OIV INFORMATION REPORT ON WATER IN OENOLOGY

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Illustrated examples of the information provided can be seen throughout this document with a series of images, which are indicated by the icon 📷.

This document, drafted and developed on the initiative of the OIV, is a collective expert report.

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RATIONALE

Since the beginning of 2019, several notifications have been sent to the TBT Committee of the World Trade Organisation concerning certain provisions of Member States regarding the use of water in wine production.

Taking into account the elements presented to the WTO by various Member States and non-Members of the OIV concerning this issue and which may lead to technical barriers to trade,

Given that the Agreement of 3 April 2001 establishing the International Organisation of Vine and Wine stipulates in Article 2, paragraph 2.d that the OIV shall contribute to the harmonisation and adaptation of regulations by its members or, where relevant, facilitate mutual recognition of practices within its field of activities,

The General Secretariat of the OIV has prepared this information note, in order to recommend to start potential new works on this subject within the relevant structures of the OIV.

This document brings together in its first part, the history of the notifications sent to the WTO and the second part is devoted to the state of art of the various regulations in this area.

Finally, the last part suggests some recommendations for potential new works to be undertaken.

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Establishment of the OIV Task Force on Water into Wine

The OIV Scientific and Technical Committee (CST) of October 2019 endorses to incorporate the study of the use of water in wine making process as an issue into the 2020 work programme.

In addition during the meeting of 1st July 2020, the CST agrees to create a Task Force on Water into Wine (TFWW) to deal with scientific and technical issues related to the addition of water in wine making process including several members of the CST and the 1st Vice-president Pr. Monika Christmann as rapporteur

Following the decision of the CST on 1st July 2020, The members of the Task Force are proposed among the members of the CST as follow:

Rapporteur: Monika Christmann
Secretary: Jean-Claude Ruf (Scientific Coordinator of the OIV)
OIV Directorate general
Members of the Task Force (CST Members):
Regina Vanderlinde (President of the OIV)
Luigi Moio (2nd Vice president of the OIV)
Fernando Zamora (President of the group of experts “Technology”
Dominique Tusseau (President of the Commission Oenology)
Markus Herderich (President of the Sub-commission Methods of Analysis)
Ana Maria Ruano (Scientific secretary of the Sub-commission Methods of Analysis)
Tony Battaglene (Vice-president of the Commission “Economy and Law)
José Lez Secchi (qualified personality)

OIV Standards

Nowadays, the International Organisation of Vine and Wine admit, as oenological practice, the addition of water only for aromatised wines, beverages based on vitivinicultural products and wine-based beverages as defined by the OIV International Code of oenological practices (Resolution OIV-OENO 439-2012) for the following specific objectives: i) preparing flavouring essences ii) dissolving colours and sweeteners and iii) setting the final composition of the product.

The only case, where water could be reintroduced concerns the practice for the reduction of the sugar content in musts through membrane coupling (OENO 450B-2012). This process consists in extracting the sugar from musts, by using membrane coupling combining microfiltration or ultrafiltration with nanofiltration or inverted osmosis. The ultrafiltrate obtained during the first step of the treatment is then concentrated by nanofiltration or inverted osmosis.

The water and the organic acids filtered out by the nanofiltration process can be reintroduced into the treated must.

However, the OIV has not established clear provision regarding water addition for specific technical necessity in particular to incorporate any substance or food permitted for use as a food additive or a processing aid.

International regulations

ARGENTINA

Water for technological requirements

Solely to dissolve additives and processing aids. No official limit.

Opening of a public consultation on the introduction of a maximum limit for the technological use of water (2.8%).

AUSTRALIA

Water for technological requirements

Standard 4.5.1

A maximum of 7% v/v of wine for:

- incorporating additives,
- incorporating processing aids,

water used as an accessory to the winemaking process

Water to facilitate fermentation

Standard 4.5.1

Addition to dilute grape must with a high sugar content prior to fermentation. The must should not be diluted below 13.5 degrees Baumé

CHILE

Water for technological requirements

Articles 21 and 42 of Decree 29 of 22 June 2013 modifying Decree 78 of 1986 (Law 18455)

Article 21: Max. 5% v/v for the following operations during winemaking:

- washing of crushing equipment,
- dissolution of additives,
- rehydration of fermentation yeasts.

The volume of the must may not be increased by more than 5% of the initial volume.

Article 42: Max. 5% v/v during winemaking

to dissolve additives and winemaking products.

The volume after all treatments may not be increased by more than 2% v/v of the initial volume of wine.

Total: max. 7% v/v

EUROPEAN UNION

Water for technological requirements

Regulation (EU) No 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agricultural products stipulates in Annex VIII, Part II, A., point 1 that "All authorised oenological practices shall exclude the addition of water, except where required on account of a specific technical necessity."

In addition, an agreement between the EU and the USA sets the conditions on trade of wine and in particular regarding the use of oenological practices.

INDIA

Water for technological requirements

Food Safety and Standards (Alcoholic Beverages) Regulation, 2018. 3.2.iii "water added in preparation of wine shall not be more than 30 ml per kg of grape or fruit."

(OIV Note: proposal for amendment currently under review)
Water to facilitate fermentation Not permitted.

NEW ZEALAND

Water for technological requirements
Standard 1.1.2—3(2); Standard 2.7.4—2 Definitions
wine means:
a) a food that is the product of the complete or partial fermentation of fresh grapes, or a mixture of that product and products derived solely from grapes; or
b) such a food with any of the following added during production:
i) grape juice and grape juice products;
ii) sugar
iii) brandy or other spirit;
iv) water that is necessary to incorporate any substance or food permitted for use as a food additive or a processing aid

SOUTH AFRICA

Water for technological requirements
The addition of water to wine is not allowed in South Africa. In principle however, the use of water for technical reasons, e.g. to dissolve yeast, additives, etc is allowed. There is any legislation in terms of the Liquor Products Act, Act 60 of 1989 that specifies any detail in this regards.
Going forward South Africa is working on an amendment to specifically address this in the legislation. This will most probably only receive attention in 2020. At the moment the status is that the addition of water to wine is not allowed.

USA

Water for technological requirements
Code of federal regulations, Title 27, Chapter I, Subchapter A, part 24, subpart F)
24.176 Crushing and fermentation
Water may be used to flush equipment during the crushing process"
"Water may be used to rehydrate yeast to a maximum to two gallons of water for each pound of yeast; however, except for an operation involving the preparation of a yeast culture starter and must mixture for later use in initiating fermentation, the maximum volume increase of the juice after the addition of rehydrated yeast is limited to 0.5 percent."

Max. 0.5% v/v

Water to facilitate fermentation

Dilution to reduce sugar content in musts
24.176 Crushing and fermentation
"Water may be used to facilitate fermentation but the density of the juice may not be reduced below 22 degrees Brix. However, if the juice is already less than 23 degrees Brix, the use of water to flush equipment or facilitate fermentation is limited to a juice density reduction of no more than one degree Brix"
Dilution to reduce acidity

24.178 Amelioration
(a) General. In producing natural wine from juice having a fixed acid level exceeding 5.0 grams per liter, the winemaker may adjust the fixed acid level by adding ameliorating material (water, sugar, or a combination of both) before, during and after fermentation. The fixed acid level of the juice is determined prior to fermentation and is calculated as tartaric acid for grapes, malic acid for apples, and citric acid for other fruit. Each 20 gallons of ameliorating material added to 1,000 gallons of juice or wine will reduce the fixed acid level of the juice or wine by 0.1 gram per liter (the fixed acid level of the juice or wine may not be less than 5.0 gram per liter after the addition of ameliorating material).

(b) Limitations.
(1) Amelioration is permitted only at the bonded wine premises where the natural wine is produced.
2) The ameliorating material added to juice or wine may not reduce the fixed acid level of the ameliorated juice or wine to less than 5.0 grams per liter.
(3) For all wine, except for wine de-scribed in paragraph (b)(4) of this section, the volume of ameliorating material added to juice or wine may not exceed 35 percent of the total volume of ameliorated juice or wine (calculated exclusive of pulp). Where the starting fixed acid level is or exceeds 7.69 grams per liter, a maximum of 538.4 gallons of ameliorating material may be added to each 1,000 gallons of wine or juice. Max. 35% v/v (volume of wine)

California laws are a bit more restrictive than the federal ones: the California Code of Regulations states that no water in excess of the minimum amount necessary to facilitate normal fermentation, may be used in the production or cellar treatment of any grape wine (17 CCR § 17010).

8 The conversion factor to convert degrees Bé to degrees Brix is approximately 1.8, that is 1 degree Bé = 1.8 degrees Brix. http://www.ccwcoop.com.au/__files/d/40040/Baume%20Brix%20Conversion%20Chart.pdf (Accessed 7 April 2016)

1 • LEVELS OF WATER ADDITION FOR TECHNOLOGICAL REQUIREMENTS

Oenological Products are mostly in a solid state (powder, crystals) and must be dissolved in water, must, wine or a mixture of water/must or water/wine, in order to achieve total dissolution.

Addition of water is generally allowed for technological requirements and in particular to incorporate any oenological substances permitted for use as a food additive or a processing aid.

In addition, the different regulations do not precise a maximum percentage of water used for technological requirements.

The members of the Task Force have studied the requirements of exogenous technological water for the dissolution of oenological products and winemaking practices.

The National Institute of Vitiviniculture of Argentina has carried out a technical study on "Products that have been authorized for Oenological use", especially those that require previous dissolution before being added to the must or wine, and it has also contemplated a tolerance on the other Oenological Practices (Annex 1). The figures are calculated based on

1. the minimum and maximum quantities in grams per hectoliter of the Oenological Products used in the wine industry established by the recommendations provided by the manufacturers.

2. The oenological products which require only water for their dissolution. The oenological products which can be solved in must/wine matrix are not considered.

3. the different vinification methods, storage and bottling systems for generic wine, varietal wine and sparkling wine and used in their maximum concentrations, in general.

Taking into account the different calculation, the percentage of exogenous technological water for the dissolution of enological products is estimated at 2.4%. In addition, It has been considered appropriate to include a tolerance percentage that takes into account the other Oenological Practices that might incorporate small amounts of water as part of the technological processes such as: emptying of hoses, pumps, pre-layering formation in the filtration process, traces of water that remain during washing of winepresses,

...concrete containers, stainless steel tanks, machinery and other practices carried out in the winery. It has been estimated between 15-20% on the percentage of the value obtained for the dissolution of the Oenological Products, establishing a 0.4%.

Therefore the percentage of exogenous technological water for the dissolution of Oenological Products and other Oenological Practices is estimated at 2.8%.

The oenological department of Geisenheim University has also estimated the percentage of exogenous technological water for the dissolution of Oenological Products and other Oenological Practices (Annex 2).
Base on the minimum and maximum quantities in grams per hectolitre of the Oenological Products used in the wine industry and the quantity of water needs to dissolve the products, the minimum and maximum percentage is estimated is accordingly estimated at 1.1% and 5.8%.

Another calculation has been carried out by the University of Rovira i Virgili on the total exogenous water that can be introduced into the wine by the addition of additives and processing aids (Annex 3) The calculation table considers some of the most usual treatments of grape juice and wine and tries to consider only the maximal content of exogenous water that can be introduced in the wine by means of the addition of the different products (additives and processing aids). The maximum percentage of exogenous technological water for the dissolution of Oenological Products is estimated at 8.1%.
This study do not consider the exogenous water that can be introduced into the wine by filtration, especially when perlites or kieselguhr are used since it is really very difficult to calculate because it depends a lot of the volume of the filtered wine, the size of the filter and the care applied during the operation. The amount of exogenous water that can be introduced by the cleaning operations of tanks and pipes, and the subsequent racking of wines is also not considered for similar reasons. Finally, another source of exogenous water may be when it rains and part of this rainfall water comes in with the grapes.

Evidently it is difficult to imagine that a wine can be elaborated using all these products but in theory it is legally possible and consequently it must be considered in the discussion.

In any case, the total value reached applying all these treatments is very high (8.1%) compared to the study conducted by Geisenheim University in which he calculated a total percentage of exogenous water of 5.35%, but in this study some of the considered products were not included.

2. ANALITICAL ISSUES

With regard to the detection of water addition, this is determined on the basis of analysis of the isotopic ratio $^{18}O/^{16}O$ (expressed as $\delta^{18}O$‰) of wine water and the comparison of this value with the reference data defined by an official wine databank.

In the book Food Integrity Handbook, A guide to food authenticity issues and analytical solutions, the authors indicate that the ^{18}O of wine ethanol was measured directly on dry-ethanol using TC/EA-IRMS in pyrolysis conditions, after having trapped residual water using a molecular sieve [8]. It was found to be significantly correlated with the ^{18}O of wine water and can therefore be considered as an internal reference to improve the detection of wine watering, as is the case for fruit juice [9].As the addition of water to wine changes only the ^{18}O of water and not that of ethanol, the watering of wine changes this relationship, which can then fall outside the threshold value, even if the water ^{18}O is not outside the limit defined by the wine databank. Thus, measuring the ^{18}O of ethanol improves the detection of the watering of wine.

The isotopic values were expressed in δ‰ vs. V-PDB (Vienna Pee Dee Belemnite) for δ13C and VSMOW (normalised in relation to the Vienna Standard Mean Ocean Water – Standard Light Antarctic Precipitation V-SMOW-SLAP standard scale) for $\delta^{18}O$ and $\delta^{2}H$.

OIV METHOD

- In 2009, the Member states of the OIV have adopted the resolution OIV-Oeno 353/2009 concerning the Method for $^{18}O/^{16}O$ isotope ratio determination of water in wines and must

- Therefore, the determination of the $^{18}O/^{16}O$ isotope ratio of water from wine and must, is performed using the isotope ratio mass spectrometry (IRMS) according to the official OIV Method OIV-MA-AS2-12: R2009 .

- In addition, in 2011, the Member states of the OIV have adopted a resolution OIV-Oeno 426-2011 concerning the determination of the deuterium distribution in ethanol derived from fermentation of grape musts, concentrated grape musts, grape sugar (rectified concentrated grape musts) and wines by application of nuclear magnetic resonance (SNIF-NMR/ RMN-FINS) .

- This Official OIV method could be also used for the determination of water addition in wine making process.

In 2019 Serbian Ministry of agriculture has submitted to the OIV Sub-commission of Methods of analysis an official proposal for new work on “EIM for IRMS of Ethanol”, using new approach using new EIM – Module – IRMS (Ethanol Isotope Measurement – Module – Isotope Ratio Mass Spectrometry) instrumental technique and new analytical parameter δDn(δ^{2}Hn) wine ethanol value, which represents $\delta^{2}H$ value of non-exchangeable hydrogen stable isotope ratio in ethanol, with other isotopic species (□18O values in wine water) to improve detection of illegal wine production practices such as addition of sugar and/or dilution with water

Principle and procedure of the method and preliminary draft Resolution were submitted to the SCMA for further discussion. The method is not yet adopted but is currently in the step by step procedure.

At the OIV levels, limits for $\delta^{18}O$ value are not laid down in any provision. The official wine databank established by different countries, shall be consulted to evaluate the addition of water. For the interpretation, it is of fundamental importance in the process to have as much information as possible about the wine/must to be assessed: in fact the assessment is based on the vintage, typology and origin of the declared wine/must.

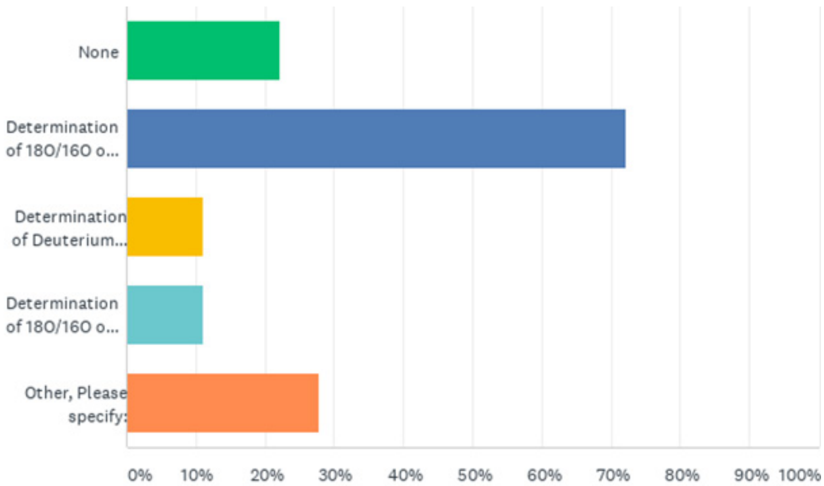
OIV QUESTIONNAIRE

According the respondent, The official wine databank established by different countries, shall be consulted to evaluate the addition of water. For the interpretation, it is of fundamental importance in the process to have as much information as possible about the wine/must to be assessed: in fact the assessment is based on the vintage, typology and origin of the declared wine/must

In addition, some remarks have been made regarding the specific methods.

- On January 2021, the OIV secretariat has launched a questionnaire to the OIV member states in order to gather information on the types of analysis they perform in term of control for addition of water in wine making process.

- Among the different methods available, as the figure X shows, 72.2% of the respondent used the OIV official method of determination of $^{18}O/^{16}O$ of wine water with a comparison with a database. 11.1 % use the method for the determination of deuterium, 11.1 % use the methods for the determination of $^{18}O/^{16}O$ of water in combination with $^{18}O/^{16}O$ of ethanol, 22.2 % of the respondent do not perform control with isotopic ratio and 16.7% indicate that they use others methods. Furthermore, among the respondent several countries performed two types of methods in parallel.



1) Some limitations of the existing method for the determination of $^{16}O/^{18}O$ of most or wine water need for special equipment and very long measurements procedure from 5 to 18 hours.

2) New methods with a good perspective: - Deuterium measurement by the NMR method, - EIM-IRMS method (proposed by the Delegation of Serbia in 2019), - Fast and simple direct measurement of $^{2}H/^{1}H$ ratio of water by the IRMS-Pyrolysis-method after preliminary water extraction from musts or wine (e.g. using the Dean-Stark apparatus & toluene).

3) The use of the combined method ($^{18}O/^{16}O$ of water + $^{18}O/^{16}O$ of ethanol) seems to be problematic from the methodological point of view in view of analytical problems with the measurement (e.g. pyrolysis reactor) and the lack of a single solution - which analyte should be used for the $^{18}O/^{16}O$ ratio measurement - alcohol containing distillate (with 4-30 % of water) or purified/absolute alcohol (with max. 1 % of water)

3 • OENOLOGICAL PRACTICES AND THE ISOTOPIC FRACTIONATION

Several studies have shown that certain oenological practices accepted, in particular by the OIV, could lead to changes in isotope ratios.

In view of climate change and certain health and social pressures, the use of certain practices aimed at reducing the alcohol content of wines has increased.
Recently, different studies have investigated the variation of isotopic ratio during wine dealcoholisation.
For example osmotic distillation can modify the isotopic ration in wines[8]. It has been demonstrated that the isotopic ratio analysis of $^{18}O/^{16}O$ is modified by an alcohol reduction of 2% v/v in a way that corresponds to an addition of 4-5 % of external water.

In addition, the variation of $^{18}O/^{16}O$ of the widuring dealcoholisation by membrane contactor has been studied [9]. The authors concluded that reduction of the alcohol level of wines by membrane contactors using waters streams as stripping agents, alters in some extent the oxygen isotopic ratio $^{18}O/^{16}O$ of the wine.

This effect might be wrongly confused with "watering", due to the net water transfer from the stripping side towards the wine compartment. A net water transfer towards the wine really occurs: in the conditions of experiments it can be estimated in the order of 50–80 mL of water per litre of ethanol removed, as represented by the ratio α. However , simple calculations show this amount of water gives negligible contribution to the observed □18□ variation. In addition, the whole experimentation puts clearly in evidence that "watering" is not the primary cause of the decrease in the isotopic water concentration in the wine compartment. Apparently, the main cause of the variation of the isotopic ratio should be the diffusion of the isotopic water itself.

In recent works [10] variations of wine water $\delta^{18}O$ of up to -1 ‰ and of ethanol $\delta^{13}C$ of up to +1 ‰ have been encountered for 2 % v/v dealcoholisation. The drop in $\delta^{18}O$ water is mainly caused by isotopic diffusion, which involves H218O migration from the wine to the extracting solution. The increase of $\delta^{13}C$ is due to the fact that ^{13}C has vapour pressure lower than the ^{12}C, and this causes a prevalent transfer of ethanol with ^{12}C.

8 Does osmotic distillation change the isotopic relation of wines? Matthias Schmitt, Marcelo Murgo, Sebastian Prieto BIO Web of Conferences 3 02006 (2014) DOI: 10.1051/bioconf/20140302006
9 Roberto Ferrarini, Gian Maria Ciman, Federica Camin, Serena Bandini, Carlo Gostoli, Variation of oxygen isotopic ratio during wine dealcoholization by membrane contactors: Experiments and modelling, Journal of Membrane Science, 498, 2016, 385-394, https://doi.org/10.1016/j.memsci.2015.10.027.
10 Fedrizzi, B., Nicolis, E., Camin, F. et al. Stable Isotope Ratios and Aroma Profile Changes Induced Due to Innovative Wine Dealcoholisation Approaches. Food Bioprocess Technol 7, 62–70 (2014). https://doi.org/10.1007/s11947-013-1068-x

4 • ORIGIN AND TYPE OF WATER

Rainwater, potable water, water from boilers or treated river water are all possible candidates to the process, but a winemaker may want to distil before use, to remove chlorine/chloramines that may impede fermentation and stain the flavour of the wine.

High brix levels can pose problems during primary fermentation and secondary fermentation. Stuck primary fermentations are common because many yeast strains are inhibited at high alcohol levels. In concerned countries, where the practice is admitted, it is a common practice to add water to the high sugar grape must or juice prior to primary fermentation. The idea is to dilute the brix down to a more manageable level. However, If you simply add water to must or juice, you will not only dilute sugar concentration, but also dilute total acidity. For this reason, it is common to use water that is acidulated with tartaric acid to perform the dilution. The acidulated water will not only dilute the sugar concentration, but it will keep total acidity and pH constant.[11]

If the addition of tap water could be identified with methods of isotopic ratio due to the difference in $\delta^{18}O$, organic water which is correspond to a water from plant origin is always difficult to identified.

11 A document by Brehm Vineyards indicates “

5 • INTERVIEWS

On 11th February 2021, in agreement with the rapporteur of the TFWW and due to their expertise on the analytical method, it has been decided to interview external experts on analytical issues related to the addition of water in wine making process during a visio conference with the members of the Task Force for exchanging your views on this theme.

The purpose of this interview is to exchange views on the accuracy of methods of analysis to detect water addition mainly on the methods of isotopic ratio and other issues, the use of different oenological practices which induce a modification of $^{18}O/^{16}O$ isotope ratio as dealcoholisation technics and the potential means to distinguish different origins of water present in wine.

The members below are invited to specific interview through the Task Force on Water into Wine":

- François Guyon, Jean-Philippe ROSEC - Service commun des laboratoire France",
- Eric Jamin and Freddie Thomas - "Eurofins Laboratories
- Professor Alexander Kolesnov and Gennady Kalabin
- Research Laboratory of Food Quality & Technology (PNIL)" of participating to this interview is listed below Russia.
- Bernard Medina expert at Chemical Society of France (SCF)

This interview do not supersedes the works of the OIV Sub-commission of methods of analysis but constitutes a piece of work of the Task Force.

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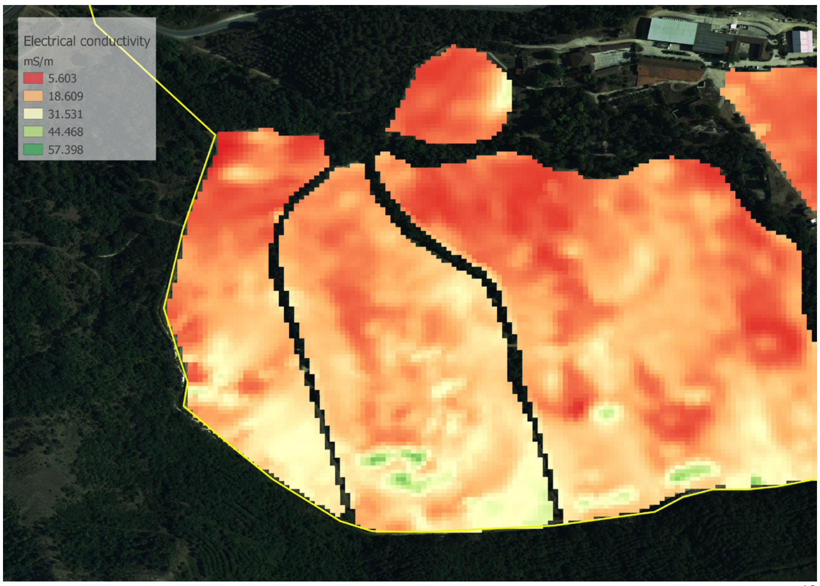

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Before questioning the invited experts, the rapporteur, Monika Christmann underlined the big issue related to numerous different practices influencing the isotopic ratio in wine. Some example are given in particular on the use of some physical treatments, notably, treatment for alcohol reduction which has a real impact on the composition of wine and the determination of isotopic ratio, which can looks like water addition.

One of the questions is to know whether the OIV oxygen 18 method is enough reliable to detect the addition of water related to the reference database and to detect a water addition of 5 -6 % of water. According to the answers, F Guyon indicates that compared to sugar addition it's more difficult to detect water addition.

The main tool to control the water in wine, is the reference to an isotopic databank ; the following step for a laboratory is to estimate the maximal level of water, after having discussed and exchanged with other concerned organisms.
The non-conformity could be declared when water level exceeds 10%. Otherwise, there is some uncertainty to overestimate the water addition.

It has been underlined another issue in particular when wine comes from another country or another region. The discrepancy of oxygen 18 does not always mean water addition, it's can be also other falsification, which makes data interpretation more complicated.

Regarding the databank, it appears that it is established with reference authentic wine without no treatment, or on wines having undergone few oenological practices.
The replies indicates that a small amount of water to activate the yeasts and also sulphites could be added. So there's already some water included in the value of the databank.

A question on the addition of water to grape juice prior to the fermentation has been asked and Is it easily or reliably detectable, in particular ?

It appears that if the constitution of the initial juice is known, it's very easily detectable. However, if you do not know the region, area, we do not know variability of origin of water, that complicates the data interpretation.

Another question concerns the link between the determination Oxygen 18 in water and the oxygen 18 in ethanol. It seems that it is a reliable procedure to escape reference database.

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EUROFINS representatives indicate that they cannot use the European databank, but its own databank, so, in order to avoid very extensive databank, they developed internal reference approach combining oxygen 18 in water and oxygen 18 in ethanol. They have published several papers on this approach [12] ; This approach is applied in EUROFINS laboratory.

The Interest of this approach is to be able to interpret without having a large collection of wines but it is not an improvement of water detection methods and the water introduced by adding oenological treatments is not detectable by these methods.

The EUROFINS representative explained that a step forward, in his opinion, would consist in carrying out experiments with various practices; the most relevant would be the influence of reducing alcohol. It is important to think of technics involving partial distillation of ethanol because this could influence a lot mostly ethanol's value but also water level potentially.

According to the information provided by Alexander Kolesnov, it appears that in Russia are used different analytical methods of measurement of oxygen isotopes; for example hydrogen isotopes, as; they also use the measurement of proton content in order to measure the water in wine and in must [13] [14].

Among alternative methods, they use the new EIM – Module – IRMS (Ethanol Isotope Measurement – Module – Isotope Ratio Mass Spectrometry) instrumental technique proposed by Serbia [15] , and which is considered as an improved method for the detection of water addition.
However, Mr. Kolesnov underlined that they need to develop databank to interpret the results

Russia does not have yet the databank on isotopes. There is only a draft of national standards for identification of some components in vine products, water in wine and must. These standards are originated from scientific publications around the world which is not in force yet.
A question is raised on the measurement ratio of oxygen isotope in alcohol but in which alcohol ? are you using highly purified alcohol or not for this measurement ?

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12 Jamin E., Guérin R., Rétif M., Lees M. & Martin G.J. (2003). – Improved Detection of Added Water in Orange Juice by Simultaneous Determination of the Oxygen-18/ Oxygen-16 Isotope Ratios of Water and Ethanol Derived from Sugars. J. Agric. Food Chem., 51 (18), 5202–5206. doi:10.1021/jf030167m

13 New approach for wine authenticity screening by a cumulative 1H and 2H qNMR V. Ivlev, V. Vasil'ev, G. Kalabin, A. Kolesnov, M. Zenina, N. Anikina, N. Gnilomedova, V. Gerzhikova, E. Egorov, T. Guguchkina, M. Antonenko BIO Web Conf. 15 02022 (2019) DOI: 10.1051/bioconf/20191502022

14 Scientific study of 13C/12C carbon and 18O/16O oxygen stable isotopes biological fractionation in grapes in the Black Sea, Don Basin and the Western Caspian regions Alexander Kolesnov, Margarita Zenina, Sergey Tsimbalaev, Dmitrii Davlyatshin, Mikhail Ganin, Nadezhda Anikina, Natalya Agafonova, Evgeniy Egorov, Tatyana Guguchkina, Anton Prakh, Mikhail Antonenko BIO Web Conf. 9 02020 (2017) DOI: 10.1051/ bioconf/20170902020

15 Quantitative analysis and detection of chaptalization and watering down of wine using isotope ratio mass spectrometry I. Smajlovic, D. Wang, M. Túri, Z. Qiding, I. Futó, M. Veres, K.L. Sparks, J.P. Sparks, D. Jakšić, A. Vuković, M. Vujadinović BIO Web Conf. 15 02007 (2019); DOI: 10.1051/bioconf/20191502007

EUROFINS representative indicate that the method they are using is based on distilling ethanol and trapping the water with molecular sieve. There is a correlation between the oxygen 18 content of the ethanol and water.

It appears that the issue of sensitivity of water detection is an issue of databases and limitations by nature. So whatever the technics used for measuring isotope ratio the limitations are mostly due to the natural variability of the isotopes in the grape without considering oenological practices. Nowadays several methods can detect a large water addition but not very small ones.

Several members shared the opinions about the fact that the limitation it's not due to measurement technology ; so there's not a real need to replace the existing Oxygen 18 method by introducing whatever becomes available. The real need is to have the reference database available, which appropriately captures some natural variability in the water that has been used to grow grape, and to make the wine by legal means. But just create the database will not probably solve the problem as with climate change, and development of different irrigation practices, new grape varieties, introduce permanently new variables and new potential causes of uncertainty in isotope measurement. So just create a database will not probably solve this problem.

Speaking of the problem of the sensitivity of water detection methods, F Guyon and The President of the OIV pointed out the impossibility to detect organic water in wine by the current detection methods.

It appears impossible to distinguish the origin of water by the detection methods used in France; whether water come from addition or from the mixture of different vintages or the substitution of vintage ?

The President of the OIV underlined the necessity to develop new more reliable methods.

To the question about what additional methods of analysis could be used in the future for better control, EUROFINS representatives indicate that NMR profiling could be tested; there is some existing models which based on level of signal expected from undiluted matrix and some models which detect a potential dilution; It is not sure this will bring added value because it is not considered as a more sensitive isotopic method.

The limitation is the same, the database ; however, we have to get references which are very closed to the commercial product of the unknown product we are testing. The method becomes sensitive when we take reference samples at the time the grape has been processed and compared that with the time when the wine is on the market.

To the question about what could be done by the OIV ?, It is suggested to start by studying dealcoholized wines' impact on water isotope profile of various technological measures. Dealcoholized wines' market is growing significantly, so, this is the area the OIV should focus on in a targeted way.

It is important to have experience on the impact of isotopic ratio of different practices like using bipolar membranes Spinning cone columns or electrodialysis.
It is suggested to take commercial conventional wines and dealcoholized wines and to use the test of commercial market wines to see if there is any abnormalities around commercial wines with the reduced alcohol concentration, to see may be dealcoholizing practices do result unsecured isotopic values. It could be a very good start to make comparison of conventional wines with alcohol reduced wines to see if there's any abnormalities when it comes to oxygen 18 isotope value.

EUROFINS representative also pointed out the lack of information on these new technologies used for alcohol reduction ; It would interesting to organise some industrial trials by producing dealcoholized wine in an experimental design and analyse samples at different stages comparing the isotopes and NMR profiling methods.
The rapporteur suggested to speak with producers of dealcoholized wines to give some samples before treatment and after treatment and to allow some analytical tests of their wines at different stages of winemaking process. They should also be interested in the getting the knowledge of the real values of their products.

EUROFINS representative indicated that the test of commercial wines is a very good idea and it will be very useful the use of NMR profiling because we have to take into account the impact of real life on the samples ; so in any way we need finished wines ; ideal situation will be to have finished wine with transparent information on the technological process. So, it could be proceeded through independent institutes having facilities to make wine in an industrial way but under controlled conditions : and on the other hand, we should go beyond the limits to see if we are able to monitor that. Then as a second database, we can also use commercial wine with a declared way of processing (used additives included, type of used technologies, etc.)

The rapporteur underlined once again that the water in wine is a real issue because there's more and more countries asking for some sort of certificates, stating that there's no water addition in the product. That's why the OIV started to deal with this issue.

The real concern is the total lack of knowledge about many different legal or illegal technologies the wines are going through during winemaking process and their impacts on isotopic ratio in wine.
For example it's must be determined how much water gets into the wine because of some physical treatments, liquid materials to be legally used in winemaking and the combination of all of that.
This lack of knowledge can cause a serious problem to the OIV as the current database might deliver wrong answers.

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5 • CONCLUSIONS AND RECOMENDATIONS

The lack of knowledge and transparency on the quantities of water added for oenological questions actually poses a problem of legal insecurity for operators in international transactions. So this is a real trade problem.

It is important that all decisions are based on science and not let governments play with this unknown situation.

This report identifies three main area of investigation for the OIV in relation with the issue of water in wine making process.

1. Methods of analysis

It appears that the issue of sensitivity of water detection is an issue of databases and limitations by nature. So whatever the technics used for measuring isotope ratio the limitations are mostly due to the natural variability of the isotopes in the grape without considering oenological practices.

The real need is to have the reference database available, which appropriately captures some natural variability in the water that has been used to grow grape, and to make the wine by legal means. But just create the database will not probably solve the problem as with climate change, and development of different irrigation practices, new grape varieties, introduce permanently new variables and new potential causes of uncertainty in isotope measurement.

Therefore, it would be important for the OIV to evaluate by the “Sub-commission Methods of analysis” new analytical methods in order to fill the gaps or uncertainties that appear with current methods, in particular with regard to certain oenological practices.

- By detecting small addition of water in musts or in wines and not only large water addition.

- By taking into account certain oenological practices, including dealcoholisation technics.

2. Provision regarding water addition for specific technical

Addition of water is generally allowed for technological requirements and in particular to incorporate any oenological substances permitted for use as a food additive or a processing aid.

The OIV has not established clear provision regarding water addition for specific technical necessity in particular to incorporate any substance or food permitted for use as a food additive or a processing aid.

In addition, the different regulations do not precise a maximum percentage of water used for technological requirements

Therefore, regarding the use of water for technological needs, the OIV and especially the group of experts “Technology” and “Specification” should evaluate the possibility in its recommendations:

- To include a reference to the use of water for technological requirements; Today the OIV has no reference in the matter.
- To determine a maximum percentage of water addition for technological requirements

3. The impact of oenological practices

Considering that the current methods of analysis can not distinguish between water getting into the wine because of some liquid materials and the change in the isotopic ratio in wine due to new physical treatments or a combination of all legally used practices in winemaking the OIV needs to investigate this problem in more detail.

- Therefore, the OIV and the group of experts “Technology” and the “Sub-Commission of Analysis” should study existing and new OIV oenological practices and their impact regarding the use of water

In the context of increasingly applied physical techniques, it is necessary to determine and assess more carefully the impacts of oenological practices in term of composition because some treatments can affect the ratio of some components of wines and to avoid mis -interpretation.

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ANNEXES

Annex 1 **Study of Argentina on the requirements of technological water for the dissolution of oenological products and winemaking**

Annex 2 **Study of Geisenheim University on the requirements of technological water for the dissolution of oenological products**

Annex 3 **Study of Rivera y Virgilio University on the analysis of the total exogenous water that can be introduced into the wine with the different winemaking operations**

ANNEX 1: STUDY OF ARGENTINA ON THE REQUIREMENTS OF TECHNOLOGICAL WATER FOR THE DISSOLUTION OF OENOLOGICAL PRODUCTS AND WINEMAKING

Instituto Nacional de Vitivinicultura

www.inv.gov.ar | República Argentina

General Wine Act No. 14878 from the Argentine Republic and its regulations prohibit any addition of exogenous water in wines and musts. On the other hand, said Act in its Sections 19 and 21 empowers the National Institute of Vitiviniculture (INV) to authorize the use of oenological products, oenological practices and to set the limits for wine components.

Table 1: minimum and maximum quantities in grams per hectolitre of the Oenological Products recommended by the suppliers used for winemaking in Argentina

Product	International Enological Codex	Minimum dose of pure product (g/hl)	Maximum dose of pure product (g/hl)	Percentage of product dissolved in water	Dissolution in Water / Must / Wine
Potassium Anhydrous Sulfite	(Oeno 34/2000)	6	16	10	Water
Potassium Hydrogen Sulfite	OENO 38/2000	5	20	10	Water
Tartaric Acid	(Oeno 49/2000 modified by Oeno 4/2007)	100	250	0	Must or Wine
Citric Acid	(Oeno 23/2000)	20	60	0	Must or Wine
Lactic Acid	(OENO 29/2004 modified by Oeno 4/2007)	3	20	0	Must or Wine
Malic Acid	(OENO 30/2004)	50	250	0	Must or Wine
Ascorbic Acid	(Oeno 18/2000 modified by Oeno 4/2007)	5	20	0	Must
Enzymatic preparations	(OIV-Oeno 365-2009; OIV-Oeno 485-2012)	1	3	10	Grape
Oenological Tannins	OIV-OENO 554-2015	5	40	0	Must / Wine
Active dry yeasts	(OIV-Oeno 329-2009)	20	40	10	Water
Diammonium Hydrogen Phosphate	(Oeno 15/2000)	30	100	0	Must
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls	Inactivated Yeasts: Oeno 459/2013; Yeast Protein Extracts: Oeno 452/2012; Yeast Autolysates: Oeno 496/2013; Yeast Hulls: oeno 497/2013	15	50	10	Water
Lactic Acid Bacteria	(OIV-Oeno 328-2009, Oeno 494-2012)	1	1	10	Water

Product	International Enological Codex	Minimum dose of pure product (g/hl)	Maximum dose of pure product (g/hl)	Percentage of product dissolved in water	Dissolution in Water / Must / Wine
Bentonites	(Oeno 11/2003 modified Oeno 441-2011)	20	120	10	Water
Colloidal Silicon Dioxide	(Oeno 44/2000)	10	30	30	Water
Gelatine	(Oeno 13/2003)	3	20	10	Water
Potassium Caseinate	OENO 35/2000	10	100	10	Water
Egg (Albumin of)	(Oeno 32/2000)	5	15	10	Water
Fish Glue	(Oeno 24/2000)	1	3	1	Water
Lysozime	(Oeno 15/2001 modified by Oeno 4/2007)	25	50	10	Water
Protein Plant Origin	(OENO 28/2004, 495-2013) OIV-OENO 557-2015 OIV-OENO 575-2016	3	30	10	Water
Yeast Mannoproteins	(Oeno 26/2004)	5	15	10	Water
Chitosan	(OIV-Oeno 368-2009)	3	50	10	Water
Copper Sulfate	(Oeno 25/2000)	0,05	0,25	2,5	Water
Polyvinylpolypyrrolidone	(Oeno 11/2002 modified by Oeno 4/2007	10	70	10	Water
Oenological Carbon	(Oeno 7/2007)	5	200	0	Wine
Metatartaric Acid	(Oeno 31/2000)	5	10	20	Water
Potassium Polyaspartate	OIV-OENO 572-2017	5	20	10	Water
Potassium Hydrogen Tartrate	(Oeno 39/2000)	20	40	10	Water
Potassium Sorbate	(Oeno 42/2000)	10	20	20	Water
Carboxymethylcellulose (cellulose gum)	(OIV-Oeno 366-2009)	5	10	5	Water
Gum Arabic	(Oeno 27/2000)	8	20	20	Water
Dimethyl Dicarbonate	(Oeno 25/2004 modified by Oeno 4/2007)	7	20	0	Wine

Table N°2 shows examples of alternatives for using oenological products that could be used in winemaking and the percentage of water required for dissolution

Product	% of technological water	Alternative N°1	% of technological water	Alternative N°2	% of technological water	Alternative N°3	% of technological water	Alternative N°4	% of technological water	Alternative N°5	% of technological water	Alternative N°6	% of technological water
Potassium Anhydrous Sulfite						5	0.05	5	0.05			4	0.04
Potassium Hydrogen Sulfite	10			15	0.15	15	0.15	10	0.1	20	0.2	20	0.2
Tartaric Acid	0			250								30	
Citric Acid	0			50								15	
Lactic Acid	0												
Malic Acid	0												
Ascorbic Acid	0												
Enzymatic preparations	10			2	0.02								
Oenological Tannins	0	10		5									
Active dry yeasts	10	30	0.3	20	0.2	20	0.2	20	0.2	20	0.2	20	0.2
Diammonium Hydrogen Phosphate	0	30		10		20		10					
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls	10			30	0.3							30	0.3
Lactic Acid Bacteria	10	1	0.01	1	0.01	1	0.01						
Bentonites	10	30	0.3	50	0.5	50	0.5	50	0.5	150	0.15	50	0.5
Colloidal Silicon Dioxide	30							50	0.17				
Gelatine	10	30	0.3									20	0.2
Potassium Caseinate	10			30	0.3							10	0.1
Egg (Albumin of)	10					30	0.3						
Fish Glue	1					2	0.02	2	0.02				
Lysozyme	10	50	0.5			20	0.2					30	0.3
Protein Plant Origin	10												
Yeast Mannoproteins	10											5	0.05
Chitosan	10												
Copper Sulfate	2.5												
Polyvinylpolypyrrolidone	10	20	0.2	20	0.2			10	0.1				

Product	% of technological water	Alternative N°1	% of technological water	Alternative N°2	% of technological water	Alternative N°3	% of technological water	Alternative N°4	% of technological water	Alternative N°5	% of technological water	Alternative N°6	% of technological water
Oenological Carbon	0	30		10				40					
Metatartaric Acid	20	20	0.1	10	0.05	20	0.1					10	0.05
Potassium Polyaspartate	10												
Potassium Hydrogen Tartrate	10												
Potassium Sorbate	20	25	0.125	25	0.125	25	0.25	20	0.2	25	0.25	20	0.2
Carboxymethylcellulose	5	10	0.2	10	0.2			10	0.1				
Gum Arabic	20	30	0.15	10	0.05	20	0.2	20	0.2	30	0.15	30	0.3
Dimethyl Dicarbonate	0												
TOTAL PERCENTAGE OF ADDED WATER			2.19		2.11		1.98		1.64		0.95		2.44

The oenological products mentioned in the green rows do not require water for their dissolution.

Tables No. 3 to 8 It is shown the maximum concentrations of wine Oenological Products used in different wineries in Argentina.

TABLE 3: PERCENTAGES OF TECHNOLOGICAL WATER OBTAINED FROM THE DIFFERENT CATEGORIES OF WINES

Product	% of product dissolved in water	Generic White Wine	% of technological water	Varietal White Wine	% of technological water	Sparkling Wine	% of technological water	Generic Red Wine	% of technological water	Varietal Red Wine	% of technological water
Potassium Anhydrous Sulfite	10			5	0.05						
Potassium Hydrogen Sulfite	10	15	0.15	10	0.1						
Tartaric Acid	0	100		100				100		100	
Citric Acid	0										
Lactic Acid	0										
Malic Acid	0										
Ascorbic Acid	0			10							
Enzymatic preparations	10	2	0.02	2	0.02			2	0.02	2	0.02
Oenological Tannins	0										
Active dry yeasts	10	20	0.2	20	0.2			20	0.2	20	0.2
Diammonium Hydrogen Phosphate	0	40									
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls	10							10	0.1		
Lactic Acid Bacteria	10										
Bentonites	10	50	0.5	50	0.5			80	0.8	50	0.5
Colloidal Silicon Dioxide	30										
Gelatine	10										
Potassium Caseinate	10									40	0.4
Egg (Albumin of)	10							10	0.1	20	0.2
Fish Glue	1										
Lysozime	10	10	0.1								
Protein Plant Origin	10										
Yeast Mannoproteins	10										
Chitosan	10										
Copper Sulfate	2.5										
Polyvinylpolypyrrolidone	10	60	0.6								
Oenological Carbon	0	100									
Metatartaric Acid	20	15	0.075	15	0.075			15	0.075	15	0.075
Potassium Polyaspartate	10										
Potassium Hydrogen Tartrate	10							20	0.2		
Potassium Sorbate	20										
Carboxymethylcellulose (cellulose gum)	5	10	0.2								
Gum Arabic	20										
Dimethyl Dicarbonate	0										
TOTAL PERCENTAGE OF ADDED WATER			**1.85**		**0.95**				**1.50**		**1.40**

The oenological products mentioned in the green rows do not require water for their dissolution

TABLE 4: PERCENTAGES OF TECHNOLOGICAL WATER OBTAINED FROM THE DIFFERENT CATEGORIES OF WINES

Product	Generic White Wine	% of technological water	Varietal White Wine	% of technological water	Sparkling Wine	% of technological water	Generic Red Wine	% of technological water	Varietal Red Wine	% of technological water
Potassium Anhydrous Sulfite			5	0.05	5	0.05			5	0.05
Potassium Hydrogen Sulfite	20	0.2	15	0.15	15	0.15	10	0.1	5	0.05
Tartaric Acid	300		300		300		300		300	
Citric Acid	30		30		30		30		30	
Lactic Acid										
Malic Acid										
Ascorbic Acid										
Enzymatic preparations	3	0.03	3	0.03			2	0.02	3	0.03
Oenological Tannins							70		70	
Active dry yeasts	20	0.2	20	0.2	20	0.2	20	0.2	20	0.2
Diammonium Hydrogen Phosphate	20		20		20		20		20	
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls	50	0.5	50	0.5	50	0.5	50	0.5	50	0.5
Lactic Acid Bacteria									20	0.2
Bentonites	80	0.8	50	0.5	30	0.3				
Colloidal Silicon Dioxide	30	0.1	10	0.03	30	0.1	30	0.1	30	0.1
Gelatine	10	0.1	10	0.1	10	0.1	10	0.1	10	0.1
Potassium Caseinate										
Egg (Albumin of)			5	0.05	10	0.1	6	0.06	6	0.06
Fish Glue			5	0.5						
Lysozime										
Protein Plant Origin										
Yeast Mannoproteins									10	0.1
Chitosan										
Copper Sulfate										
Polyvinylpolypyrrolidone	5	0.05	5	0.05	5	0.05				
Oenological Carbon	40									
Metatartaric Acid	10	0.05	10	0.05	10	0.05	10	0.05	10	0.05
Potassium Polyaspartate										
Potassium Hydrogen Tartrate										
Potassium Sorbate	20	0.1					20	0.1		
Carboxymethylcellulose (cellulose gum)	10	0.2	10	0.2	10	0.2	10	0.2	10	0.2
Gum Arabic							25	0.125	25	0.125
Dimethyl Dicarbonate										
TOTAL PERCENTAGE OF ADDED WATER		**2.33**		**2.41**		**1.80**		**1.56**		**1.77**

TABLE 5: PERCENTAGES OF TECHNOLOGICAL WATER OBTAINED FROM THE DIFFERENT CATEGORIES OF WINES

Product	Generic White Wine	% of technological water	Varietal White Wine	% of technological water	Sparkling Wine	% of technological water	Generic Red Wine	% of technological water	Varietal Red Wine	% of technological water
Potassium Anhydrous Sulfite	2	0.02	5	0.05	5	0.05			2	0.02
Potassium Hydrogen Sulfite										
Tartaric Acid	200		200		300		100		100	
Citric Acid										
Lactic Acid	50		50		50		50			
Malic Acid	100		100				50		50	
Ascorbic Acid										
Enzymatic preparations										
Oenological Tannins							20		20	
Active dry yeasts	20	0.2	20	0.2	20	0.2	20	0.2	20	0.2
Diammonium Hydrogen Phosphate										
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls	40	0.4	40	0.4	40	0.4	20	0.2	20	0.2
Lactic Acid Bacteria										
Bentonites	100	1	100	1	50	0.5	100	1	30	0.3
Colloidal Silicon Dioxide										
Gelatine										
Potassium Caseinate									10	0.1
Egg (Albumin of)					10	0.1				
Fish Glue										
Lysozime										
Protein Plant Origin										
Yeast Mannoproteins	10	0.1					15	0.15	15	0.15
Chitosan										
Copper Sulfate	0.2	0.008								
Polyvinylpolypyrrolidone	30	0.3	30	0.3	30	0.3				
Oenological Carbon	30				30					
Metatartaric Acid										
Potassium Polyaspartate							80	0.8	80	0.8
Potassium Hydrogen Tartrate	20	0.2	20	0.2	40	0.4				
Potassium Sorbate										
Carboxymethylcellulose (cellulose gum)	10	0.2	10	0.2	10	0.2				
Gum Arabic							15	0.075	15	0.075
Dimethyl Dicarbonate	20						20			
TOTAL PERCENTAGE OF ADDED WATER		**2.43**		**2.35**		**2.15**		**2.43**		**1.85**

TABLE 6: PERCENTAGES OF TECHNOLOGICAL WATER OBTAINED FROM THE DIFFERENT CATEGORIES OF WINES

Product	Generic White Wine	% of technological water	Varietal White Wine	% of technological water	Sparkling Wine	% of technological water	Generic Red Wine	% of technological water	Varietal Red Wine	% of technological water
Potassium Anhydrous Sulfite	2	0.02	5	0.05	5	0.05			2	0.02
Potassium Hydrogen Sulfite										
Tartaric Acid	200		200		300		100		100	
Citric Acid										
Lactic Acid	50		50		50		50			
Malic Acid	100		100				50		50	
Ascorbic Acid										
Enzymatic preparations										
Oenological Tannins							20		20	
Active dry yeasts	20	0.2	20	0.2	20	0.2	20	0.2	20	0.2
Diammonium Hydrogen Phosphate										
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls	40	0.4	40	0.4	40	0.4	20	0.2	20	0.2
Lactic Acid Bacteria										
Bentonites	100	1	100	1	50	0.5	100	1	30	0.3
Colloidal Silicon Dioxide										
Gelatine										
Potassium Caseinate									10	0.1
Egg (Albumin of)					10	0.1				
Fish Glue										
Lysozime										
Protein Plant Origin										
Yeast Mannoproteins	10	0.1					15	0.15	15	0.15
Chitosan										
Copper Sulfate	0.2	0.008								
Polyvinylpolypyrrolidone	30	0.3	30	0.3	30	0.3				
Oenological Carbon	30				30					
Metatartaric Acid										
Potassium Polyaspartate							80	0.8	80	0.8
Potassium Hydrogen Tartrate	20	0.2	20	0.2	40	0.4				
Potassium Sorbate										
Carboxymethylcellulose (cellulose gum)	10	0.2	10	0.2	10	0.2				
Gum Arabic							15	0.075	15	0.075
Dimethyl Dicarbonate	20						20			
TOTAL PERCENTAGE OF ADDED WATER		**2.43**		**2.35**		**2.15**		**2.43**		**1.85**

TABLE 7: PERCENTAGES OF TECHNOLOGICAL WATER OBTAINED FROM THE DIFFERENT CATEGORIES OF WINES

Product	Generic White Wine	% of technological water	Varietal White Wine	% of technological water	Sparkling Wine	% of technological water	Generic Red Wine	% of technological water	Varietal Red Wine	% of technological water
Potassium Anhydrous Sulfite	2	0.02	5	0.05	5	0.05	2	0.02	5	0.05
Potassium Hydrogen Sulfite										
Tartaric Acid										
Citric Acid										
Lactic Acid										
Malic Acid										
Ascorbic Acid										
Enzymatic preparations	4	0.04	4	0.04	4	0.04	3	0.03	3	0.03
Oenological Tannins							5		5	
Active dry yeasts	15	0.15	15	0.15	15	0.15	15	0.15	15	0.15
Diammonium Hydrogen Phosphate	15		15		15		10		10	
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls	30	0.3	45	0.45	30	0.3	35	0.35	35	0.35
Lactic Acid Bacteria										
Bentonites	45	0.45	45	0.45	25	0.25				
Colloidal Silicon Dioxide										
Gelatine	12	0.12	12	0.12	12	0.12	15	0.15	15	0.15
Potassium Caseinate	15	0.15	15	0.15			15	0.15	15	0.15
Egg (Albumin of)										
Fish Glue										
Lysozime										
Protein Plant Origin	10	0.1	10	0.1	10	0.1	15	0.15	15	0.15
Yeast Mannoproteins										
Chitosan							12	0.12	12	0.12
Copper Sulfate										
Polyvinylpolypyrrolidone	15	0.15	15	0.15	10	0.1				
Oenological Carbon										
Metatartaric Acid										
Potassium Polyaspartate										
Potassium Hydrogen Tartrate	50	0.5	50	0.5	50	0.5				
Potassium Sorbate										
Carboxymethylcellulose (cellulose gum)	10	0.2	10	0.2	10	0.2				
Gum Arabic							15	0.075	14	0.07
Dimethyl Dicarbonate			10				12		12	
TOTAL PERCENTAGE OF ADDED WATER		**2.18**		**2.36**		**1.81**		**1.20**		**1.22**

TABLE 8: PERCENTAGES OF TECHNOLOGICAL WATER OBTAINED FROM THE DIFFERENT CATEGORIES OF WINES

Product	Generic White Wine	% of technological water	Varietal White Wine	% of technological water	Sparkling Wine	% of technological water	Generic Red Wine	% of technological water	Varietal Red Wine	% of technological water
Potassium Anhydrous Sulfite										
Potassium Hydrogen Sulfite	15	0.15	18	0.18			10	0.1	10	0.1
Tartaric Acid			300						200	
Citric Acid	60		60				50			
Lactic Acid	100		150				200		200	
Malic Acid			150							
Ascorbic Acid			5							
Enzymatic preparations	1	0.01	1	0.01					3	0.03
Oenological Tannins			5						10	
Active dry yeasts			30	0.3			20	0.2	10	0.1
Diammonium Hydrogen Phosphate	40		40				40		40	
Inactivated Yeasts; Yeast Protein Extracts; Yeast Autolysates; Yeast Hulls			50	0.5					20	0.2
Lactic Acid Bacteria									40	0.4
Bentonites	150	1.5	100	1			60	0.6		
Colloidal Silicon Dioxide										
Gelatine										
Potassium Caseinate			6	0.06						
Egg (Albumin of)									6	0.06
Fish Glue										
Lysozime										
Protein Plant Origin										
Yeast Mannoproteins			4	0.04					4	0.04
Chitosan										
Copper Sulfate										
Polyvinylpolypyrrolidone			6	0.06						
Oenological Carbon	60		10							
Metatartaric Acid	20	0.1					20	0.1		
Potassium Polyaspartate										
Potassium Hydrogen Tartrate			4	0.04						
Potassium Sorbate	20	0.1					20	0.1		
Carboxymethylcellulose (cellulose gum)			10	0.2			10	0.2	10	0.2
Gum Arabic									20	0.1
Dimethyl Dicarbonate										
TOTAL PERCENTAGE OF ADDED WATER		**1.86**		**2.39**				**1.30**		**1.23**

The highest percentage of water needed to dissolve oenological products in this study considering the different winemaking practices was 2,4%

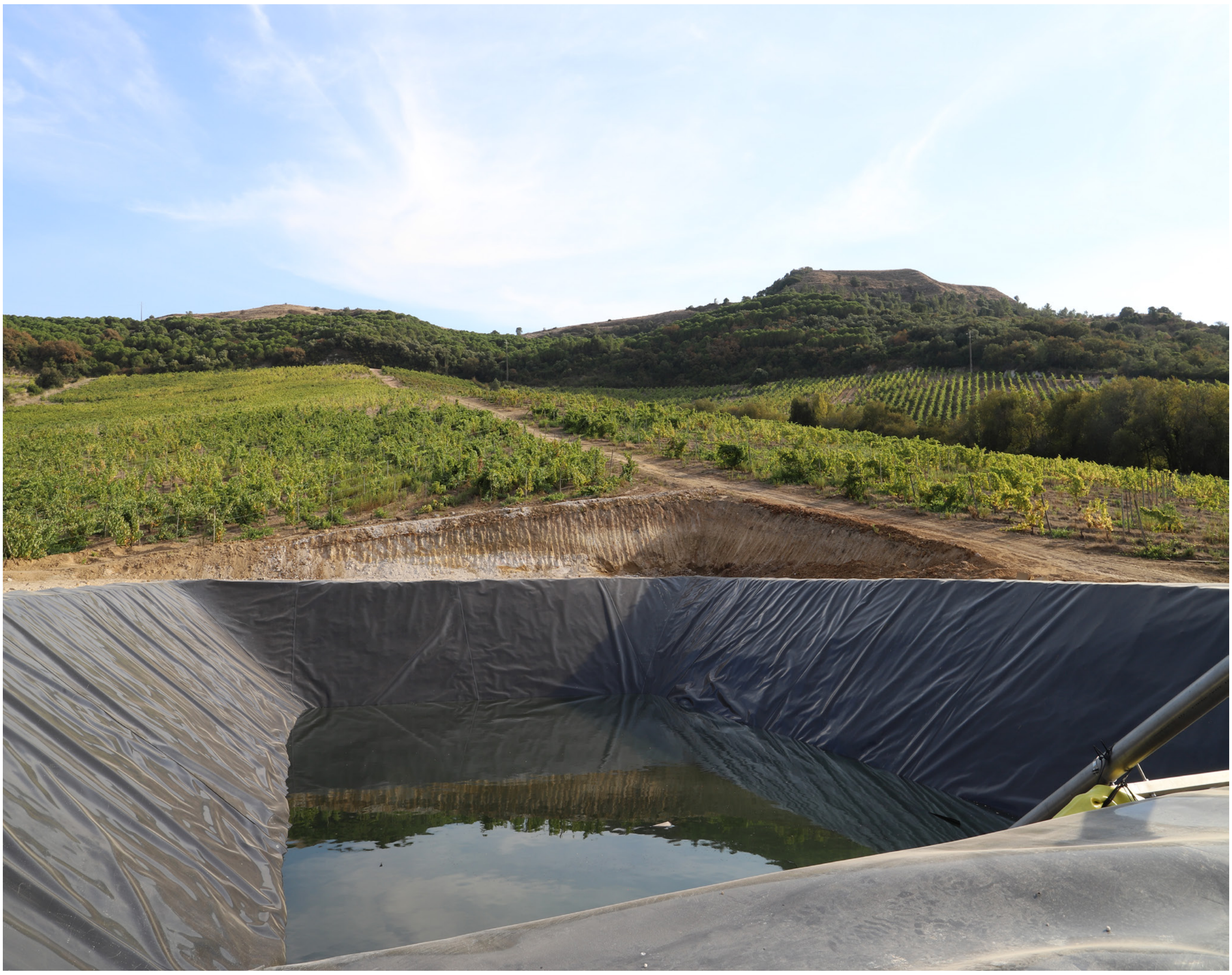
It was considered appropriate to include a tolerance percentage that takes into account the other Oenological Practices that might incorporate small amounts of water as part of the technological processes such as: emptying of hoses, pumps, pre-layering formation in the filtration process, traces of water that remain during washing of winepresses, concrete containers, stainless steel tanks, machinery and other practices carried out in the winery.

The tolerence percentage for other oenological practices was estimated at 0,4%.

In relation with the previous statements, the RESOL-2019-15- APN-INV-MAGYP established a maximum limit of 2.8% of Technological Water, coming from the dissolution of Oenological Products and other Oenological Practices.
This value was validated at the Technical Advisory Comettee of
INV, composed by Wineries Associations, Grapegrowers Organizations and Winemakers Associations.

The water used for these purposes is calledTechnological Water

This study has been carried out for local wines in Argentina and does not have any implications on imported wines.



TECHNICAL SHEETS

OENOLOGICAL PRODUCTS	PROVIDER	ORIGIN	LINKS OF TECHNICAL SHEETS
ACIDO ASCORBICO	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/antioxidantes/es/ACIDO_ASCORBICO_es.pdf
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/%C3%81cido%20L-ascorbico%202_0%20es.pdf
ACIDO CITRICO	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/productos_enologicos/es/ACIDO_CITRICO_es.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp- content/uploads/FP/FT_ES_Citric_Acid_Laffort.pdf
	MARTIN VIALATTE ENOLOGIA	FRANCIA	http://www.cavatap.com/userfiles/file/altres/10_040%20SP%20OENOCITRIL.pdf?phpMyAdmin=5ecf1508a6eb371395f9b880b2e32705
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/%C3%81cido%20Citrico%202_0%20es.pdf
ACIDO LACTICO	AGROVIN	ESPANA	https://www.interempresas.net/FeriaVirtual/Catalogos_y_documentos/45198/ACIDO_LACTICO_es.pdf
	INSTITUTO ENOLOGICO DE CHAMPAGNE	FRANCIA	https://ioc.eu.com/wp- content/uploads/documents/ioc/ft/FT%20ACIDE%20LACTIQUE%20OENO%20(ES).pdf
ACIDO MALICO	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/productos_enologicos/es/ACIDO_MALICO_es.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp- content/uploads/FP/FT_ES_Malic_Acid_Laffort.pdf
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/%C3%81cido%20L-malico%202_0%20es.pdf
	VINQUALIS	ESPANA	http://www.vinqualis.com/files/productosweb/documentos/acidomalicoftvinqualis.pdf
ACIDO METARTARICO	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/estabilizantes/es/METAVIMON_es.pdf
	BIOCOR	ESPANA	http://www.biocor.es/wp- content/uploads/2017/04/Acido_Metatartrico.pdf
	DERVINSA	ARGENTINA	http://www.dervinsa.com.ar/fichas_tecnicas/DERVINSA_ACIDO_METATARTARICO.pdf
	MAG S.R.L.	ARGENTINA	http://magsrl.com.ar/imagenes/mag/quimica/acido_%20metat artarico.pdf
	OENOFRNACE	FRANCIA	https://www.az3oeno.com/wp-content/uploads/2015/02/FT_OF_AcideMetatartrique_ES5.pdf
	QUIMINSA	ARGENTINA	http://quiminsa.net/wp-content/uploads/2017/10/acido-metatararico.pdf
	VINICAS	CHILE	http://vinicas.cl/pdf/acido_metatartarico.pdf
	VINQUALIS	ESPANA	http://www.vinqualis.com/files/productosweb/documentos/acidometatartaricoftvinqualis.pdf
ACIDO TARTARICO	AEB ARGENTINA S.A.	ARGENTINA	https://www.aeb- group.com/media/catalogs/ar/enologia/productos/tratamientos%20especificos/acidificantes/mix%20acid%20tl/mix_acid_tl_tds_es_0180316_oeno_argentina.pdf
	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/productos_enologicos/es/ACIDO_TARTARICO_es.pdf
	DERVINSA	ARGENTINA	http://www.dervinsa.com.ar/acido_tartarico.php
	ENARTIS	ITALIA	https://www.enartis.com/datasheets/TECHNICAL-DATA-SHEET/IT/TDS-IT-AcidoTartarico.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp- content/uploads/FDS/FDS_ES_Tartaric_Acid_Laffort.pdf
	LAMOTHE-ABIET	FRANCIA	https://www.lamothe-abiet.com/images/stories/telechargement/Fiches- techniques/FT-Espagnol/FT_ES_ACIDE_TARTRIQUE.pdf
	QUIMINSA	ARGENTINA	http://quiminsa.net/wp-content/uploads/2017/10/Acido-Tartarico1-1.pdf
	SAS SOFRALAB	FRANCIA	https://www.oenofrance.com/DOCS/FT_SOF_ACIDETARTRIQUE_ES.pdf
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/%C3%81cido%20Tartarico%202_0%20es.pdf
BACTERIAS	LAMOTHE ABIET	FRANCIA	https://www.lamothe- abiet.com/images/stories/telechargement/Fiches-techniques/FT-

LACTICAS			Espagnol/FT_ES_OENO_2.pdf
BENTONITA	AEB	ARGENTINA	https://www.aeb-group.com/Media/catalogs/es/enologia/productos/clarificantes/INORG%C3%81NICOS/BENTOGRAN%20GEL/BENTOGRAN_GEL_TDS_ES_0140317_OENO_Spain.pdf
	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/clarificantes/es/MAXIBENT_G_es.pdf
	DOLMAR	ESPANA	https://www.dolmarproductos.com/web/binary/saveas?model=ir.attachment&field=datas&filename_field=name&id=12045
	ENARTIS	ITALIA	https://www.enartis.com/datasheets/TECHNICAL-DATA-SHEET/IT/TDS-IT-BentolitSuper.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FP_ES_Microcol_Alpha.pdf
	SOFRALAB	FRANCIA	https://www.az3oeno.com/wp-content/uploads/2015/02/FT_OF_BentoniteS_ES3.pdf
BISULFITO DE POTASIO EN SOLUCION	SOFRALAB	FRANCIA	https://www.az3oeno.com/wp- content/uploads/2015/02/FT_OF-BISULFITO-DE-POTASSIUM- ES6.pdf
CARBON ACTIVADO	AEB ARGENTINA S.A.	ARGENTINA	https://www.aeb-group.com/Media/catalogs/ar/enologia/productos/clarificantes/CARBONES%20ACTIVOS/DECORAN%20PLUS/DECORAN_PLUS_TDS_ES_0100316_OENO_Argentina.pdf
	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/decolorantes/es/CROER_F10X_es.pdf
	CORIMPEX	ITALIA	http://www.corimpex.com/english/products/clarifying-agents/Carbons.html
	ENARTIS	ITALIA	https://www.enartis.com/datasheets/TECHNICAL-DATA-SHEET/ES/TDS-ES-BlackPf.pdf
	L'ABOTT FRANCE	ARGENTINA	http://oenolab.com.ar/productos/carbolyte.pdf
	LAMOTHE-ABIET	FRANCIA	https://www.lamothe- abiet.com/images/stories/telechargement/Fiches-techniques/FT-Espagnol/FT_ES_CHARBON_SUPER_ULTOSE_TS.pdf
	SAS SOFRALAB (OENOFRANCE)	FRANCIA	https://www.oenofrance.com/DOCS/FT_OF_CHARBONSUPERD_FR.pdf
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/Smartvin%20Carb%202_0%20es.pdf
CARBOXIMETIL CELULOSA (CMC)	AEB - ESPANA	ESPANA	http://www.acenologia.com/aeb/pdf/NEWCEL.pdf
	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/estabilizantes/es/ESTABICEL_es.pdf
	L'ABOTT FRANCE	ARGENTINA	http://oenolab.com.ar/productos/souper-hidro-cmc.pdf
	QUIMINSA	ARGENTINA	http://quiminsa.net/wp-content/uploads/2017/10/CMC- Polvo1.pdf
CASEINATO DE POTASIO	CORIMPEX	ITALIA	http://www.corimpex.it/prodotti/Chiarificanti/Caseinato-di-Potassio.html
	ENARTIS	ITALIA	https://www.enartis.com/datasheets/TECHNICAL-DATA-SHEET/ES/TDS-ES-Protoclar.pdf
	INSTITUT OENOLOGIQUE DE CHAMPAGNE	FRANCIA	https://ioc.eu.com/wp-content/uploads/documents/ioc/ft/FT%20CASEINATE%20DE%20POTASSIUM%20(EN).pdf
	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FP_ES_Casei_Plus.pdf
	LAMOTHE-ABIET (VINICAS)	FRANCIA	https://www.lamothe- abiet.com/images/stories/telechargement/Fiches-techniques/FT- Espagnol/FT_ES_CASEIMIX.pdf
	QUIMINSA	ARGENTINA	http://quiminsa.net/wp-content/uploads/2017/10/Casevin-K- Caseinato-de-Potasio1.pdf
CREMOR TARTARO	DERVINSA	ARGENTINA	http://www.dervinsa.com.ar/fichas_tecnicas/DERVINSA_CREMOR_TARTARO.pdf
	ESSEDIELLE	ITALIA	http://www.essedielleenologia.com/wp-content/uploads/2019/03/CREMORE-DI-TARTARO-2019.pdf
DIMETIL DICARBONATO (DMDC)	LANXESS	ALEMANIA	http://www.vinicas.cl/pdf/Velcorin_Wine_span.pdf
	AEB	ARGENTINA	https://www.aeb- group.com/Media/catalogs/ar/enologia/productos/enzimas/CLARIFICACI%C3%93N/ENDOZYM%20ECLAIR%20LIQUID/ENDOZYM_ECLAIR_LIQUID_TDS_ES_1010217_OENO_Arg

ENZIMAS DE CLARIFICACION			entina.pdf
	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/enzimas/es/Enozym_GLUCAN_es.pdf
	DOLMAR	ESPANA	http://test.tuteuralimentos.com.ar/archivos/productos/cl arificacionfce.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FP_ES_Lafase_Clarification.pdf
	LALLEMAND - ARGENTINA	ARGENTINA	https://catalogapp.lallemandwine.com/uploads/enzyme/docs/239c372188be21e6da21186a1dccbe0de720352e.pdf
	LARROQUE OENOLOGIA	ESPANA	http://www.velomaquinaria.es/ft_enoquimica/flotacion/EXTRAZIMA_FLOTACION.pdf
	SOFRALAB	FRANCIA	https://www.az3oeno.com/wp-content/uploads/2015/02/FT_OF_ENZYM- HIGHZYM_ES2.pdf
ENZIMAS DE MACERACION	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/enzimas/es/E novin_CROM_es.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp- content/uploads/FP/FP_ES_Lafase_XL_Extraction.pdf
	LALLEMAND	FRANCIA	https://catalogapp.lallemandwine.com/uploads/enzyme/docs/3aed5e0d4fbf85fdf70c00a934f48a7722815021.pdf
	LARROQUE OENOLOGIE	ESPANA	http://www.velomaquinaria.es/ft_enoquimica/enzimas/EXTRAZIMA_MACERACION.pdf
FOSFATO DIAMONICO	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FT_ES_Ammonium_Phosphate_Laffort.pdf
	LAMOTHE ABIET	FRANCIA	https://www.lamothe- abiet.com/images/stories/telechargement/Fiches-techniques/FT- Espagnol/FT_ES_PHOSPHATE_DIAMMONIQUE.pdf
	QUIMINSA	ARGENTINA	http://quiminsa.net/wp-content/uploads/2017/11/Fosfato-Diamonico1.pdf
	SOFRALAB	FRANCIA	https://www.oenofrance.com/DOCS/FT_SOF_PHOSPHATEDIAMMONIQUE_ES.pdf
GELATINA	AEB ARGENTINA S.A	ARGENTINA	https://www.aeb-group.com/Media/catalogs/AR/ENOLOGIA/PRODUCTOS/CLARIFICANTES/ORG%C3%81NICOS/GALASIL%20EXTRA%20FINE/GELASIL_EXTRA_FINE_TDS_ES_0100118_OENO_Argentina.pdf
	CORIMPEX	ITALIA	http://www.corimpex.it/prodotti/Chiarificanti/Gelatine.html
	DOLMAR	ESPANA	https://www.google.com/search?q=GELATINA+CLARBOOM+DOLMAR&rlz=1C1GCEA_enAR806AR807&oq=GELATINA+CLARBOOM+DOLMAR&aqs=chrome..69i57.592j0j8&sourceid=chrome&ie=UTF-8
	LAFFORT	FRANCIA	https://laffort.com/wp- content/uploads/FP/FP_ES_Gelatine_Extra_N1.pdf
	LAMOTHE-ABIET (VINICAS)	FRANCIA	http://www.vinicas.cl/pdf/gelatine_superieure.pdf
	SAS SOFRALAB (OENOFRANCE)	FRANCIA	https://www.oenofrance.com/DOCS/FT_OF_IS15_ES.pdf
GOMA ARABIGA	ENARTIS	ITALIA	https://www.enartis.com/datasheets/TECHNICAL-DATA-SHEET/ES/TDS-ES-Maxigum.pdf
	MARTIN VIALATTE OENOLOGIE	FRANCIA	http://esvin.co.nz/wp-content/uploads/2012/04/Filtrostabil- P1.pdf
	QUIMINSA	ARGENTINA	http://quiminsa.net/wp-content/uploads/2017/10/aguarabiga.pdf
	SOFRALAB	FRANCIA	https://www.oenofrance.com/DOCS/FT_OF_KORDOFAN_ES.pdf
ICTIOCOLA	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/clarificantes/es/ICTIOCLAR_es.pdf
	LAMOTHE-ABIET	FRANCIA	http://www.vinicas.cl/pdf/ictiocola_polvo.pdf
LEVADURAS	AEB	ARGENTINA	https://www.aeb- group.com/media/catalogs/ar/enologia/productos/levaduras/polivalentes/fermol%20associees/fermol_associees_tds_es_0140316_oeno_argentina.pdf
	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/levaduras/es/Viniferm_911_es.pdf
	ENARTIS	ITALIA	https://www.enartis.com/datasheets/TECHNICAL-DATA-SHEET/ES/TDS-ES-FermQ7.pdf
	LALLEMAND	FRANCIA	https://catalogapp.lallemandwine.com/uploads/yeasts/docs/77f75bbfdd63a179cb96c69435c091116339d665.pdf
	SOFRALAB	FRANCIA	http://www.rjoenology.com/ft/Levures/FT_OF_SELECTYSLA FRUITEE_FR.pdf
LISOZIMA	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/enzimas/es/Enovin_LYSO_es.pdf
	EVERINTEC	ITALIA	https://www.ever.it/cms/files/file/986508LISOZIMA_03_150508_ESP.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FP_ES_Lysozym.pdf
MANOPROTEINA	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/polisacaridos/e s/mannocup_es.pdf

NUTRIENTES NITROGENADOS (Levadura inactiva - Corteza o cascara de levadura - Autolizado de levadura – Clorhidrato de tiamina – Mezclas de los anteriores y fosfato diamónico)	AEB ARGENTINA S.A.	ARGENTINA	https://www.aeb- group.com/media/catalogs/ar/enologia/productos/bioregul adores%20y%20nutrientes/minerales/enovit%20perlage/enovit_perlage_tds_es_0110316_oeno_argentina.pdf
	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/nutrientes/es/ Actimax_PLUS_es.pdf
	LALLEMAND	FRANCIA	https://catalogapp.lallemandwine.com/uploads/nutrient/docs/2dbf5e5d5071c63b83de881f93cd967894efc6f9.pdf
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/V%20Starter%20TF%202_0%20es.pdf
OVOALBUMINA	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/clarificantes/es/OVOVIN_es.pdf
	BIOCOR	ESPANA	http://www.biocor.es/wp-content/uploads/2019/01/Albumina_huevo.pdf
	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FP_ES_Ovoclaryl.pdf
PVPP	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/clarificantes/es/DIVERGAN_es.pdf
	INSTITUT OENOLOGIQUE DE CHAMPAGNE	FRANCIA	https://ioc.eu.com/wp-content/uploads/documents/ioc/ft/FT%20PVPP%20(ES).pdf
	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FT_ES_Viniclar_P.pdf
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/PVPP%202_0%20es.pdf
QUITOSANO	AEB	ARGENTINA	https://www.aeb-group.com/Media/catalogs/es/enologia/productos/clarificantes/complejos/CHITOCEL/CHITOCEL_TDS_ES_0100118_OENO_Spain.pdf
	LALLEMAND	FRANCIA	https://catalogapp.lallemandwine.com/uploads/siy/docs/7071fa79e1dba9c3bdcefc7a6be8754b244c52fe.pdf
POLIASPARTATO DE POTASIO	ENARTIS	ITALIA	https://www.interempresas.net/FeriaVirtual/Catalogos_y_documentos/176089/171106112846.pdf
PROTEINA DE ORIGEN VEGETAL	LAFFORT	FRANCIA	https://laffort.com/wp-content/uploads/FP/FP_ES_Vegecoll.pdf
SOLUCION ACUOSA DE SO2 (MBK).	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/antioxidantes/es/METABISULFITO_POTASICO_es.pdf
	LAMOTHE-ABIET	FRANCIA	https://www.lamothe- abiet.com/images/stories/telechargement/Fiches-techniques/FT- Francais/FT_FR_PYROSULFITE_DE_POTASSIUM.pdf
	QUIMINSA	ARGENTINA	http://quiminsa.net/wp-content/uploads/2017/10/Metabisulfito- de-Potasio1-2.pdf
	SAS SOFRALAB	ESPANA	https://www.az3oeno.com/wp-content/uploads/2015/02/FT_OF_METABISULFITEDEPOTASSIUM_ES2.pdf
	VINICAS	CHILE	vinicas.cl/pdf/metabisulfito.pdf
	VINQUALIS	ESPANA	http://www.vinqualis.com/files/productosweb/documentos/metabi
SOLUCION DE SILICE COLOIDAL	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/clarificantes/es/SILISOL_es.pdf
	INSTITUT OENOLOGIQUE DE CHAMPAGNE	FRANCIA	https://ioc.eu.com/wp- content/uploads/documents/ioc/ft/FT%20GELOCOLLE%20(ES).pdf
	LAMOTHE-ABIET	FRANCIA	https://www.lamothe- abiet.com/images/stories/telechargement/Fiches-techniques/FT-Francais/FT_FR_GEL_DE_SILICE.pdf
SORBATO DE POTASIO	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/antioxidantes/es/SORBATO_POTASICO_es.pdf
	LAFFORT	FRANCIA	https://www.laboratoire-obst.com/media/blfa_files/ft- es-sorbisol-k_1.pdf
	VASON	ITALIA	https://www.vason.com/uploads/MediaGalleryArticoliDocumenti/Sorbato%20de%20potasio%202_0%20es1.pdf
SULFATO DE COBRE	LAFFORT	FRANCIA	https://laffort.com/wp- content/uploads/FP/FT_ES_Sulfiredox.pdf
TANINO	AEB	ARGENTINA	https://www.aeb- group.com/Media/catalogs/AR/ENOLOGIA/PRODUCTOS/TANINOS/EL%C3%81GICOS/EB%20XO/EB_XO_TDS_ES_1070317_OENO_Argentina.pdf

	AGROVIN	ESPANA	http://www.agrovin.com/agrv/pdf/enologia/taninos/es/ Vinitanon_es.pdf
	INSTITUT OENOLOGIQUE DE CHAMPAGNE	FRANCIA	https://www.enotecniaioc.com/wp-content/uploads/documents/enotecnia/ft/FT%20ESSENTIAL%20OAK%20SWEET%20(ES).pdf

ANNEX 2: STUDY OF GEISENHEIM UNIVERSITY ON THE REQUIREMENTS OF TECHNOLOGICAL WATER FOR THE DISSOLUTION OF OENOLOGICAL PRODUCTS

Produkt		Menge [g/hL]		Wasseranteil	Wasser in Produkt [L]				Bemerkungen
		min	max	[ ]	min [L]	max [L]	min [%]	max [%]	
Enzyme flüssig	f	0,5	12	1	0,000005	0,000120	0,001%	0,012%	in mL
DAP flüssig	f	200	500	0,75	0,001500	0,003750	0,150%	0,375%	in mL | max. gesetz. Wert 1 g/L 5 mL = 1 g
Hausenpaste flüssig	f	25	100	0,98	0,000245	0,000980	0,025%	0,098%	in mL | 2% Lösung | in Produkt lösen
Kieselsol 30% flüssig	f	20	250	0,7	0,000140	0,001750	0,014%	0,175%	in mL | 30%iger Wasseranteil
Speisegelatine flüssig	f	20	100	0,8	0,000160	0,000800	0,016%	0,080%	in mL
Pflanzenprotein flüssig	f	50	500	0,95	0,000475	0,004750	0,048%	0,475%	in mL | Wasseranteil abgeleitet aus festem Produkt
Gummiarabicum flüssig	f	10	300	0,8	0,000080	0,002400	0,008%	0,240%	in ml
Kaliumbisulfit 15%	f	1	30	0,85	0,000009	0,000255	0,001%	0,026%	in mlL15% Lösung
Ammoniumbisulfit	f	2,5	32	0,38	0,000010	0,000122	0,001%	0,012%	in mL | je Liter 620 g
CMC flüssig	f	75	200	0,95	0,000713	0,001900	0,071%	0,190%	in mL | 200 mL/hL= 10 g/hl zusätzlich in 10 fache Menge Wein lösen
Milchsäure 80%	f	63	376	0,2	0,000126	0,000752	0,013%	0,075%	in mL
Hefe	pg	20	40	10	0,002000	0,004000	0,200%	0,400%	
Enzyme	pg	3	5	10	0,000300	0,000500	0,030%	0,050%	in Wasser oder Most
Bentonit	pg	50	200	5	0,002500	0,010000	0,250%	1,000%	
Hefeautolysat	pg	30	40						Produkt suspendieren
Hefezellwandpräparat	pg	10	40	5	0,000500	0,002000	0,050%	0,200%	
Mischpräparat (Hefezellwand, DAP, B1	pg	20	50						je kg Hefe 1 kg Nährstoff zusammen mit Hefe
DAP	pg	50	100						Produkt suspendieren
Kohle	pg	50	100						direkt
Speisegelatine	pg	5	40	10	0,000500	0,004000	0,050%	0,400%	Lösen in 5 L kaltem und 5 L Warmenwasser
K-Kasein	pg	2	40	10	0,000200	0,004000	0,020%	0,400%	
Pflanzenprotein	pg	5	50	10	0,000500	0,005000	0,050%	0,500%	
PVPP	pg	15	80						Produkt suspendieren
BSA	pg	1	1	20	0,000200	0,000200	0,020%	0,020%	Wassergabe optinoal
BSA-Nährstoff	pg	20	20	1	0,000200	0,000200	0,020%	0,020%	Angabe in Handwarmem Wasser lösen
Tannin	pg	2	30	10	0,000200	0,003000	0,020%	0,300%	Angabe in kleiner Wassermenge bis 10 fache Menge
Mannoproteine	pg	5	30	10	0,000500	0,003000	0,050%	0,300%	
Kupfersulfat	pg	0,2	1	1	0,000002	0,000010	0,000%	0,001%	Angabe in kleiner Wassermenge zu lösen
Kupferzitrat	pg	5	50						Produkt suspendieren
Lysozym	pg	25	50						Produkt suspendieren
Metaweinsäure	pg	10	10						Produkt suspendieren
Sorbinsäure	pg	27	27						Direktzugabe
Apfelsäure	pg	10	40						Produkt suspendieren
Weinsäure	pg	10	40						Produkt suspendieren
Cellulose									
Kieselgur									
Perlit									
Summe Wasseranteil					0,011	0,053	1,11%	5,35%	
	f	flüssig							
	pg	pulver/granulat							

ANNEX 3: STUDY OF RIVERA Y VIRGILIO UNIVERSITY ON THE ANALYSIS OF THE TOTAL EXOGENOUS WATER THAT CAN BE INTRODUCED INTO THE WINE WITH THE DIFFERENT WINEMAKING OPERATIONS

The following table considers some of the most usual treatments of grape juice and wine and tries to consider the maximal content of exogenous water that can be introduced in the wine by means of the addition of the different products (additives and technological aids).

TABLE 1. Exogenous water introduced into the wine with the different winemaking operations

Operation		Product	Dose			Normal Solution or Suspension Richness	mL/L		% added water		Total Added Water (%)
			Minimal	Maximal			Minimal	Maximal	Minimal	Maximal	
				g/hL	ml/hL	%					
Prefermentative operations	Protection of the grape juice	SO_2 in the grape juice	0	10	-	5-10	0	1	0	0.100	0.750
		Ascorbic acid	0	25	-	10	0	2.5	0	0.250	
		Oenological tannins	0	40	-	10	0	4	0	0.400	
	Settling / Flotation	Pectolytic Enzymes	0	4	-	10	0	0.4	0	0.040	1.540
		Charcoal	0	100	-	50	0	2	0	0.200	
		Gelatine	0	20	-	5	0	4	0	0.400	
		Silica gel (30%)	0	-	100	25	0	4	0	0.400	
		Bentonite	0	50	-	10	0	5	0	0.500	
Alcoholic Fermentation		Yeast Non-Saccharomyces	0	40	-	10	0	4	0	0.400	1.600
		Yeast S. Cerevisiae	0	40	-	10	0	4	0	0.400	
		Activators	0	40	-	10	0	4	0	0.400	
		Inactivated Dry Yeast	0	40	-	10	0	4	0	0.400	
Malolactic fermentation		Lactic acid bacteria	No data available. Normally LAB are suspended in 2,5 l of water for 25 hl of wine						0	0.100	0.200
		Activators lactic bacteria	0	40	-	10	0	4	0	0.100	
Wine protection (oxidation; microorganisms)		SO_2 in the wine	0	10	-	5-10	0	1	0	0.100	1.250
		Potassium sorbate	0	20	-	20	0	4	0	0.400	
		Quitosan	0	10	-	5-10	0	1	0	0.100	
		Lysozyme	0	50	-	20	0	2.5	0	0.250	
		PVPP	0	100	-	25	0	4	0	0.400	
Stabilization		Gelatine/Ictiocole/Vegetal proteins/...	0	10	-	5	0	2	0	0.200	2.813
		Silica gel (30%)	0	-	100	25	0	4	0	0.400	
		Bentonite	0	200	-	10	0	20	0	2.000	
		CMC or KPA or Metatartàric acid	0	10	-	10	0	1	0	0.100	
		Arabic Gum	0	30	-	30	0	1	0	0.100	
		Copper sulfate or citrate	0	0.1		0.8	0	0.125	0	0.013	
TOTAL ADDED WATER (%)											8.153

This table do not consider the exogenous water that can be introduced into the wine by filtration, especially when perlites or kieselguhr are used since it is really very difficult to calculate because it depends a lot of the volume of the filtered wine, the size of the filter and the care applied during the operation. The amount of exogenous water that can be introduced by the cleaning operations of tanks and pipes, and the subsequent racking of wines is also not considered for similar reasons. Finally, another source of exogenous water may be when it rains and part of this rainfall water comes in with the grapes.

Evidently it is difficult to imagine that a wine can be elaborated using all these products but in theory it is legally possible and consequently it must be considered in the discussion of the OIV task force water in wine.

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Thanks! Follow us.

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