in which malolactic fermentation is to occur should be maintained at a temperature of approximately 18 °C.

d) Where selected cultures of lactic acid bacteria are used, these shall comply with the prescriptions of the *International Oenological Codex*.

3.1.2.4. **DE-ACIDIFICATION USING AN ELECTROMEMBRANE PROCESS (OENO 484-2012)**

Definition

Physical method of ionic extraction from the wine under the action of an electric field using permeable membranes with anions on the one part and bipolar membranes on the other. The combination of permeable membranes with anions and bipolar membranes is used to manage a reduction in titratable acidity and the actual acidity (increase in the pH).

Objectives

a) Correct excess natural acidity caused by climate conditions in the wine region by reducing titratable acidity and actual acidity (increase in the pH).

b) Develop balanced wines in terms of taste.

Prescriptions

a) Refer to the general file on separative techniques used in the processing of musts and wines ([21]) and the file on the application of membrane techniques to wines ([22]).

b) De-acidification using an electromembrane process should not be intended to hide a fault.

c) The anionic membranes must be placed in such a way that they only allow the extraction of anions and in particular the organic acids from the wine.

d) The bipolar membranes are impermeable to anions and cations in the wine.

e) The wine from a de-acidified wine should contain at least 1g/l of tartaric acid.

f) De-acidification by membrane process and acidification are mutually exclusive.

g) An oenologist or qualified technician will be responsible for implementing the process.

h) The membranes used must comply with the prescriptions contained in the *International Oenological Codex*.

3.2.1. **FINING (OENO 7/99), (OENO 6/04), (OENO 9/04) (OIV-OENO 339A-2009), (OIV-OENO 339B-2009, OENO 417-2011)**

Classification

Alginic acid: processing aid

Chitin-glucan: processing aid

Chitosan: processing aid

Isinglass: processing aid

Kaolin: processing aid

Gelatine: processing aid

([21]) See footnote 3.

([22]) OIV file 3.0.1 APPLICATION OF MEMBRANE TECHNIQUES (OENO 373B/2010)

Definition

Treatment of wine using membrane techniques enabling the selective holding back or passing of some compounds in wine.

Objectives

a) To elaborate more balanced wine in terms of organoleptic characteristics
b) To compensate effects of adverse weather conditions and climate change, and to resolve certain organoleptic issues
c) To expand the techniques available for development of products more adapted to consumer expectations.

Prescriptions

a) See the general sheet on treatments of musts and wines with separative techniques used for the treatment of wines and musts
b) The above-mentioned objectives can be reached by applying these techniques, for example, for:
   1. the tartaric stabilisation,
   2. the partial dehydratation,
   3. the partial dealcoholisation of wine,
   4. the adjustment of acidity and pH,
   5. the reduction of the concentration of certain organic acids,
   6. the reduction of the volatile acidity of wines qualified to be released on the market,
   7. management of dissolved gas.
c) There are different types of membrane techniques alone or in combination depending on the sought after objectives, including:
   1. microfiltration,
   2. ultrafiltration,
   3. nanofiltration,
   4. membrane contactor,
   5. reverse osmosis,
   6. electromembranes processes,
   7. other membrane techniques.
d) The use of membranes to obtain opposite features are not allowed.
e) This practice shall be carried out by an oenologist or a qualified technician.
f) The membranes and material, in addition to techniques used in complementary procedures, shall be consistent with the provisions of the *International Code of Oenological Practices* and the *International Oenological Codex*.

Egg (albumin): processing aid

Colloidal silicon dioxide solution: processing aid

Definition

Clarification of wine by addition of substances that precipitate particles in suspension:

— whether by promoting the natural sedimentation of the former, or

— by coagulating around the particles to be eliminated and by entraining them in sediments.

Objectives

a) To complete spontaneous clarification on those occasions when it is unsatisfactory.

b) To soften red wines by removing from them some of the tannins and polyphenols.

c) To clarify wines with haze problems, stirred up lees, insoluble coloured matter, etc.

Prescriptions

a) For clarifying agents promoting simply the sedimentation of particles, refer to Treatment with bentonites ([23]).

b) For the coagulating clarifying agents, only the following products are admissible: gelatin, albumin and white of egg, isinglass, skim milk, casein, alginates, colloidal solution of silicon dioxide, kaolin, potassium caseinate, proteins of plant origin, chitosan, chitin-glucan, yeast protein extracts.

c) The substances used shall comply with the prescriptions of the *International Oenological Codex*.

3.2.2. **FILTRATION (2/89)**

Classification

Diatomite: processing aid

Perlite: processing aid

Definition

Physical process consisting of passing the wine through appropriate filters that retain particles in suspension.

Objectives

a) Clarifying the wine, if necessary by successive stages (clarifying filtration).

b) Obtaining biological stability of the wine by elimination of microorganisms (sterilising filtration).

Prescriptions

Filtration can be undertaken:

a) by continuous deposition, using appropriate additives such as diatomaceous earth, perlite, cellulose…,

b) on pads of cellulose or other appropriate materials,

c) on mineral or organic membranes of a porosity greater than or equal to 0,2 μm (microfiltration).

The filter materials used shall comply with the prescriptions of the *International Oenological Codex*.

3.2.2.1. **FILTRATION BY CONTINUOUS DEPOSITION (1/90)**

Definition

Filtration of the wine, after formation of a filter bed, which is then fed constantly by a continuous addition of filter material into the wine to be clarified.

([23]) This definition applies solely to wines *stricto sensu* such as defined in Part I, chapter 3 of the OIV *Code of Oenological Practices*.

Objective

To obtain a suitable level of clarity, to a given technological stage, by the elimination of substances in suspension in the wine.

Prescriptions

a) The nature of the filter material (such as diatomaceous earth, perlite and cellulose) and the necessary dose are determined by the turbidity of the wine and the clarification sought.

b) The filter materials used shall comply with the prescriptions of the *International Oenological Codex*.

3.2.3. **RACKING (16/70), (OENO 6/02)**

Classification

Nitrogen: processing aid

Argon: processing aid

Definition

Operation involving the transfer of wine from one wine container to another by allowing the separation of solid deposits from the liquid.

Objectives

a) Separate wine from the lees, and/or the deposits resulting from the addition of clarifying agents, deposited at the bottom of the container.

b) Separate the wine from the micro-organisms at the end of the alcoholic and/or malolactic fermentation, or the bacterial or yeast sediment.

c) Enable the carrying out of all wine making operations, treatment or transportation of wines.

d) Enable the tartric stabilisation by cooling and the separation of tartrate crystals (potassium bitartrate and calcium tartrate).

Prescriptions

Racking can occur:

a) either in the absence of air to avoid oxidation,

b) or with aeration to eliminate hydrogen sulfide or to reduce carbon dioxide or to create controlled oxidation,

c) or at room temperature, or after cooling to avoid possible carbonic gas loss,

d) or using the law of interconnected vessels, either with pumps or hand containers,

e) in the case of racking in the absence of air, the container to be filled must be rendered inert with carbon dioxide, nitrogen or with argon. These gases must comply with *International Oenological Codex* prescriptions.

3.2.4. **TREATMENT WITH SILICON DIOXIDE (1/91)**

Classification

Colloidal silicon dioxide solution: processing aid

Definition

Addition to wine of a colloidal solution (gel) of silicon dioxide coupled with the addition of a gelatin solution or, possibly, with other proteinaceous finings.

Objective

To achieve the flocculation of the gelatin and possibly other proteinaceous finings, with a view to clarification.

Prescriptions

a) The product is added to young white wines and rosés and occasionally to red wines.

b) Preliminary tests are necessary to determine optimal doses of the colloidal solutions of silicon dioxide and gelatin or possibly, of other proteinaceous finings.

c) The products shall comply with the prescriptions of the *International Oenological Codex*.

3.2.6. **TANNIN ADDITION (16/70, OENO 613-2019)**

Definition

Addition of tannins to wine.

Objectives

a) To facilitate the stabilisation of wines by partial precipitation of excess proteinaceous matter;

b) to facilitate the fining of wines in conjunction with protein-type fining agents and prevent over-fining;

c) to contribute to the antioxidant and antioxidasic protection of compounds of the wine;

d) to promote the expression, stabilisation and preservation of colour in red wines.

Prescription

The tannins used should comply with the prescriptions of the *International Oenological Codex*.

3.2.7. **FINING USING PROTEINS OF PLANT ORIGIN (OENO 8/04)**

Classification

Protein of plant origin from wheat: processing aid

Protein of plant origin from peas: processing aid

Protein of plant origin from potatoes: processing aid

Objectives

Use of protein matter of plant origin for the fining of wines in order to improve their clarity, stability and gustatory properties.

Prescriptions

1. The doses to be used are determined after a preliminary test trial. The maximum usage dose should be less than 50 g/hl. After racking, the wines are analysed (turbidity, colour, absorbance at 280 nm) and tasted. The dose retained corresponds to the sample which clarifies the wine without excess and gives a better result for tasting.

2. Proteins of plant origin can be used with other admitted products such as tannins, bentonite, silica gel.

3. Proteins of plant origin must comply with the prescriptions of the *International Oenological Codex*.

3.2.8. **USE OF ENZYMES FOR IMPROVING FILTERABILITY OF WINES (OENO 15/04, OENO 498-2013, OENO 682-2021)**

Classification

Arabinanases: processing aid

Cellulases: processing aid

Pectin lyases: processing aid

Pectinemethylesterase: processing aid

Polygalacturonases: processing aid

Hemicellulases: processing aid

Definition

Addition to wine of enzymatic preparations containing activities catalysing the degradation of plugging macromolecules of grapes which went into the must and in wine during the vinification process, as well as plugging macromolecules of bacterial or fungal origin.

Enzyme activities involved in improving the filterability of wines notably include arabinanases, rhamnogalacturonases, and hemicellulases, and to a lesser extent polygalacturonases, pectin lyases and pectinmethylesterases, as well as β-glucanases if wines come from botrytised grapes or have a high glucans content from yeast cell walls.

Objective

To improve the filterability of wines by specific hydrolysis of colloids.

Prescription

The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

3.2.9. **USE OF ENZYMES FOR THE RELEASE OF FLAVOURING COMPOUNDS FROM GLYCOSYLATED PRECURSORS (OENO 17/04, OENO 498-2013)**

Classification

Glycosidases: processing aid

Glucosidases: processing aid

Definition

Addition to wine of enzymatic preparations containing activities catalysing the hydrolysis of the saccharide portion of the glycosylated aromatic substances (flavour precursors) of grapes which went into the must and the wine during the vinification process.

The enzymatic activities involved in the release of flavouring substances are glycosidases and glucosidases.

Objective

To enhance the aromatic potential of wine.

Prescription

The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

3.2.10. **USE OF ENZYMES FOR IMPROVING THE SOLUBILISATION OF YEAST COMPOUNDS (OENO 18/04)**

Classification

Beta-glucanases: processing aid

Definition

The addition to wine during winemaking on lees of enzymatic preparations notably with β-glucanase activities that catalyse the degradation of yeast cell walls.

Objectives

a) To facilitate the release of yeast-soluble constituents into wine.

b) To improve the colloidal stability of wines.

Prescription

The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

3.2.11. **USE OF ENZYMES FOR THE CLARIFICATION OF WINES (OENO 12/04, OENO 498-2013, OENO 682-2021)**

Classification

Arabinanases: processing aid

Cellulases: processing aid

Pectin lyases: processing aid

Pectinemethylesterase: processing aid

Polygalacturonases: processing aid

Hemicellulases: processing aid

β-glucanases: processing aid

Definition

Addition to wine of enzymatic preparations containing activities catalysing the degradation of grape macromolecules which went into the must and wine, as well as macromolecules of bacterial or fungal origin.

Enzyme activities involved in the clarification of wines notably include polygalacturonases, pectin lyases, pectinmethylesterases, and to a lesser extent arabinanases, rhamnogalacturonases, cellulases and hemicellulases, as well as β- glucanases if wines come from botrytised grapes

Objective

To facilitate the clarification of wines.

Prescription:

The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

3.2.12. **FINING USING CHITOSAN (OIV-OENO 337A-2009)**

Classification

Chitosan: processing aid

Definition

Addition of chitosan of fungal origin for the purpose of fining wines

Objectives

a) To reduce turbidity by precipitating particles in suspension.

b) To carry out a treatment to prevent protein haze by the partial precipitation of excess proteinaceous matter.

Prescriptions

a) The doses to be used are determined after preliminary testing. The maximum dose used must not exceed 100 g/hl.

b) Sediments are eliminated by physical procedures.

c) Chitosan of fungal origin may be used alone or together with other admitted products.

d) Chitosan must comply with the requirements of the *International Oenological Codex*.

3.2.13. **FINING USING CHITIN-GLUCAN (OIV-OENO 337B-2009)**

Definition

Addition of chitin-glucan of fungal origin for the purpose of fining wines

Objectives

a) To reduce turbidity by precipitating particles in suspension.

b) To carry out a treatment to prevent protein haze by the partial precipitation of excess proteinaceous matter.

Prescriptions

a) The doses to be used are determined after preliminary testing. The maximum dose used must not exceed 100 g/hl.

b) Sediments are eliminated by physical procedures.

c) Chitin-glucan of fungal origin may be used alone or together with other admitted products.

d) Chitin-glucan must comply with the requirements of the *International Oenological Codex*.

3.2.14. **FINING USING YEAST PROTEIN EXTRACTS (OENO 417-2011)**

Classification

Yeast protein extracts: processing aid

Definition

Addition of yeast protein extracts for fining wines

Objectives

a) Reduce turbidity of wines by precipitating suspended particles.

b) Preserve chromatic characteristics of wines.

c) Eliminate excess tannin.

d) Improve wine filterability.

Prescriptions

a) The doses used are determined beforehand by laboratory trials (fining point).

b) Maximum dose to be used as determined by an efficiency test conducted in laboratory must not exceed 60 g/hl for red wine and 30 g/hl for white and rosé wine.

c) The yeast protein extracts can be used alone or associated with other authorised fining products.

d) The deposits from the fining are to be eliminated from wine by physical procedures.

e) The yeast protein extracts must comply with the prescriptions of the *International Oenological Codex*.

3.2.15. **USE OF FILTER PLATES CONTAINING ZEOLITES Y-FAUJASITE TO ADSORB HALOANISOLES (OENO 444-2016)**

Definition

Treatment using a filter plate containing zeolites Y-faujasite applied during filtration.

Objectives

a) To reduce the concentration of haloanisoles responsible for off-flavour in wines, below their sensory perception threshold.

Prescriptions

a) The treatment should be carried out on clarified wines;

b) the filter plates should be cleaned and disinfected before filtration;

c) the application of zeolites Y-faujasite should comply with the prescriptions in the *International Oenological Codex*.

3.3.1. **REMOVAL OF IRON (16/70)**

Classification

Potassium hexacyanoferrate (II): processing aid

Calcium phytate: processing aid

Definition

Treatment designed to eliminate excess iron in wine.

Objective

Prevention of iron hazes.

Prescription

One of the following treatments is used, with or without a combined oxygenation:

Tannin addition and fining,

Addition of calcium phytate,

Use of potassium ferrocyanide,

Use of iron-removing carbon (not accepted),

Use of citric acid.

3.3.3. **TARTRATE STABILISATION BY TREATMENT WITH CATION EXCHANGERS (OENO 1/93, OENO 447-2011)**

Definition

Operation consisting of passing the wine through a column of polymerised resin that reacts as an insoluble polyelectrolyte whose cations are able to be exchanged with cations of the surrounding medium.

Objective

To obtain a tartrate-stable wine:

— with respect to potassium hydrogen tartrate,

— with respect to calcium tartrate (and other salts of calcium).

Prescriptions

a) The treatment must be limited to the elimination of excess cations.

   — The wine may be initially cold treated.

   — Only the minimum fraction of a wine necessary for obtaining stability will be treated with cation exchangers.

b) The treatment will be performed using cation exchange resins regenerated in the acid cycle.

c) The whole process will be placed under the responsibility of an oenologist or specialist technician.

d) The resins shall comply with the prescriptions of the *International Oenological Codex* and shall not lead to excessive modifications of the physico-chemical composition and sensory characteristics of the wine.

3.3.4. **COLD STABILISATION TREATMENT (5/88), (OENO 2/04)**

Definition

Operation that consists of chilling the wine.

Objectives

a) To promote the crystallisation and precipitation of potassium and calcium tartrates, the precipitation of colloids and also to improve the stability of wine.

Prescriptions

For objective (a), the treatment is performed using mechanical refrigeration or natural cold sources, with or without addition of potassium bitartrate crystals followed by the separation by physical techniques of the crystals and colloids precipitated.

3.3.5. **TREATMENT WITH BENTONITES (16/70)**

Classification

Bentonites: processing aid.

Addition of bentonites to wine.

Objective

To prevent protein and copper hazes.

Prescription

The substances used shall comply with the prescriptions of the *International Oenological Codex*.

3.3.6. **TREATMENT WITH GUM ARABIC (AG 12/72-OEN, OIV-OENO 689-2022)**

Classification

Gum arabic: additive

Definition

Addition of gum arabic to wine.

Objectives

a) To avoid copper haze.

b) To protect wine against light iron haze.

c) To prevent the precipitation of substances such as pigments that, in the wine, are in the colloidal state.

Prescriptions

a) The product should be added to the wine after the last filtration, or just before bottling.

b) The dose used shall not exceed 0,8 g/L for red liqueur wines and 0,3 g/l for other wines.

c) The gum arabic shall comply with the prescriptions of the *International Oenological Codex*.

3.3.7. **TREATMENT WITH METATARTARIC ACID (16/70)**

Classification

Metatartaric acid: additive

Definition

Addition of metatartaric acid to wine.

Objective

To prevent the precipitation of potassium hydrogen tartrate and calcium tartrate.

Prescriptions

a) The addition should take place only at the last moment, before bottling.

b) The dose used shall be less than or equal to 10 g/hl.

c) The duration of protection depends on the storage temperature of the wine, because the acid in question hydrolyses slowly in the cold, but rapidly under hot conditions.

d) The metatartaric acid shall comply with the prescriptions of the *International Oenological Codex*.

3.3.8. **TREATMENT WITH CITRIC ACID (16/70)**

Classification

Citric acid, monohydrate: additive

Definition

Addition of citric acid to wine.

Objective

To bind ferric ions in a soluble complex anion and thus to lessen the tendency to form iron hazes.

Prescriptions

a) The maximum citric acid content of the wine at the point of consumption shall be 1 g/l.

b) The citric acid used shall comply with the prescriptions of the *International Oenological Codex*.

3.3.10. **TREATMENT WITH POTASSIUM FERROCYANIDE (16/70)**

Classification

Potassium ferrocyanide: Processing aid

Definition

Addition of potassium ferrocyanide to wine.

Objective

To lessen the wine's content:

— of iron to avoid iron hazes,

— of copper to avoid copper hazes,

— and more generally of heavy metals.

Prescriptions

a) This procedure can be executed only by a responsible and qualified technician.

b) The main operation must be preceded by trials to determine the amount of product to add.

c) The main operation should be followed by an examination of the treated wine, to determine the absence of an excess of ferrocyanide or its derivatives.

d) The potassium ferrocyanide used shall comply with the prescriptions of the *International Oenological Codex*.

3.3.12. **CALCIUM TARTRATE TREATMENT (OENO 8/97)**

Classification

Calcium tartrate: processing aid

Definition

Addition of calcium tartrate to wine.

Objective

To contribute to the tartric stabilisation of wine by decreasing the content of potassium hydrogenotartrate and calcium tartrate.

Prescriptions

a) The dose used must be inferior to 200 g/hl.

b) The treatment is carried out by calcium tartrate addition, stirring and artificial cooling of the wine followed by the separation with crystals formed by physical means.

c) Calcium tartrate must conform to the prescriptions of the *International Oenological Codex*.

3.3.13. **TREATMENT OF WINES WITH YEAST MANNOPROTEINS (OENO 4/01; 15/05)**

Classification

Yeast mannoproteins: additive

Definition

Treatment of wines by using mannoproteins from yeast wall degradation.

Objective

Improve stability of wine only with regard to tartaric salts and/or its proteins in the case of white or rosé wines.

Prescriptions

a) The doses that should be used will be established by the person in charge of the treatment;

b) For certain young red and rosé wines the person in charge of the treatment should consider a pre-treatment using yeast cell walls if the mannoproteins alone do not present the sought after efficiency;

c) Mannoproteins must comply with the provisions of the *International Oenological Codex*.

3.3.14. **TREATMENT WITH CELLULOSE GUMS (CARBOXYMETHYLCELLULOSE) (OENO 2/08, OENO 586-2019, OENO 659-2020)**

Classification

Sodium carboxymethylcellulose: additive

Definition

Addition of cellulose gums to white, rosé and sparkling wines

Objective

Contribute to the tartaric stabilisation of white wine and sparkling wine

Prescriptions

a) The dose of carboxymethylcellulose to be used should be below 200 mg/l.

b) For questions of incorporation, it is preferable to use products in granulated form or less viscous products.

c) Carboxymethylcellulose may cause instability in the presence of proteins and polyphenols.

d) Cellulose gums used must be in accordance with the provisions of the *International Oenological Codex*.

3.3.15. **TREATMENT WITH POTASSIUM POLYASPARTATE (OENO 543/2016)**

Classification

Additive

Definition

Addition of potassium polyaspartate to wines

Objective

Contribute to the tartaric stabilisation of wines

Prescription

a) The optimum dose of potassium polyaspartate used to stabilise wines, also those with a high degree of tartaric instability, must not exceed 10 g/hl. At higher doses, the potassium polyaspartate's (KPA) stabilising performance is not improved and, in some cases, an increase of wine turbidity could be induced.

b) For red wines with high colloidal instability, prior treatment with bentonite is recommended.

c) The application of potassium polyaspartate must be in accordance with the prescriptions of the *International Oenological Codex*.

3.3.16. **USE OF ASPERGILLOPEPSIN I TO REMOVE HAZE-FORMING PROTEINS (OENO 541B/2021)**

Definition

The addition to wine of Aspergillopepsin I from *Aspergillus* spp. to remove haze-forming proteins.

Objective

To prevent protein haze in still white and rosé wines and sparkling wines.

Prescriptions

a) After addition of Aspergillopepsin I preparation, one short-term wine heating must be applied as it contributes to the unfolding of haze-forming proteins and facilitates their enzymatic degradation by proteases, as well as leads to a denaturation of the protease itself.

This single heat treatment must take into account:

— the activity of the Aspergillopepsin I preparation as regards temperature,

— the quantity of Aspergillopepsin I used,

— the minimum temperature of treatment should be at or above the denaturation temperature of the proteins, generally comprised between 60 and 75 °C,

— the heating time, generally around 1 minute. Too long heating time could induce negative organoleptic impact.

This loss of three-dimensional conformation of TLPs (Thaumatin Like Proteins) is reversible, so the heating has to be simultaneous to the addition of enzymes for optimal efficiency.

b) The wine is immediately cooled to an appropriate temperature.

c) A filtration must be performed to remove the residual proteins (including added proteases and other proteins).

d) The enzymes used must comply with the prescriptions of the *International Oenological Codex*.

3.4.2. **BIOLOGICAL STABILISATION (1/91, OENO 581A-2021)**

Definition

Processing designed to eliminate undesirable microorganisms or to inhibit their development.

Objective

To obtain biological stability of the wine.

Prescriptions

To achieve the objective, the following procedures may be used:

a) Heat Treatment

— Pasteurisation,

— Hot bottling.

b) Sterilising filtration.

c) The application of microbial inhibitors, such as sulphite, sorbic acid, fumaric acid, dimethyl dicarbonate and diethyl dicarbonate (not accepted).

d) Depletion of the must in undesirable microorganisms (filtration, centrifugation) and in nutritional elements by development of successive generations of microorganisms followed by their elimination.

3.4.3. **PASTEURISATION (5/88)**

Definition

Heating wine to a specified temperature for a given time.

Objectives

a) To inhibit the activity of microorganisms present in the must at the time of treatment.

b) To inactivate enzymes present in the wine.

Prescriptions

a) Pasteurisation can be performed:

— in bulk (see bulk pasteurisation ([24])),

— in bottle (see in-bottle pasteurisation ([25])).

([24]) See OIV file 3.4.3.1 hereafter.

([25]) OIV file 3.5.10 IN-BOTTLE PASTEURISATION (5/82):

a) Pasteurisation can be performed:
   — by immersing bottles in hot water,
   — by running hot water onto bottles.
b) The increase in temperature shall cause no alteration in the appearance, colour, odour or taste of the wine.
c) A sufficient headspace will be provided under the cork to allow for the expansion in volume of the wine and precautions will be taken to avoid explosion of bottles due to excessive pressure.

b) Pasteurisation can be achieved using different techniques:

— by passage of the wine through a heat exchanger followed by rapid cooling,

— by bottling and corking the wine hot, followed by natural cooling (see hot bottling ([26])),

— by heating the wine in bottles, followed by cooling.

c) The increase in temperature and the techniques used shall cause no alteration in the appearance, colour, odour or taste of the wine.

3.4.3.1. **BULK PASTEURISATION (1/90)**

Definition

Heating wine to a specified temperature for a given time.

Objectives

a) See 3.4.3.

b) To inactivate oxidative enzymes when they are present in the wine.

Prescriptions

a) Bulk pasteurisation is performed by passing the wine through a heat exchanger followed by cooling. It can take two forms:

— simple pasteurisation,

— flash pasteurisation.

Flash pasteurisation is distinguished from simple pasteurisation by rapid heating, to a higher temperature, for a very short time, followed by rapid cooling.

b) The treatment should not produce any alteration in the clarity, colour, odour or taste of the wine.

3.4.4. **SULPHITING (OENO 7/03)**

Classification

Sulphur dioxide: additive

Definition

The addition of gaseous sulphur dioxide, sulphuric solutions or potassium metabisulphite solutions to wine.

Objectives

a) To obtain the microbiological stabilisation of wine by limiting and/or preventing the growth of yeast and technologically unwanted bacteria.

b) To use its reducing and antioxidant properties.

c) To combine certain molecules that give undesirable odours.

d) To inhibit possible oxidasic activities.

Prescriptions

a) The total sulphur dioxide contents when marketed must at least comply with the limits set by Annex C of the *Compendium of International Methods of Analysis of Wine and Musts*.

b) The addition of sulphur dioxide can be carried out by:

— the direct addition to wine during the wine making process,

— the direct addition to the wine prior to bottling,

([26]) OIV file 3.5.4 HOT BOTTLING (OENO 9/97):
The wine should not be heated above 45 °C.

— the direct injection to the wine prior to filling,

— the direct injection in the empty bottle prior to filling.

c) The products used must comply with the prescriptions of the *International Oenological Codex*.

3.4.5. **TREATMENT WITH SORBIC ACID (5/88)**

Definition

Addition to wine of sorbic acid or potassium sorbate.

Objectives

a) To obtain biological stability of the wine.

b) To prevent the re-fermentation of wines containing fermentable sugars.

c) To prevent the development of undesirable yeasts.

Prescriptions

a) The addition should take place only shortly before bottling.

b) The dose used shall not exceed 200 mg/l expressed as sorbic acid.

c) The sorbic acid and potassium sorbate shall comply with the prescriptions of the *International Oenological Codex*.

3.4.7. **TREATMENT WITH ASCORBIC ACID (OENO 12/01)**

Classification

Ascorbic acid: additive

Erythorbic acid: additive

Definition

Addition of ascorbic acid ([27]) to wine.

Objective

Protect the wine through the antioxidant properties of the product, against the influence of oxygen in the air, which modifies its colour and flavour.

Prescriptions

a) It is recommended to add ascorbic acid during bottling, otherwise it oxidises in the presence of air and the oxidation product causes far more significant oxidative alterations in the wine than those resulting from oxygen in the air in the absence of ascorbic acid.

b) The dose used shall not exceed 250 mg/l.

c) When the ascorbic acid has also been used on grape or must, the final concentration, in terms of ascorbic plus dehydroascorbic acid, shall not exceed 300 mg/l.

d) The ascorbic acid shall comply with the prescriptions of the *International Oenological Codex*.

3.4.9. **TREATMENT WITH POLYVINYLPOLYPYRROLIDONE (PVPP) (5/87)**

Classification

Polyvinylpolypyrrolidone: processing aid

Definition

Addition to wine of polyvinylpolypyrrolidone (PVPP).

([27]) Isoascorbic acid, or D-ascorbic acid or erythorbic acid has the same antioxidant power as ascorbic acid and can be used for the same oenological purpose. This acid exhibits the same appearance and the same solubility properties as ascorbic acid. With the exception of rotatory power, this acid should exhibit the same properties as ascorbic acid, respond in the same way to the identifying reactions, pass the same tests and responds to the same quantitative analysis. (Cf Codex sheet COEI-1-ASCACI: 2007).

Objectives

To reduce the content of tannin and other polyphenols in the wine with a view:

— to overcoming the tendency to brown,

— to reducing the astringency,

— to correcting the colour of slightly discoloured white wine.

Prescriptions

a) The dose of PVPP used shall not exceed 80 g/hl.

b) The PVPP used shall comply with the prescriptions of the *International Oenological Codex*.

3.4.11. **TREATMENT OF WINES WITH UREASE (OENO 2/95)**

Classification

Urease: processing aid

Definition

Addition to wine of an active acid urease, produced from *Lactobacillus fermentum*.

Objective

To reduce the level of urea in wines, when this is excessive, in order to avoid the formation of ethyl carbamate during ageing. The enzyme transforms urea into ammonia and carbon dioxide.

Prescriptions

a) It is preferable to add the urease to wine already clarified by spontaneous sedimentation of the lees.

b) A knowledge of the level of urea in the wine will allow assessment of the dose of urease to be added.

c) The urease will be eliminated during the filtration of the wine.

d) The urease shall comply with the prescriptions of the *International Oenological Codex*.

3.4.12. **LYSOZYME TREATMENT (OENO 10/97)**

Classification

Lysozyme: additive

Definition

Addition of lysozyme to the wine.

Objectives

a) Control of the growth and activity of the bacteria responsible for malolactic fermentation of the wine.

b) Reduction of the rate of sulphur dioxide.

Prescriptions

a) According to experiments, the maximum dose of 500 mg/l appears to be sufficient to control the growth and the activity of the bacteria responsible for malolactic fermentation.

b) Lysozyme cannot totally substitute itself to SO_2 which possesses antioxidant properties. A SO_2 + lysozyme association provides more stable wines.

c) When must and wine are treated with lysozyme, the cumulative dose must not exceed 500 mg/l.

d) The product must conform to the prescriptions of the *International Oenological Codex*.

3.4.13. **TREATMENT WITH DIMETHYL DICARBONATE (DMDC) (OENO 5/01, OENO 421-2011)**

Definition

Addition of dimethyl dicarbonate to wine.

Objectives

a) Obtain microbiological stability of bottled wine containing fermentable sugars.

b) Prevent the development of unwanted yeast and lactic bacteria.

c) Block fermentation of sweet, medium sweet, and medium dry wines.

Prescriptions

a) For objective a), should only be added shortly before bottling.

b) The dosage should be no more than 200 mg/l expressed as dimethyl dicarbonate.

c) The addition of dimethyl dicarbonate must not lead to surpassing the maximum content level for methanol in wine, as recommended by the OIV.

d) The wine should not be placed on the market as long as dimethyl dicarbonate is detectable.

e) The dimethyl dicarbonate used must comply with the provisions of the *International Oenological Codex*.

3.4.14. **ADSORBANT COPOLYMER TREATMENT (PVI/PVP) (OENO 2/07, OENO 262-2014)**

Classification

PVI/PVP copolymer: processing aid

Definition

The addition of polyvinylimidazole – polyvinylpyrrolidone copolymers (PVI/PVP) in order to reduce copper, iron and heavy metal contents.

Objectives

a) To prevent defects caused by too high metal contents (for example ferric casse).

b) To reduce undesirable, high concentration of metals due to:

— must contaminated by metal cations,

— metal cation contamination during must or wine treatment from winemaking equipment,

— enrichment in copper following the treatment of wines by copper sulphate.

Prescriptions

a) The amount used should be less than 500 mg/l.

b) When musts and wine are treated with PVI/PVP polymers, the accumulated dosage should be less than 500 mg/l.

c) The copolymers should be eliminated after no more than 2 days after the addition taking into account the precautionary principle and separated from the wine by filtering before bottling.

d) The adsorbant copolymers used should comply with the prescriptions of the *International Oenological Codex* and in particular monomers limits.

e) The implementation of the procedure shall be placed under the responsibility of an oenologist or a specialised technician.

3.4.15. **TREATMENT WITH D,L-TARTARIC ACID (OENO 4/08)**

Classification

D,L-tartaric acid: processing aid

Potassium D,L-tartrate: processing aid

Definition

Addition of D,L-tartaric acid or the potassium-salts of D,L-tartaric acid in wine

Objectives

Reduction of excessive levels of calcium

Prescriptions

a) The treatment yields particularly insoluble salts. The use of D,L-tartaric acid is subject to certain regulations.

b) The treatment will be placed under the responsibility of an oenologist or a specialist technician.

c) The products added shall comply with the prescriptions of the *International Oenological Codex*.

3.4.16. **TREATMENT USING CHITOSAN (OIV-OENO 338A/2009)**

Classification

Chitosan: processing aid

Definition

Addition of chitosan of fungal origin to wines

Objectives

a) To reduce heavy metal content, notably iron, lead, cadmium, copper.

b) To prevent iron haze, copper haze.

c) To reduce possible contaminants, especially ochratoxin A.

d) To reduce undesirable micro-organisms, notably *Brettanomyces*.

Prescriptions

a) The doses to be used are determined after preliminary testing. The maximum dose used must not exceed:

— 100 g/hl for the objectives a) and b),

— 500 g/hl for the objective c),

— 10 g/hl for the objective d).

b) Sediments are eliminated by physical procedures.

c) Chitosan of fungal origin may be used alone or together with other admitted products.

d) Chitosan must comply with the requirements of the *International Oenological Codex*.

3.4.17. **TREATMENT USING CHITIN-GLUCAN (OIV-OENO 338B/2009)**

Classification

Chitin-glucan: processing aid

Definition

Addition of chitin-glucan of fungal origin to wines

Objectives

a) To reduce heavy metal content, notably iron, lead, cadmium, copper.

b) To prevent iron haze, copper haze.

c) To reduce possible contaminants, especially ochratoxin A.

Prescriptions

a) The doses to be used are determined after preliminary testing. The maximum dose used must not exceed:

— 100 g/hl for the objectives a) and b),

— 500 g/hl for the objective c).

b) Sediments are eliminated by physical procedures.

c) Chitin-glucan complex of fungal origin may be used alone or together with other admitted products.

d) Chitin-glucan complex must comply with the requirements of the *International Oenological Codex*.

3.4.20. **USE OF SELECTIVE PLANT FIBRES (OENO 582-2017, OIV-OENO 684A-2022)**

Definition

Use in wine of a selective adsorbent composed of plant fibres.

Objectives

a) To reduce the ochratoxin A levels in wines.

b) To reduce the number and levels of phytosanitary products residues in wines.

Prescriptions

a) Selective plant fibres are to be used as processing aids and incorporated either into wine or during filtration with continuous deposition, during cross-flow filtration, or as a constituent of a filter sheet.

b) The recommended dosage is to be determined according to the filtration technique used, without exceeding 1,5 kg/m^2 of the filter sheet surface area or 200 g/hL in wine.

c) Selective plant fibres used in wines are to be removed by racking after sedimentation, centrifugation, or filtration.

d) Selective plant fibres are to be used in wines in compliance with the regulatory requirements, particularly the permitted limits for phytosanitary products residues.

e) Selective plant fibres must comply with the prescriptions of the *International Oenological Codex*.

3.4.21. **MALOLACTIC FERMENTATION ACTIVATORS (OIV-OENO 531-2015)**

Definition

Addition of malolactic fermentation activators at the end or after the alcoholic fermentation to facilitate malolactic fermentation.

Objective

Promote the initiation, kinetics or completion of malolactic fermentation:

— by enriching the environment with nutrients and growth factors for acid lactic bacteria,

— by the adsorption of some bacteria inhibitors.

Prescriptions

a) Activators are microcrystalline cellulose or products derived from the degradation of yeasts (autolysates, inactivated yeasts, yeast walls).

b) Activators can be added to wine or fermenting wine before or during malolactic fermentation.

c) The activators must not induce organoleptic deviations in wine.

d) Malolactic fermentation activators must comply with the prescriptions contained in the *International Oenological Codex*.

3.4.22. **TREATMENT OF WINES USING ADSORBENT STYRENE-DIVINYLBENZENE BEADS (OENO 614B-2020)**

Definition

Physical process of reduction or elimination of organoleptic deviations characterised as ‘earthy-musty’ by the appropriate and controlled percolation of wines at a high flow rate through adsorbent styrene-divinylbenzene beads.

Objective

a) To eliminate the perception of organoleptic deviations characterised as 'earthy-musty' by the reduction in concentration or elimination of one of the main molecules responsible, geosmine.

Prescriptions

a) Treatment should be carried out on clarified wines with turbidities of less than 30 NTU (nephelometric turbidity units);

b) the quantity of adsorbent beads to be used in the column and the wine flow rate are to be determined based on the initial geosmine content;

c) the adsorbent beads are placed in a column that is compliant with standards for food contact materials;

d) the adsorbent beads implanted and the conditions of their use should comply with the prescriptions of the *International Oenological Codex*.

3.4.23. **TREATMENT WITH FUMARIC ACID TO INHIBIT MALOLACTIC FERMENTATION (OENO 581A-2021)**

Classification

Fumaric acid: Additive

Definition

Addition of fumaric acid to wine.

Objectives

1) Control of the growth and activity of the lactic acid bacteria responsible for the malolactic fermentation of wine;

2) reduction of the dose of sulphur dioxide;

3) preserve malic acidity.

Prescriptions

1) Doses of 300-600 mg/L to control malolactic fermentation, even in the presence of high quantities of inoculum and during tumultuous fermentation;

2) fumaric acid must comply with the prescriptions of the *International Oenological Codex*.

3.5.4. **HOT BOTTLING (OENO 9/97)**

Definition

Bottling of wine heated prior to the immediate corking of the bottle.

Objectives

a) Biological stabilisation of the wine;

b) Elimination of oxygen;

c) Physico-chemical stabilisation.

Prescription

The wine should not be heated above 45 °C.

3.5.5. **OXYGENATION (545B/2016)**

Classification

Oxygen: processing aid

Definition

Addition of oxygen or air to wine

Objectives

a) To use 'micro-oxygenation', 'macro-oxygenation' and 'nano-oxygenation' technologies on wines.

b) To initiate oxidation phenomena with the aim of:

— contributing to stabilisation of colour and maturation of red wines by encouraging in particular the production of acetaldehyde, which can react with flavanols and anthocyanins to cause the formation of new pigments that are more stable and more intensely coloured (hyperchromic and bathochromic effect) than native anthocyanins;

— preparing wines used in treatments to eliminate excess iron (file 3.3.1) through oxidation of ferrous iron into ferric iron.

c) To reduce the concentration of 'volatile sulphur compounds' such as hydrogen sulphide, methane-thiol, etc.

d) To reduce aroma compounds related to vegetal sensory characters.

e) To facilitate fining of wines.

Prescriptions

a) In the case of 'micro-oxygenation', the rate at which the quantity of oxygen is added should be lower than that of the oxygen consumption by the treated wine; in other words, oxygen should not be accumulated in the wines during treatment. It is preferable to use this technique when wines have a high concentration of free anthocyanins.

b) 'Macro-oxygenation' is defined by the addition of higher doses of oxygen compared to 'micro-oxygenation' and by a shorter addition period. This is specifically practiced at the end of fermentation, at a post-fermentative stage and up until the first racking of lees.

c) In the case of 'nano-oxygenation', oxygen is added at regular intervals in very small quantities, such as 10 to 100 µg oxygen per litre of wine.

d) In the case of treatment of excess iron (file 3.3.1), oxygenation should be followed by an addition of tannin in proportion to the iron concentration of the wine, followed by fining, preferably with casein. The addition of oxygen should always precede the removal of iron by calcium phytate.

e) For stabilisation of the colour and improvement of the quality of a red wine during maturation, the doses to be added to the wine, in the case of 'micro-oxygenation', are around 1-5 mg/l per month – depending, mainly, on their initial anthocyanin and polyphenol concentration and concentration of free SO_2. In the case of treatment using 'macro-oxygenation', the oxygen doses added are higher to take into account the oxygen consumption by the yeast lees.

f) Due to the potential for the development of oxidative aromas, wine that undergoes oxygenation should be tasted regularly in order to define an optimum duration and temperature depending on the desired aromatic profile of the wine. 'Micro-oxygenation' is not recommended above 22 °C to avoid excessive oxidation or below 8 °C to avoid oxygen accumulation.

g) The aim of oxygenation should not be a reduction in sulphite of wines containing excess sulphur dioxide.

h) Microbiological stability (especially where *Brettanomyces bruxellensis* is concerned) should be monitored to avoid organoleptic deviations in wines.

3.5.7. **TREATMENT WITH β-GLUCANASES (3/85, OENO 498-2013)**

Classification

Beta-glucanase (β 1-3, β 1-6) β: processing aid

Definition

Addition to wine of an enzyme preparation containing activities catalysing the degradation of beta-glucans produced in the grape berry by the fungus *Botrytis cinerea* (noble rot, grey rot).

Enzyme activities involved in the degradation of β–glucans of *Botrytis cinerea* are β-glucanases type β-1,3 and 1,6. The β-glucanases including β–1.3-glucanases are also able to degrade β-glucans released by *Saccharomyces* type yeasts during alcoholic fermentation and during wine aging on lees.

Objective

To improve the clarification and filterability of wines.

Prescription

The glucanase preparation shall comply with the prescriptions of the *International Oenological Codex*.

3.5.8. **TREATMENT WITH COPPER SULPHATE (2/89)**

Classification

Copper sulphate, pentahydrate: processing aid

Definition

Addition of copper sulphate pentahydrate ($CuSO_4$ $5H_2O$) to wine

Objective

To remove the bad taste and odour due to hydrogen sulphide and possibly to its derivatives.

Prescriptions

a) The dose of copper sulphate pentahydrate necessary to comply with the objective should be determined by a preliminary test. It shall not exceed 1 g/hl.

b) The colloidal cupric precipitate formed must be eliminated from the wine.

c) After treatment, the copper content of the wine should be checked and reduced to a level less than or equal to 1 mg/l by an appropriate procedure, complying with the specifications of Annex C of the *Recueil of International Methods of Analysis for Wines and Musts*.

d) The copper sulphate used shall comply with the prescriptions of the *International Oenological Codex*.

3.5.9. **CARBON TREATMENT OF SLIGHTLY COLOURED WINE (16/70)**

Classification

Oenological carbon: processing aid

Definition

Addition of carbon to wine.

Objectives

Correction of the colour:

— of white wines produced from red vine varieties with white juice,

— of white wines accidentally discoloured by contact with containers that have held red wines,

— of very yellow wines prepared from white varieties,

— of oxidised wines.

Prescriptions

a) The processing shall not:

— serve to de-colour red wine or rosé,

— be applied successively to must and to the wine that results from it.

b) The quantity of dry carbon used shall be less than 100 g/hl of wine.

c) The carbon used shall comply with the prescriptions of the International *Oenological Codex*.

3.5.10. **IN-BOTTLE PASTEURISATION (5/82)**

Definition

Heating wine in bottles to a temperature and for a duration sufficient to prevent subsequent activity of microorganisms in the bottle.

Objective

See 3.12

Prescriptions

a) Pasteurisation can be performed:

— by immersing bottles in hot water,

— by running hot water onto bottles.

b) The increase in temperature shall cause no alteration in the appearance, colour, odour or taste of the wine.

c) A sufficient headspace will be provided under the cork to allow for the expansion in volume of the wine and precautions will be taken to avoid explosion of bottles due to excessive pressure.

3.5.11. **PARTIAL DEHYDRATION OF WINES (OENO 2/01).**

Definition

Prescriptions to concentrate wine by elimination of water.

Objective

Increase alcohol strength by volume of wine.

Prescriptions

a) The objective can be achieved by a variety of methods known as subtractive enrichment techniques.

b) This prescription should not be used on wines showing any organoleptic defects.

c) The elimination of water in wine cannot be done in conjunction with the possible elimination of water in the corresponding grape or must.

3.5.11.1. **WINE CONCENTRATION BY FREEZING / CRYOCONCENTRATION (OENO 3/01)**

Definition

Prescriptions for concentrating wine by partial freezing and physical removal of the ice thus formed.

Objective

See the sheet 'Partial dehydration of wine'.

Prescription

a) See the sheet 'Partial dehydration of wine';

b) Concentration can lead to a reduction of 20 % of initial volume and should not be increased by more than 2 % by volume of the initial alcohol strength of wine.

3.5.14. **TREATMENT WITH COPPER CITRATE (OENO 1/08)**

Classification

Copper citrate: processing aid

Definition

Addition of hydrated copper citrate alone or mixed with clarifying agents (for example bentonite)

Objective

Remove bad taste and odour due to hydrogen sulfide and possibly its derivatives.

Prescriptions

a) The dose of hydrated copper citrate necessary for fulfilling the objective must be determined by a prior trial test. This dose must not exceed 1 g/hl.

b) Copper colloidal precipitate formed must be eliminated from wine by filtration.

c) Following all treatments, the copper content of wine must be monitored and returned to levels equal to or under the residual level of wine set by the OIV in accordance with the specifications of Annex C of the *International Compendium of Methods of Analysis of Wines and Musts*.

d) The copper citrate used must be in accordance with the provisions of the *International oenological Codex*.

3.5.17. **MANAGEMENT OF DISSOLVED GAS IN WINE USING MEMBRANE CONTACTORS (OENO 499-2013)**

Definition

Physical method for the management of dissolved gas concentrations in wine using membrane contactors (hydrophobic membranes) and gases applied in oenology.

Objective

a) Reduction of the dissolved oxygen level in wine;

b) Increase of the dissolved oxygen level in wine;

c) Reduction of the dissolved carbon dioxide level in wine;

d) Adjustment of the dissolved carbon dioxide level in still or semi-sparkling wines according to the definition in the *International Code of Oenological Practices*;

e) Increase of the dissolved carbon dioxide level in order to obtain carbonated wines according to the definition in the *International Code of Oenological Practices*.

Prescription

a) See the general sheet on *separative techniques used in the treatment of musts and wines* ([28]) as well as the sheet on the *application of membrane techniques in wine* ([29]).

b) This technique can be used from the end of alcoholic fermentation to packaging to replace the use of bubbling device or venturi type systems.

c) This practice shall be carried out by an oenologist or a qualified technician.

d) For objective b) see the prescriptions of the resolution related to oxygenation of wine ([30]).

e) The wine treated or to be treated must comply with the definitions and limits of the OIV.

f) The membranes used must comply with the provisions of the *International Oenological Codex*.

g) The gases used must comply with those allowed and defined in the *International Oenological Codex*.

3.5.18. **TREATMENT OF WINES USING A MEMBRANE TECHNOLOGY COUPLED WITH ADSORPTION ON DEODORANT ACTIVATED CARBON OR ADSORBENT STYRENE-DIVINYLBENZENE BEADS TO REDUCE VOLATILE PHENOLS (OENO 504-2014; OIV-OENO 657-2023)**

Definition

Process that consists of reducing the excess content of volatiles phenols in wine using a combination of membrane filtration and treatment of the permeate with deodorant activated carbon or adsorbent styrene-divinylbenzene beads.

Objective

a) Reduce the content of volatile phenols of:

— microbial origin (e.g. *Brettanomyces* spoilage), and/or

— environmental origin (e.g. smoke volatiles from fire), and/or

— winery origin (e.g. tainted barrels or surfaces),

that might constitute organoleptic defects or mask the aromas of the wine.

([28]) See footnote 3.
([29]) See footnote 20.
([30]) See OIV file 3.5.5 above.

Prescription

a) Refer to the general file on separative techniques used in the treatment of wines (Chapter 3.0) and the file on the application of membrane separation techniques applied to wine (Chapter 3.0.1).

b) The objective of the first step of the process is to produce a permeate containing some of the volatile phenols. This can be achieved through a membrane separation technique.

c) The permeate obtained during the first step of the process is treated with a deodorant activated carbon or adsorbent styrene-divinylbenzene beads.

d) The treated permeate is then reincorporated with the retentate.

e) The volume of permeate extracted and treated with the deodorant activated carbon or adsorbent styrene-divinylbenzene beads is dependent on the membrane separation techniques and quantity of volatile phenols to be removed.

f) An oenologist or a qualified technician will be responsible for implementing the treatment.

g) The deodorant activated carbon or adsorbent styrene-divinylbenzene beads and filtration membranes used must comply with the prescriptions contained in the *International Oenological Codex*.

4.1.7. **PROMOTING SECONDARY FERMENTATION BY THE USE OF NUTRITIVE SALTS AND OF YEAST GROWTH FACTORS (OENO 7/95)**

Classification

Lactic bacteria: processing aid

Ammonium sulphate: processing aid

Diammonium hydrogen phosphate: processing aid

Definition

Addition of ammonium salts and of thiamine to base wines destined for secondary fermentation.

Objective

To facilitate the multiplication of yeasts during secondary fermentation in a bottle or in a closed tank still containing grape sugars or with the addition of a tirage liqueur.

Prescriptions

Nutrititive salts and other growth factors added shall be:

a) for nutritive salts, diammonium phosphate, or ammonium sulphate to a maximum dose of 0,3 g/l (expressed as the salt);

b) for growth factors, thiamine in the form of thiamine hydrochloride to a maximum dose of 0,6 mg/l (expressed as thiamine).

c) These substances shall comply with the prescriptions of the *International Oenological Codex*.

4.1.8. **TIRAGE (3/81)**

Classification

Active dry yeast: processing aid

Ammonium chloride: processing aid

Potassium alginate: processing aid

Calcium alginate: processing aid

Definition

Operation that consists of filling into bottles, that are hermetically closed, the cuvee, well mixed with tirage liqueur. An inoculum of selected yeasts is added, and possibly clarifying agents and activators of secondary alcoholic fermentation.

Objective

To initiate secondary alcoholic fermentation with the aim of obtaining effervescence.

Prescriptions

a) The following clarifying agents are authorised:

— Bentonites (see Treatment with bentonites ([31])),

— Organic fining agents (see Fining ([32])),

— Tannins (see Tannin addition ([33])),

— Potassium alginate.

b) Activators of secondary alcoholic fermentation are authorised (see Promoting secondary fermentation by the use of nutritive salts and of yeast growth factors ([34])).

c) These products shall comply with the prescriptions of the *International Oenological Codex*.

4.1.10. **TRANSVASAGE (OENO 7/02)**

Definition

Operation involving the isobarometric transfer of sparkling wine from one wine container to another.

Objectives

a) Enable the separation of wine from the lees, and/or deposits coming from the addition of clarifying agents, deposited at the bottom of the container

b) Enable the blending and mixing of wines of different origin

c) Enable physical clarification by filtration, centrifuge, etc.

d) Enable the separation of crystals, tartric stabilization by cooling and separation of tartrate crystals (potassium bitartrate and calcium tartrate)

e) Proceed with isobarometric bottling

Prescriptions

Transvasage can occur:

a) in the absence of air to avoid any oxidation,

b) at room temperature, or preferably after cooling to avoid any possible loss of carbonic gas,

c) using the law of interconnected vessels or with pumps,

d) the end container must be rendered inert by carbon dioxide, nitrogen or argon. These gases must comply with *International Oenological Codex* prescriptions.

4.3. **LIQUEUR WINE (ECO 2/2007)**

Liqueur wine is a product with acquired alcoholic strength above or equal to 15 % and below or equal to 22 %. A state can however, for its domestic market, apply a maximum acquired alcoholic strength of above 22 % whilst remaining below or equal to 24 %.

Liqueur wine is made from grape musts (including partially fermented grape musts) and/or wine, to which are added, alone or in a mixture, distillates, spirits and alcohol of vitivinicultural origin.

One or more of the following products can be added: concentrated or caramelised grape must, over ripened or raisined grapes, mistelles, caramel.

([31]) See OIV file 3.3.5 above.
([32]) See OIV file 3.2.1 above.
([33]) See OIV file 3.2.6 above.
([34]) See OIV file 4.1.7 above.

A state can, however, for its domestic market, allow the use of neutral alcohol of agricultural origin if this usage is already authorised in the regulations of this state at the time of the adoption of the present resolution, within a limited time period.

4.3.2. **TIRAGE IN A CLOSED TANK (3/81)**

Definition

Operation that entails putting the cuvee, well blended with the tirage liqueur, into a pressure-resistant tank, with the addition of an inoculum of selected yeasts, and possibly of clarifying agents and activators of secondary alcoholic fermentation. All the outlets of the tank are then hermetically closed.

Objective

To initiate secondary alcoholic fermentation with the aim of obtaining effervescence.

Prescriptions

a) The following clarifying agents are authorised:

— Bentonites (see Treatment with bentonites ([35])),

— Organic fining agents (see Fining ([36])),

— Tannins (see Tannin addition ([37])),

— Potassium alginate.

b) Activators of secondary alcoholic fermentation are authorised (see Promoting secondary fermentation by the use of nutritive salts and of yeast growth factors ([38])).

c) These products shall comply with the prescriptions of the *International Oenological Codex*.

([35]) See OIV file 3.3.5 above.
([36]) See OIV file 3.2.1 above.
([37]) See OIV file 3.2.6 above.
([38]) See OIV file 4.1.7 above.