Anchor OENOLOGY

SUPPORTING YOU FROM

BASE WINE TO BUBBLES

2022 EDITION

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- www.sawis.co.za
- www.capclassique.co.za
- www.ioc.eu.com
- www.champagne.fr/en/homepage

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CHAPTER 01

SPARKLING WINE BASICS

DEFINITION

Sparkling wine (noun): a wine made effervescent by carbon dioxide gas, introduced artificially or produced naturally by a secondary fermentation.

The OIV defines sparkling wines as: Special wines characterised on uncorking by the production of more or less persistent effervescence resulting from the release of CO_2 of exclusively endogenous origin.

They also differentiate sparkling and carbonated wines, the latter being defined as: Special wines showing physical characteristics analogous to those of sparkling wines, but whose CO_2 is partially or totally of exogenous origin.

MAJOR PRODUCTION METHODS

In order to produce sparkling wine, two processes are required and it is the second (the one that produces the CO_2 and bubbles), that differentiates them. There are different production methods, each resulting in different levels of carbon dioxide.

- The two most popular sparkling wine production methods are the Traditional and Tank/Charmat Methods.
- Other production methods include the Transfer, Ancestral, Asti and Carbonation Methods.

TRADITIONAL METHOD

In the Traditional/Classic Method, the second fermentation takes place in the bottle the product will be sold in.

01 | HARVEST

- Whole bunches are hand-picked relatively early in the season in order to preserve their acidity.
- Mechanisation is avoided as it could cause split skins allowing for early oxidation, undesired colour and phenolic extraction.

02 | PRESS AND SETTLING

- The grapes undergo a gentle pressing, usually whole-bunch, to allow for gentle juice extraction.
- The press juice is divided into different fractions, usually two to three, called the cuvée and *tailles*.

03 | PRIMARY FERMENTATION AND (OPTIONAL) MALOLACTIC FERMENTATION

- The first fermentation creates the still, dry base wine of around 10 - 11% alcohol.
- MLF is optional and can result in softer, riper, generally creamier characteristics. Alternatively, MLF is avoided for the sake of crisp, varietal character.

04 | BLENDING AND FILTRATION

- The resulting base wines are blended .
- Base wine blends are created in order to combine various vineyards, complimentary grape varieties or wines from various vintages.
- Alternatively, the winemaker can choose to focus on a single vintage, variety or vineyard.

05 | BOTTLING

- The tirage liqueur (yeast, nutrients, clarifying agent and sugar) is added.
- The wine is bottled, sealed and placed in a cool cellar where it is allowed to ferment.

06 | SECONDARY FERMENTATION

- The second fermentation takes place in the bottle and increases the alcohol by another 1.0 - 1.5%.
- Once the fermentation process starts, the wine is left in contact with the lees.

07 | AGEING ON YEAST LEES

- This period of yeast autolysis and lees contact create additional flavours and richer textures.
- This is done according to the requirements prescribed by the various governing bodies or alternatively, at the winemaker's discretion.
- Champagne requires a minimum of 12 months ageing for non-vintage wines (15 months in bottle before release), increased to 36 months for vintage Champagne. Cava requires 9 months and as much as 30 months for Gran Reserva Cava. Cap Classique currently requires 9 months, to be increased to 12 months in 2022.

08 | RIDDLING

- After the maturation is complete, it is time for riddling.
- The bottles must be placed head down at an angle, moved and rotated to loosen the sediment (yeast and riddling aids) produced as a result of the second fermentation.
- Riddling causes the sediment to collect in the neck of the bottle in preparation for disgorgement.

09 | DISGORGEMENT

- The purpose of disgorgement is to eliminate the deposit that has collected in the neck of the bottle as a result of the riddling process.
- Once the sediment is gathered, the neck of the bottle is plunged into a refrigerated solution. The sediment (in the form of a frozen plug) is then ejected under pressure when the bottle is opened by the removal of the crown cap, with minimum loss of wine or pressure.
- This process can be done manually (*à la volée*) or mechanically.

10 | DOSAGE AND CORKING

- The dosage liqueur (wine or any product from grape origin, sulphur and sugar addition) is added to the bottle to reach the desired sugar level.
- This will influence the final sweetness and style of the sparkling wine.
- The bottle of sparkling wine is corked and sealed with a cage/wirehood.

Wines made in the Traditional Method: Champagne, Cava, Cap Classique, Franciacorta DOCG, Metodo Classico, Espumante, Sekt and British sparkling wines.

TRANSFER METHOD

This method follows the same steps as the Traditional Method, but the final processing steps happen in tank. The second fermentation therefore does not take place in the same bottle in which the product will be sold.

01 | HARVEST

02 | PRESS AND SETTLING

03 | PRIMARY FERMENTATION AND (OPTIONAL) MALOLACTIC FERMENTATION

04 | BLENDING AND FILTRATION

05 | BOTTLING

06 | SECONDARY FERMENTATION

07 | AGEING ON YEAST LEES

08 | THE TRANSFER

- The contents of the bottles are emptied under pressure into a tank.

09 | FILTRATION

- The wine is filtered in order to remove the sediment of yeast lees.

10 | DOSAGE AND BOTTLING

- The dosage liqueur (wine or any product of grape origin, sulphur and sugar addition) is added to reach the desired sugar level.
- This will influence the final sweetness and style of the sparkling wine.
- The sparkling wine is re-bottled in a new bottle, corked and sealed.

Wines made in the Transfer Method: Many sparkling wines from New World Wine countries, like Australia & New Zealand.

TANK/CHARMAT METHOD

The process is similar to that of the Traditional Method, but instead of the second fermentation happening in individual bottles, it occurs in large tanks. There is also no ageing process: the sparkling wine goes directly from fermentation to filtering, dosage and bottling.

01 | PRIMARY FERMENTATION

- The primary fermentation takes place in stainless steel tanks to create the base wine.

02 | SECONDARY FERMENTATION

- The base wine is transferred to a pressurised tank together with sugar, yeast, nutrients and a clarifying agent.
- The second fermentation takes place in sealed tanks.

03 | FILTRATION

04 | DOSAGE

05 | BOTTLING

- The wine is bottled under pressure.

Stylistic differences to the Traditional and Transfer Method:

- Not used for wines where the complexity of yeast autolysis is desired.
- Used for a fresh, fruity style of sparkling wine.
- Popular with grape varieties which do not benefit from the flavours of yeast autolysis.

Wines made in the Tank/Charmat Method: Prosecco DOC & Prosecco DOCG.

ANCESTRAL METHOD

Also known as Pétillant natural, this is the oldest method of making sparkling wine. These wines are becoming more popular due to the increased trend toward natural wine.

01 | PRIMARY FERMENTATION

- Wines are allowed to ferment until approximately 50% of the sugar has been metabolised by the yeast.

02 | FILTRATION AND PAUSE

- The fermentations are paused as the wines are filtered and chilled to 0 °C and held in tanks for several months.

03 | BOTTLE FERMENTATION

- Wines are bottled, wherein the yeast then completes the fermentation with the residual sugar. This produces CO_2 which is then trapped in the bottle.
- There must be enough sugar in the wine to build pressure and create bubbles, but not so much that the bottle explodes.

04 | RIDDLING/DISGORGING

- While there are no requirements for disgorgement, bottles can be riddled and disgorged without the addition of dosage.
- The can result in wines that contain sediment or appear cloudy.

Wines made in the Ancestral Method: Pét-Nat wines.

ASTI METHOD

The major difference to the other methods is that the wine is only fermented once.

01 | PREPARATION OF THE MUST

- The must is chilled so it does not start fermenting and stored until needed.

02 | WARMING OF THE MUST

- A process unique to the production of Asti wines.
- When needed, the juice is warmed, inoculated and the fermentation starts.
- At the beginning, CO_2 is allowed to escape.
- Partway through the fermentation, the tank is sealed to retain the CO_2.

03 | ARREST OF FERMENTATION

- The fermentation is stopped early (by chilling) at 7 - 7.5% alcohol, so the resulting wine is sweet (with residual sugar) and a minimum of 4 bars of pressure.

04 | FILTRATION AND BOTTLING

Wines made in the Asti Method: Asti DOCG & Moscato d'Asti.

CARBONATION METHOD

01 | PRIMARY FERMENTATION

02 | CARBONATION

- CO_2 is injected into the base wine, which is then bottled under pressure.

Wines made by the Carbonation Method: Done throughout the world for producing inexpensive sparkling wines.

WINE TYPES

SWEETNESS LEVELS	
TYPE	**RESIDUAL SUGAR** (g/L)
Brut Nature	<3
Extra Brut	<6
Brut	<12
Extra Dry	12 - 17
Sec	17 - 32
Demi-sec	32 - 50
Doux	>50

Blanc de blanc

- Sparkling wine made solely from white grape varieties.
- Light and clean.

Blanc de noir

- White sparkling wine made from red and/or black grape varieties.
- Rich wine, containing notes of vanilla and berries.

Prestige wines

- Specially blended house wines that are aged for a longer period than others.
- Unique flavour.

Rosé wines

- Pink-hued wine created by blending in red wine or skin contact.
- Usually dry with fruity notes.

PRODUCTION STYLES

While there are many production styles, two main methods place the focus on oxygen availability. A more reductive style of production places the focus on the fruit and fermentation-driven characters, whilst the more oxidative process of ageing enhances a richer style of sparkling wine.

REDUCTIVE

- Lean taste and flavours of flowers, fresh apple, tropical fruit, lime and lemon zest.
- Light and zippy palate.
- Reductive winemaking: preserve as much as possible of the floral and fruit characters.
- Less oxygen introduced during winemaking.
- The aroma profiles enhanced:
  - Dry, lean and zesty.
  - Fresh, dry, fruity and floral.
  - Sweet and perfumed.

AUTOLYTIC AND OXIDATIVE

- Rich and creamy with flavours of toast, brioche, yellow apple, honeycomb and sometimes hazelnut.
- To enhance the wine with the qualities of ageing.
- The aroma profiles enhanced:
  - Rich, creamy and nutty.

SENSORY ASPECTS

Factors that influence the sensory profile of sparkling wines:

- **Vineyard location and terroir (soil and climate).** Each vineyard will have its own specific profile and characteristics.
- **Cultivars used.** Each grape variety is expressed differently and influenced by the growing conditions.
- **When the grapes are harvested.** This will influence the main winemaking parameters and their analyses for e.g. the sugar concentration.
- **The fermentation conditions.** There are various winemaking decisions that play a role, including, but not limited to, the following: the fermentation vessel, the selected yeast strain for the primary fermentation, whether MLF takes place, ageing in vessels before blending/bottling, fining and filtration conditions, fermentation closures and the duration of the riddling period.
- **Selection of vintage or non-vintage wines.** Non-vintage wines are a blend of base wines made from different vintages, potentially from different growing areas and varieties. Vintage wines represent a single outstanding production year.
- **Duration of the maturation period**, be it ageing on lees or bottle maturation, both of which will significantly influence the sensory profile.
- **Selection of the dosage.** Composition, as well as sugar concentration. This will of course also determine the category of sparkling wine.

Most of these factors are dependent on the producer's preferences and selections. These choices will therefore play an important role in determining the final sensory profile of the wine. Some of the more generic profiles include the following:

SENSORY PROFILE	NOTES
DRY, LEAN & ZESTY	• Cooler climate regions • Least amount of sweetness added during dosage • Typically labelled as Brut • Most non-vintage Champagne & Cava • Most Brut, Extra Brut & Brut Nature sparkling wines
FRESH, DRY, FRUITY & FLORAL	• Warmer climate regions • Many Brut & Extra Brut sparkling wines, Extra-dry Prosecco & Franciacorta • Sparkling Rosé • Riesling Sekt • Most American, Argentine & Cap Classique sparkling wines
SWEET & PERFUMED	• Dry Prosecco • Demi-Sec & Doux sparkling wines • Asti Spumante (made with Moscato)
RICH, CREAMY & NUTTY	• Reserva & Gran Reserva Cava • Vintage Champagne, American sparkling wines, Italian 'Metodo Classico', Franciacorta & Cap Classique with 3+ years on the lees

AROMA DEVELOPMENT DURING AGEING

The aromas in sparkling wine can be divided into the following aroma categories: floral, fruity, vegetal, dried fruit and decadent.

YOUTH	MATURITY & BALANCE	COMPLETE & COMPLEX
2 - 3 years	3/4 - 6/8 years	more than 6 - 8 years
Floral	Pastry	Toast
Exotic fruit	Liquorice	Cocoa
Chalk	Brioche	Quince
Strawberry	Dates	Walnut
Mint	Toffee	Gingerbread
Peach	Fig	Dried fruit
Ginger	Stewed fruit	Honey
Red fruits	Hazelnut	Coffee
Bread	Almonds	Dried fig
Blackberry	Tobacco	Raisins
Pear	Vanilla	Mulch
Blueberry	Wild berries	
Apple	Honey	
Violets	Cherry	
Grapefruit	Apricot	
Rose	Plum	

CHAPTER 02

SPARKLING WINE AROUND THE WORLD

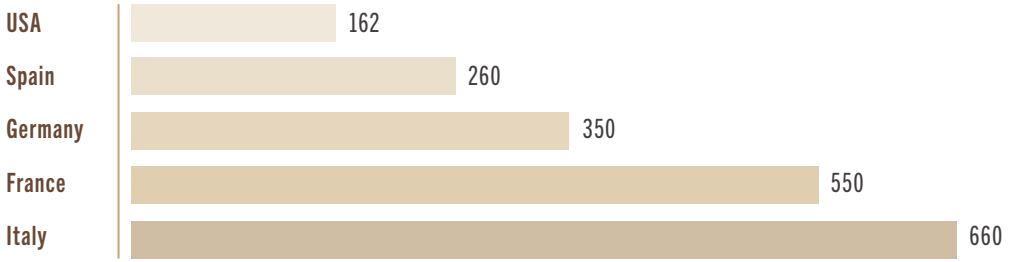
GLOBAL PERSPECTIVE

PRODUCTION

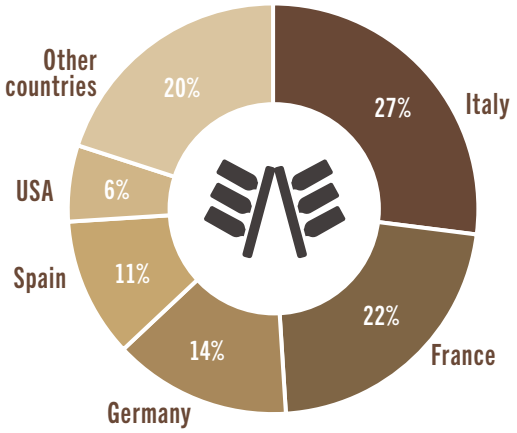
Every year, 2.5 billion bottles of sparkling wine is produced. This is a 57% increase since the year 2002. Sparkling wine production accounts for approximately 8% of the total worldwide wine production of 32.5 billion bottles.

Countries that have shown the greatest increase in sparkling wine production over the last ten years include Australia (plus 3% per year), Brazil (plus 7% per year), Portugal (plus 18% per year) and the UK. The UK has shown an increase of 33% per year and sparkling wine production now represents 70% of their total domestic wine production. It has also shown a 7% annual increase in consumption and is now the sixth largest consumer of sparkling wine at 1.5 million hectoliter (mhL).

Top five sparkling wine producing countries in the world



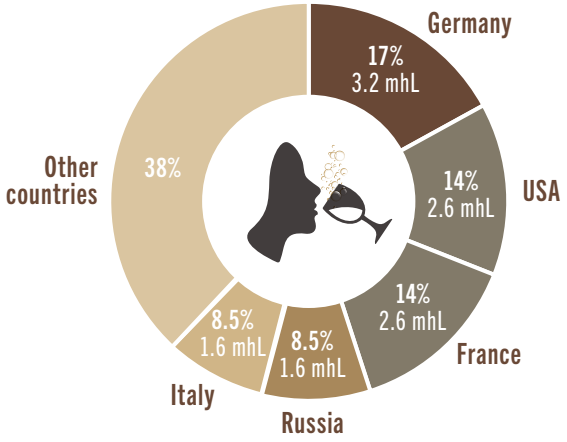
Total volume of sparkling wine produced in the world



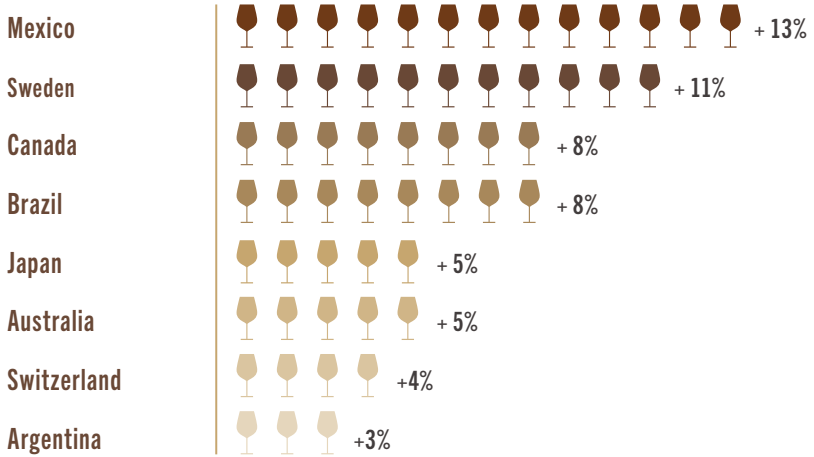
CONSUMPTION

There has been a consistent increase in the demand for sparkling wine, showing an average annual growth rate of 3% per year over the last 10 years. In terms of global wine consumption, sparkling wine now represents approximately 8%. This growth has mainly been driven by three factors: reducing the link between sparkling wine and its position as a drink only for celebration, a more diverse range of products on offer, and in turn, sparkling wines being offered at various price points.

Five countries represent 62% of the global sparkling wine consumption



The total share of consumption of these major countries have declined over the last ten years, mainly due to the average annual growth of sparkling wine consumption in emerging markets. These include:



EXPORTS

Whilst only 9% of all exported wine volume is represented by sparkling wines (approx. 9 mhL), it does however represent 21% of the total export value (approx. 6.2 billion Euro).

Three countries represent approx. 85% of the global sparkling wine export market in value and volume:

VALUE (bn Euro)			VOLUME (mhL)		
France	1	3.2 (52%)	Italy	1	3.9 (43%)
Italy	2	1.5 (25%)	France	2	1.9 (21%)
Spain	3	0.5 (7%)	Spain	3	1.8 (20%)

France is second in line in terms of export volumes, 1.9 mhL, of which 1.1 mhL is represented by Champagne. Exports account for 43% of the national sparkling wine production. Main countries for export include the USA, the UK and Singapore.

Italy exports 73% of its national sparkling wine production. In the last 20 years, the exported volume of Italian sparkling wine has increased by an annual average growth rate of 10%. This is of course driven by Prosecco that accounts for 65% of their sparkling wine exports, mainly to the UK, USA and Germany.

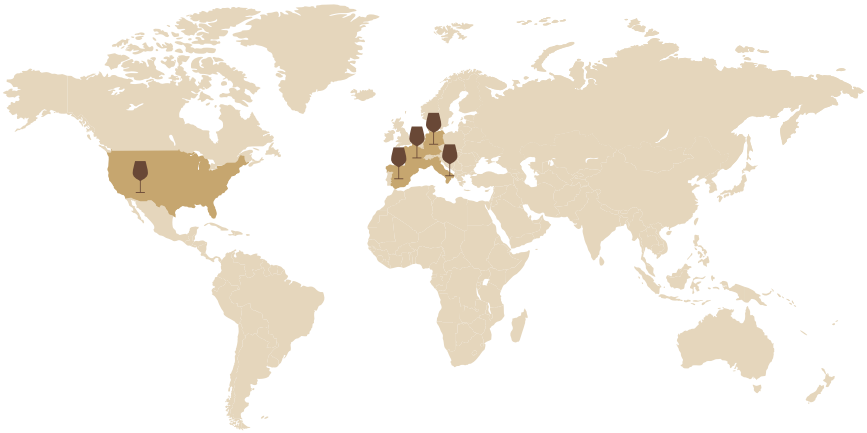
Spain in third position for both value and volume, export almost 90% of its sparkling wine production. A rise in the demand for Cava has seen the export volume double over the last 20 years, with the main destinations for export including the USA, Germany and Belgium.

IMPORTS

More than 50% of all exported sparkling wine (volume) are sent to five countries:

VALUE (m Euro)			VOLUME (mhL)		
USA	1	1 112	UK	1	1.4
UK	2	723	USA	2	1.4
Japan	3	523	Germany	3	0.7
Germany	4	425	Belgium	4	0.4
Singapore	5	308	Russia	5	0.4

MAJOR ROLEPLAYERS



- **Italy:** Prosecco, Franciacorta & Asti
- **France:** Champagne, Crémant & Rosé
- **Germany:** Sekt
- **Spain:** Cava
- **United States:** Sparkling wines

ITALY

- The production volume of sparkling wine in Italy has more than doubled in the last ten years, mainly due to tank-fermented Prosecco DOC (mainly Veneto), and to a lesser extent bottle-fermented Franciacorta DOCG (Lombardy) and Trento DOC (Trentino).
- Exports: 485 million bottles of sparkling wine, representing 19% of the country's total wine exports.
- Accounts for 43% of the world's export volume of sparkling wines and 25% of the world's export value for sparkling wines (1.5 billion Euro).

| PROSECCO

Production

- Represents 10% of the country's total wine production and 66% of the sparkling wine production.
- 500 million bottles per year.
- Mainly produced in north-eastern Italy in the Veneto region and a small production in neighbouring region Friuli Venezia.
- Made from Prosecco/Glera grapes.
- Made in Tank/Charmat Method, although bottle-fermented versions also exist.
- Majority of bottles: Prosecco DOC.
- Prosecco DOC: established in 2009, covers approx. 28 000 hectares and produces approx. 435 million bottles.

Style

- Lively and light to medium-bodied, white and ultra-fresh, citrus, white flowers, apple and pear, sometimes with a subtle floral nature.
- Not aged on lees, so the flavours tend to be simpler and less complex.
- Some Prosecco are spumante (fully sparkling) and some frizzante (slightly sparkling).

FRANCIACORTA

Production

- In the Lombardy region of Italy.
- Made in the Traditional Method from Chardonnay, Pinot Noir (Nero) and Pinot Blanc (Bianco).

Style

- As a warmer region than chilly northern France, the wines tend to be riper and fuller and can lack the zesty acidity and minerality of Champagne.

ASTI

Production

- Asti DOCG is tank-fermented.
- Made from Muscat grapes.

Style

- White, light-bodied sparkling wine.
- Intense floral and fruity flavours of peach, rose and grape. It is usually sweet and has a low level of alcohol.

FRANCE

- Total sparkling wine production: 550 million bottles.
  - 60% of this production is Champagne.
  - 43% of this production is exported (240 million bottles) and this accounts for 14% of the country's total wine exports.
  - 65% of total sparkling wine exports is represented by Champagne.
- Accounts for 21% of the world's export volume of sparkling wines and 52% of the world's export value for sparkling wines (3 billion Euro).

CHAMPAGNE

Production

- 330 million bottles per year.
- Accounts for 12% of the volume of sparkling wine produced in the world.
- Accounts for 33% of the value of sparkling wine in the world.
- Approx. 52.5% is exported and 47.5% sold locally.
- The three largest export countries in volume and value include the UK, USA and Japan.
- Any of the following grapes can be used to make Champagne: Pinot Noir, Pinot Meunier, Chardonnay, Pinot Blanc, Pinot Gris, Petit Meslier and Arbane.
- Most commonly made from three grape varieties: Chardonnay, Pinot Noir and Pinot Meunier.
- Champagne comes in both vintage and non-vintage versions.

Style

- Serious acidity and typically a dry style, though sweeter demi-sec versions exist.
- Chalky soils make their way into the wine where apple, fresh bread, citrus and sometimes a subtle smokiness, along with nutty aromas and toasted notes can be found in the finished wine.

CRÉMANT

Production

- 110 million bottles per year.
- Sparkling wine made in the *Methode Champenoise* in any region other than Champagne.
- Made by eight regions in France: Alsace, Burgundy, Bordeaux, Limoux, Loire, Jura, Die and Savoie.
- In each region, it is made from different grapes. In the Loire, it will often be Chenin Blanc or Cabernet Franc; in the Alsace, it might be Pinot Gris, Pinot Blanc or even Gewürztraminer.
- 50% of the total production: Alsace and Burgundy.
- Percentage of Crémant production exported: Loire (45%), Burgundy (45%) and Alsace (20%).

Style

- Creamy and nutty taste, rather than sweet.

GERMANY

- Total sparkling wine production: 350 million bottles.
- Biggest consumer of sparkling wines in the world.
- Sparkling wine accounts for 28% of the total German wine production.
- Home to the world's largest sparkling wine producer: Henkell & Co. (8% of the world's production of sparkling wines).

| SEKT

Production

- Any sparkling wine made in Germany.
- Made using both the Tank and Traditional Method depending on the type.

Style

- Low sweetness and low alcohol levels (as low as 6%).
- Fruity and floral aromas such as apples, pears and white flowers.
- Natural acidity and fruitiness, nutty and floral.

SPAIN

- Total sparkling wine production: 260 million bottles. Production has almost doubled in the last 20 years.
- Third largest exporter of sparkling wine: 225 million bottles (approx. 88% of their sparkling wine production is exported and it accounts for 9% of their total wine exports).
- Exported mainly to the USA, Germany and Belgium.

| CAVA

Production

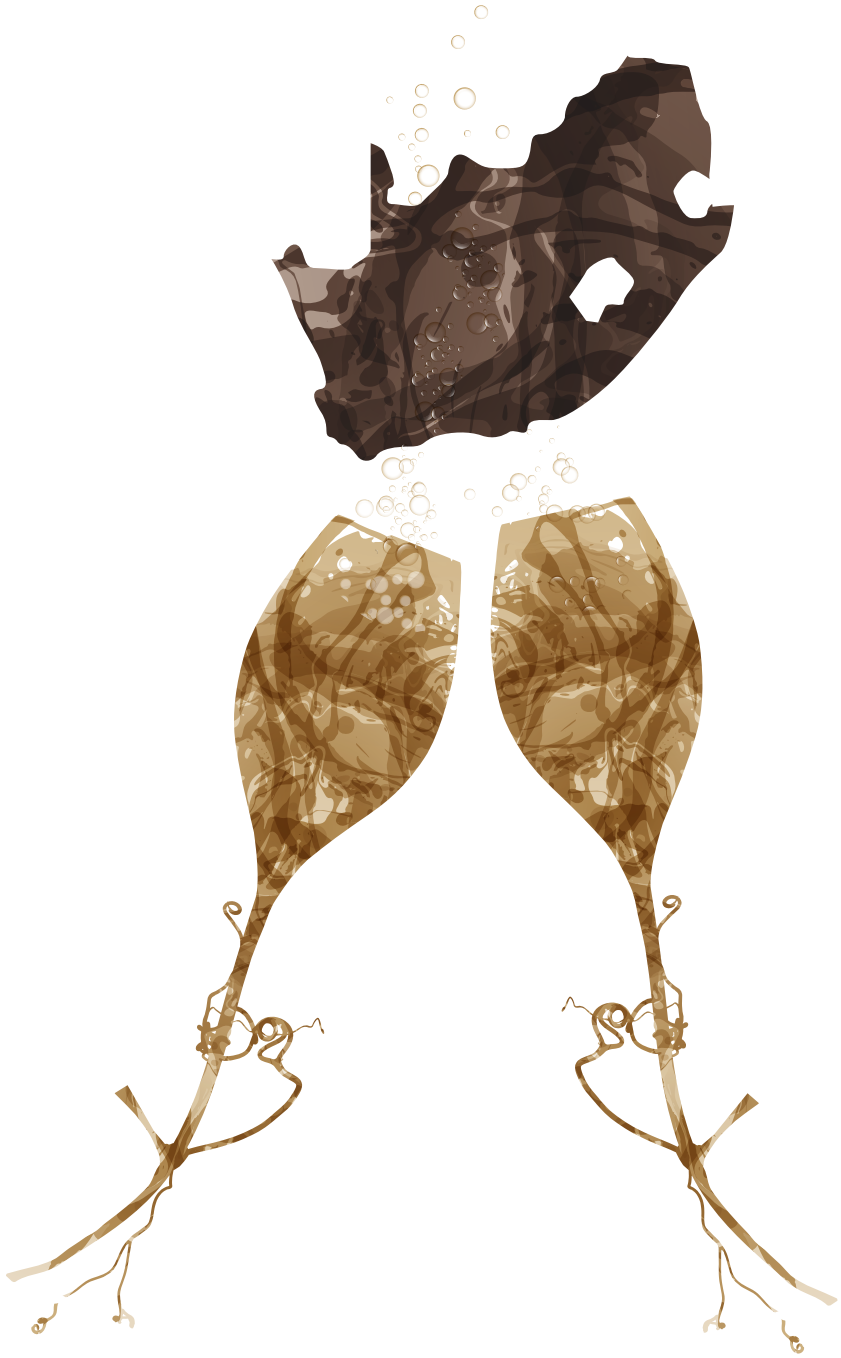
- 244 million bottles per year represent 89% of the total sparkling wine production.
- Produced anywhere, but mainly in Catalonia (approx. 38 000 hectares).
- Second fermentation in bottle and 9 months of bottle ageing on lees.
- Exports: 165 million bottles or 67.5% of total Cava production.
- Made in the Traditional Method.
- Primarily made from the Spanish grape, Macabeo (fresh, lemony flavour).
- Can also be made with Xarello and Parellada grapes (fruity undertones of pear and citrus).

Style

- All have floral aromas and are a lot less sweet in taste than Prosecco.
- Light-to-medium bodied profile, dry to somewhat off-dry in terms of sweetness and lots of lively acidity.
- Showing some similarities to Champagne in terms of time spent on the lees, which offers creamy textures, fresh-baked bread aromas and an added depth.
- Almond notes, citrus and apple, along with some mineral-driven nuances.

USA

- Total sparkling wine production: 162 million bottles.
- Annual increase in production of 4% over the last 10 years.
- Annual increase in consumption of 7% over the last 10 years.
- Third largest sparkling wine consumer (after Germany and France): 300 million bottles per year (50% produced locally/50% imported).
- The Napa Valley accounts for 77% of the national sparkling wine production.
- 6% of the US sparkling wine consumption is French Champagne.
- Sparkling wine accounts for 12% of the total volume of imported wine, but 73% of the total value of imported wine. As a result, it is the most valuable sparkling wine market in the world.
- Sparkling wines produced in the USA can be called Champagne if:
  - The vineyard was founded before March 2006.
  - The geographical origin is stated together with the word Champagne, e.g. California Champagne.
- American sparkling wines are mostly Chardonnay and Pinot Noir in origin, with more fresh fruit aromatics and less mineral-driven, chalky characters than classic Champagne.



CHAPTER 03

SPARKLING WINE IN SOUTH AFRICA

HISTORY

The OIV defines two categories: **sparkling wine** (CO_2 from a second fermentation) and **carbonated wines** (impregnated with CO_2).

In South Africa, three main types of sparkling wines are recognised:

- **Cap Classique** is the term used to describe sparkling wine made in the Traditional Method of undergoing second fermentation in the bottle in which the product is to be sold. There are quality standards that all producers adhere to, apart from the minimum time on the lees (nine months; extended to 12 months in 2022) and the bars of pressure, which are mandatory in order to use Cap Classique on the label.
- **Charmat wines** undergo the second fermentation in a tank and is then bottled under pressure. The combined duration of the second alcoholic fermentation and lees ageing must be at least 30 days where agitators are used in the tank, alternatively 80 days if taking place in a sealed tank.
- **Carbonated sparkling wines** are given their effervescence by the injection of carbon dioxide.

The first commercially available sparkling wine created in the traditional French method, the Simonsig Kaapse Vonkel, was made by Frans Malan in 1971, and celebrated its 50th anniversary in 2021. Originally it was made with Chenin Blanc, Pinotage and other varieties, although it has been made with Chardonnay and Pinot Noir since 1987. The first sparkling wines made from traditional Champagne grape varieties were not introduced to South Africa until the mid-1980s. South Africa's first sparkling rosé using the Traditional Method was created in 1987.

By 1992 there were fourteen sparkling wine producers using the Traditional Method and they created an industry group called the Cap Classique Producers Association (CCPA). The CCPA created the phrase 'Méthode Cap Classique' in 1992, referring to the distinctly French *Méthode Champenoise* way of production applied to sparkling wines in South Africa. The wines produced by this method are known as Cap Classique wines.

CAP CLASSIQUE WINES

THE VINEYARD

South Africa is home to a variety of conditions for growing the grape varieties that go into traditional style sparkling wines.

- Cap Classique producers represent 28 different geographical regions.
- Most Cap Classique wines are made from the classic Chardonnay and Pinot Noir varieties. Some producers include Pinot Meunier in their blends or portfolio. Varieties like Sauvignon Blanc, Pinotage and Chenin Blanc that are more traditional to South Africa also make their way into Cap Classique wines. The high acidity and fruity expression of Chenin Blanc performs well in these wines.
- The calcium-rich limestone soils of the Robertson region is generally recognised as ideal for growing Chardonnay. Franschhoek, Paarl and Stellenbosch are also popular growing areas for quality Chardonnay.
- The cooler growing conditions of Elgin and coastal vineyards of Walker Bay are preferred for growing fresh tasting Pinot Noir and Chardonnay.
- Darling, Durbanville, Constantia and Hout Bay are sought after areas due to their proximity to nearby oceans.
- The selected cultivar and resulting blends can influence the foaming properties. In general, Pinot Noir has a higher foaming capacity compared to Chardonnay.
- Clonal selection for sparkling base wine production focuses on higher acidity and yield, as well as lower anthocyanin and tannin content.

THE WINE

Production method

Cap Classique wines are made in the traditional French method:

- Grapes selected from various regions result in highly individual styles. Whilst any grape variety is allowed, Chardonnay and Pinot Noir are most prevalent.
- Fruit is picked early at relatively low sugar and pH levels.
- Whole bunch pressing yields the press fractions, cuvée and *tailles*, used to produce the base wines that will be used to create Cap Classique wines.
- Vineyards and varieties are pressed and fermented separately, resulting in multiple base wines. Fermentation usually takes place in stainless steel, with partial fermentation and/or ageing in neutral or used barrels for added complexity. A few winemakers also use amphora, concrete eggs, acacia barrels, ceramic pots and foudres.
- This is followed by the addition of the tirage liqueur, a mixture of wine, yeast and sugar, to start the second fermentation in the bottle. The resulting CO_2 is responsible for the bubble formation.
- After fermentation, the bottles mature horizontally in cool, dark cellars for a minimum of 12 months (2022 legislation). The style and vintage will determine the yeast contact time, with most Cap Classique producers allowing for two to five years of maturation on the lees.
- The sediment is collected in the neck of the bottle via riddling. This is followed by disgorgement or removal of the frozen sediment. The dosage liqueur is added before closure of the bottle.
- Once again, style and vintage, integration and balance will determine the duration of the bottle maturation.

Legislative requirements

Sparkling wine according to the Traditional Method:

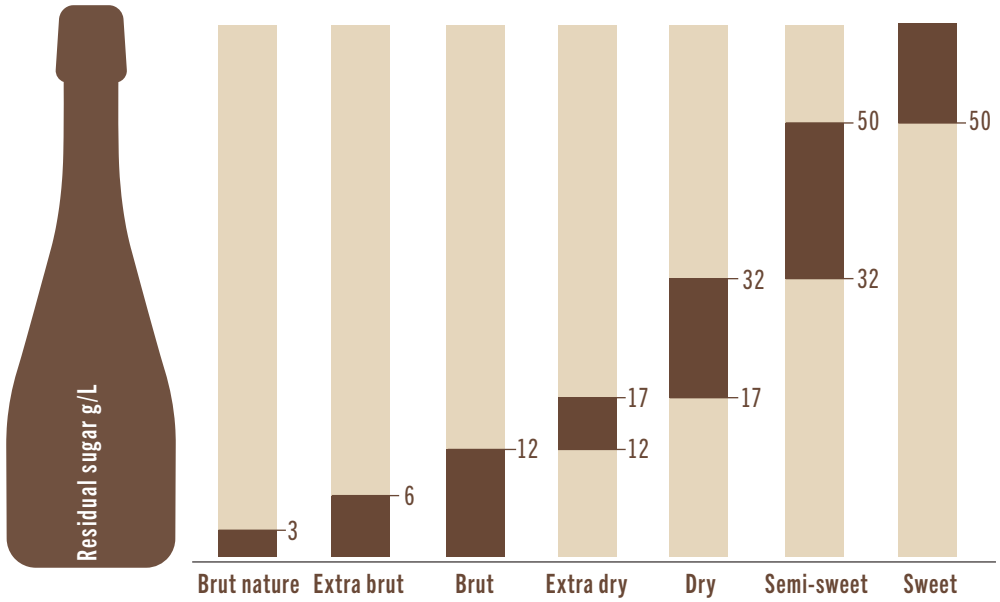
- The second alcoholic fermentation shall occur solely in the bottle in which the product is to be sold.
- The product shall remain in contact with the lees in such bottle for a continuous period of at least nine months calculated from the commencement of the second alcoholic fermentation (to be increased to 12 months in 2022).
- The separation of the lees shall be done by means of disgorgement.
- The carbon dioxide in the bottle in which the product is sold shall originate solely from the second alcoholic fermentation.
- A final pressure of between 4 - 6 bar is usually ideal, but per regulations, the wine should be more than 3 bar in pressure to be classified as Cap Classique.
- If it is intended to sell the product in bottles with a capacity of more than 1.5 L or less than 750 mL, on application, permission may be granted for a departure from the requirements set out in the first two points above.

Growth

This category has grown significantly, with the number of producers and labels of Cap Classique increasing exponentially over the past two decades.

- Approximately 225 producers.
- More than 300 labels.
- Growth of 18% in 2019 and doubling every four years.
- Approximately 100 CCPA members account for 93% of the total production of Cap Classique wines and almost 100% of the exports.
- The two largest export markets are the UK and USA. The Netherlands, Sweden and Norway, that have surpassed Germany in fifth place, round out the top 5 export markets accounting for 70% of the total exports.

Wine categories



Most Cap Classique wines are bottled as Brut.

Wine types

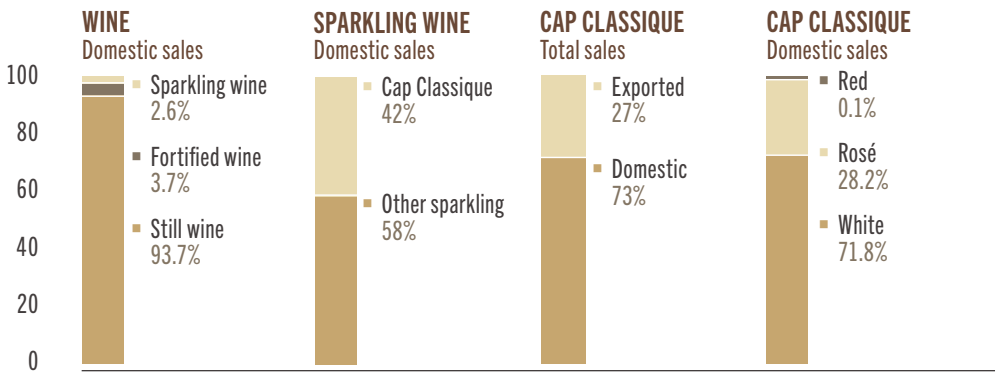
The main criteria for style in Cap Classique are vintage, grape cultivar and sugar level.

- **Prestige wines** are made from the most subtle and distinctive wines, built on a profound depth of reserve vintages. Prestige cuvées are usually brut with a minimum amount of sugar added. The small dosage is possible thanks to the quality of the grapes and the long ageing process. All are produced in limited quantities and most only in vintage years. This category is not defined by legislation, but usually entail extended lees contact time, base wines with wood components and a higher price tag.
- **Vintage wines** are produced exclusively from the wines of a single harvest. As a result, producers will only declare a vintage in exceptional years.
- **Non-vintage blends** is the largest category and is the wine most representative of a producer's style. It is usually a blend of wines from several years and a number of fruit lots, resulting in a variety of cultivars and styles. The dosage levels are generally higher and wines are more accessible.

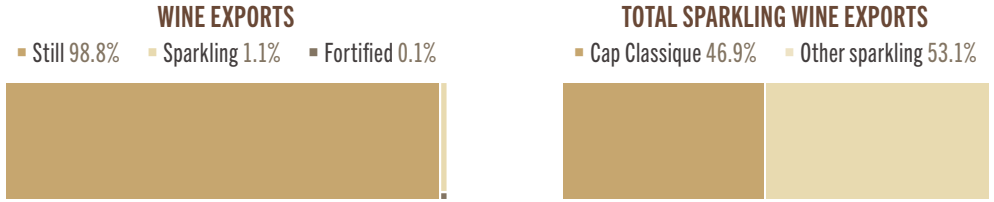
- **Blanc de blanc** wines are produced from any white single cultivar or blend of one or more white cultivars; usually Chardonnay will play a prominent role. Wines are generally bottled with lower dosage levels, with a more focused balance between acid, fruit and sugar levels. Single cultivar wines are sometimes labelled with the grape cultivar, rather than the designated style.
- **Blanc de noir wines** are produced from red grapes, usually Pinot Noir, Pinotage, Cabernet Franc, Shiraz and Pinot Meunier. This term is not widely used.
- **Rosé wines** are unique because of their colour and their more still wine-like character. They are produced by macerating the black grapes until the desired colour intensity is achieved or by adding finished red wine to the blend. The latter method is most popular.
- **Museum class wines** represent wines older than eight years, with a focus on ageing on lees and bottle maturation and the impact thereof on wine expression and quality.
- **Nectar wines** represent a new emerging category, better known as demi-sec. It was created as an easy-drinking option, with generous residual sugar balanced with acidity. Meant to go down smooth and easy, and aimed at a newer/younger sparkling wine drinker who is looking for a premium wine. The category is on the rise within South Africa.

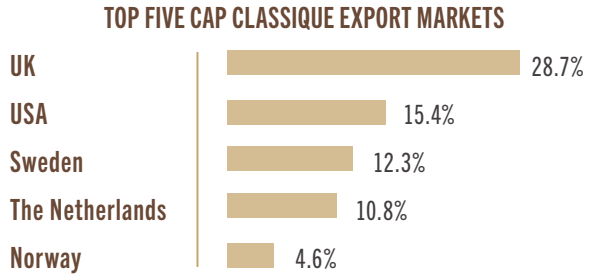
SALES AND EXPORTS

Sales



Exports





CHAPTER 04

PRODUCT CATALOGUE

VEGAN STATEMENT

Vegan products can be defined as:

- Products that do not contain ingredients nor additives from animal origin.
- Products that have not been produced with the use of substrates, ingredients or additives derived from animal origin.

Based on this definition and to the best of our knowledge, all products listed in this catalogue are vegan.

BASE WINE

While there are no restrictions on the grape cultivars allowed to produce sparkling wines, the majority are made from Chardonnay and/or Pinot Noir. Chenin Blanc, Sauvignon blanc and Pinotage are among the alternative grape varietals used. Many sparkling wines are a blend of different grape cultivars.

Harvest

- Irrespective of the cultivar selected, it is imperative to find the balance between picking grapes that are either too green or too ripe. The former will result in wines with unpleasant herbaceous notes and the latter in flabby wines, which may have overripe flavours. This optimal harvest date usually occurs between 17 - 20 ˚B and require a balance in order to ensure complexity.
- Manual harvesting reduces the extraction of phenolic compounds and the risk for oxidation. The extraction of phenolic compounds also negatively affect foaming, may cause bitterness, as well as reduce ageing capacity.

Processing

- Minimise skin contact to prevent phenolic extraction, potassium that could negatively influence the pH, solids and oxidative enzymes. Gentle pressing also limits the phenolic content, this is beneficial for the foaming capacity of the wine. Depending on the style, the extraction of aroma precursors could be encouraged or avoided.
- Whole bunch pressing is advised. The first press fraction is unwanted and can be discarded or added to the *taille* fraction. The cuvée fraction that follows is mainly used for the production of Prestige Cuvée wines, while the following *taille* fractions are processed separately for adding complexity.
- Continuous monitoring of the acid levels and colour extractability in the case of rosé wines, are important to ensure a balance between sufficient anthocyanin extraction, without excessive astringent polyphenols.

PRESS AND DOWNSTREAM PROCESSING

ENZYMES

Aroma extraction

| RAPIDASE EXPRESSION AROMA

Aroma precursor extraction in white and rosé base wines.

- An enzyme for fast, early and targeted aroma precursor extraction in white and rosé grape maceration. Skin contact allows for enhanced aroma intensity and complexity. Sufficient skin integrity is maintained to ensure effective downstream processing.
- Application: Skin and pulp cell wall degradation; reduce maceration time; replace more oxidative mechanical methods; increase precursor and aroma extraction.
- Dosage: 2 - 4 g/100 kg
- SKU: 100 g

Clarification

| IOC INOZYME

Clarification and filtration.

- Inozyme is a lyophilised pectolytic enzymatic preparation with a very broad spectrum of activity, which helps to accelerate the clarification of must and improve the filtration of the wine.
- Application: For the clarification of juice at low pH (<3.0); for the clarification of juice for base wine production.
- Dosage: 1 - 4 g/hL (must) or 1 g/hL (wine).
- SKU: 50 g

| IOC INOZYME TERROIR

Clarification under difficult settling conditions.

- Inozyme Terroir is a highly concentrated clarification enzymatic preparation to clarify white and rosé must.
- Application: Clarification of white and rosé must below 10 °C; suitable for grape varieties rich in pectins; suitable for use under accelerated pressing conditions; suitable for use on immature grapes.
- Dosage: 1 - 5 g/hL (direct addition) or 10 - 50 mL/hL (liquid suspension).
- SKU: 50 g

| RAPIDASE CLEAR

Clarification of must.

- This is an enzyme for fast and efficient grape must and wine clarification. Rapidase Clear decreases the viscosity allowing for more compact lees during settling and clearer must and wine.
- Application: Pectin degradation; decrease in lees percentage; decrease in turbidity.
- Dosage: 1 - 3 g/hL or 1 - 4 mL/hL.
- SKU: 100 g; 1, 5 & 20 kg

RAPIDASE CLEAR EXTREME

Clarification under difficult settling conditions.

- An enzyme for fast, efficient clarification of grape must in difficult and extreme conditions. The use of this enzyme allows for more compact lees and clearer must when settling conditions are difficult, including low temperatures, pH and/or hard to settle varieties.
- Application: Pectin and side chain degradation down to 6 °C; decrease viscosity; promote solid particle aggregation; decrease in settling time and turbidity; increase in clear juice percentage.
- Dosage: 1 - 4 g/hL
- SKU: 100 g

RAPIDASE FLOTATION

Enhanced efficiency during flotation.

- Enzyme for fast, efficient flotation of grape must. The use of this enzyme enables rapid viscosity decrease, allowing for faster migration of solid particles.
- Application: Soluble pectin degradation; reduce flotation time; promotes more compact foam by facilitating the accumulation of haze particles; decrease in the percentage lees and turbidity.
- Dosage: 1 - 2 mL/hL
- SKU: 5 kg

Protection

In order to avoid the enhanced extractability of compounds in the presence of SO_2, aim to add sulphur during pressing. An addition of 30 mg/L SO_2 to the cuvée fraction will prevent browning and preserve aromatics. SO_2 additions, together with other fining agents, can be added to the various press fractions, including the *tailles* (see protocol on page 31 for dosage indications).

IOC TANIN CRISTALLIN

Protect against oxidation.

- A tannin that protects against oxidation and eliminates protein haze by precipitating excess proteins in must. Add during pressing.
- Composition: Gallic tannin (tara nut).
- Application: Enhance the antioxidant properties of sulphur dioxide; early usage on must avoids bitter sensations in finished wines; facilitates clarification; use at harvest or bottling to improve preservation; add structure and finesse to white wines.
- Dosage: 2 - 6 g/hL
- SKU: 1 kg

IOC SULFITANIN

Sulphur adjustment.

- Sulfitanin is a solution of ammonium bisulphate and tara tannin at 100 g/L of pure SO_2 and is used to adjust sulphur levels in must. In the must tank for white base wine production, Sulfitanin prevents oxidation and microbiological alterations. For rosé in the maceration tank, the desired amount of colour is extracted and stabilised with the use of the product.
- Application: Antiseptic action prevents the growth of indigenous, undesirable yeast and bacteria; prevent oxidation; tannins reinforce the anti-oxidant mechanism of SO_2 and give better structure and ageing ability, without increasing the astringency in white wines; stabilise the colour in rosé wines.
- Dosage: 50 - 80 mL/hL (white and rosé wine) or 50 - 100 mL/hL (red wines).
- SKU: 5 & 10 L

CLARIFICATION AND JUICE FINING

SETTLING

IOC COLORPROTECT V

Prevent and treat oxidation.

- A blend of bentonite, PVPP and vegetable proteins that has been developed to be used on must for preventing oxidation and pinking. It reduces the levels of oxidisable and oxidised phenolic compounds in must. Rehydrate for three hours before use.
- Application: Protecting musts that are sensitive to oxidation; reduce brown colouring in oxidised must; significant reduction of pinking phenomena; reduce the level of protein instability.
- Dosage: 25 - 80 g/hL
- SKU: 1 & 5 kg

IOC COLORPROTECT V MES

Prevent and treat oxidation.

- A liquid, easy-to-use formulation of Colorprotect V. It is used for the preventative treatment of musts that are sensitive to oxidation and in particular pinking. It reduces the levels of oxidisable and oxidised phenolic compounds in must.
- Application: Can significantly enhance resistance to oxidation of oxygen-sensitive juice; reduce bitterness or herbaceous notes; allergen-free; remove brown appearance of oxidised juice; decolourising capacity and anti-pinking; reduce the level of protein instability.
- Dosage: 200 - 800 mL/hL
- SKU: 10 L

IOC INOFINE V

[FLOTATION]

Prevent oxidation in must.

- Inofine V is a formula made up exclusively of pea proteins combined with mineral-derived additives. It is particularly used for applications involving must clarification due to its high reactivity with oxidisable and oxidised phenolic compounds. Also suitable for flotation. Rehydrate for two hours before usage.
- Application: Alternative to gelatine; it provides efficient sedimentation of suspended matter; reduce turbidity in must.
- Dosage: 10 - 30 g/hL
- SKU: 1 & 15 kg

IOC INOFINE V MES

[FLOTATION]

Prevent oxidation in must.

- Inofine V MES is an easy-to-use liquid formulation of Inofine V with pea protein in a tartaric acid solution. Adding 300 mL/hL corresponds to an acidification of approximately 10 g/hL of tartaric acid. Also suitable for flotation.
- Application: Capacity to complex with polyphenols; recommended for the preventative treatment of must liable to oxidise; recommended in settling and ensures good sediment compaction; reduce turbidity in must; compatible with vegan and organic wine production.
- Dosage: 100 - 800 mL/hL
- SKU: 20 L

FLOTATION

Flotation is a technique for the clarification of mainly white and rosé juice. This dynamic process of clarification is based on separating the particles in suspension in the juice by fixing them to gas bubbles and concentrating them in a surface foam. Flotation is a relevant technique to decrease off-flavour formation in juice. It limits the contact time between the juice and undesirable compounds, whilst limiting oxidation.

Requirements for efficient flotation

Enzymes

- Juice depectinisation is essential.
- Prior to flotation, a pectin test will help to evaluate the presence of pectin, in order to optimise the process and enzyme usage.
- Enzymes decrease the juice turbidity and allow efficient migration of the particles to the surface.
- The use of a suitable pectolytic enzyme allows for a decrease in juice viscosity and helps particles to aggregate.
- It actively contributes to particle migration and significantly increases the flotation yield.
- Enzymes need to be added as soon as possible. Contact time must be between 2 to 3 hours according to the temperature, the enzyme dosage and the pectin concentration.

Flotation gas

- Bubbles must be of sufficient size to adhere to flocculates, whilst making a compact cake to help its elimination.
- Nitrogen is usually preferred because it ensures suitable bubble size for flotation, while limiting oxidation.
- The required pressure is between 5 - 7 bars. Beyond this pressure, bubbles move too quickly and have insufficient time to fix aggregates.

Adjuvants

- These adjuvants increase particle interactions and help to obtain bigger aggregates, which migrate with more speed and efficiency.

Practical considerations

- The shape of the tank is important.
  - A tank with a small diameter and large height will produce a thick and heavy cap that may submerge.
  - With a tank of too large a diameter, it will be difficult to circulate all of the must.
- The minimum liquid height is 1 m to allow for the formation of the cap and to ensure it is not broken by the flow of liquid during circulation. The maximum height is around 7 m. Beyond this, the formed cap will be too heavy and at risk of submersion.
- Provide a nitrogen cylinder with a suitable pressure reducer, which will supply the flotation unit with a pressure of around five bars.
- In general, the pumping time should correspond to approximately 1.5 times the volume of must.
- The juice must be completely depectinised: it is advised to add enzyme to the must at least two hours before flotation.
- The temperature should be kept above 13 °C: ideally between 15 and 20 °C.
- The must should not contain seeds, skins and other solids. Homogenise the tank well using the main pump, without gas or additives.

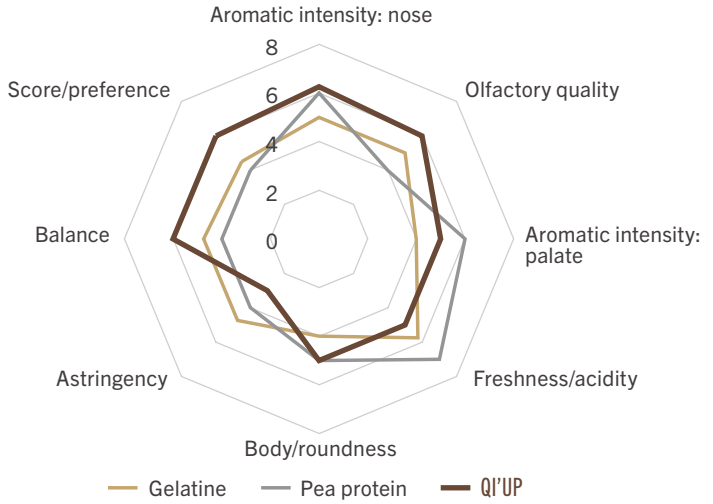
IOC QI'UP XC

Concentrated solution for the flotation of white and rosé juice.

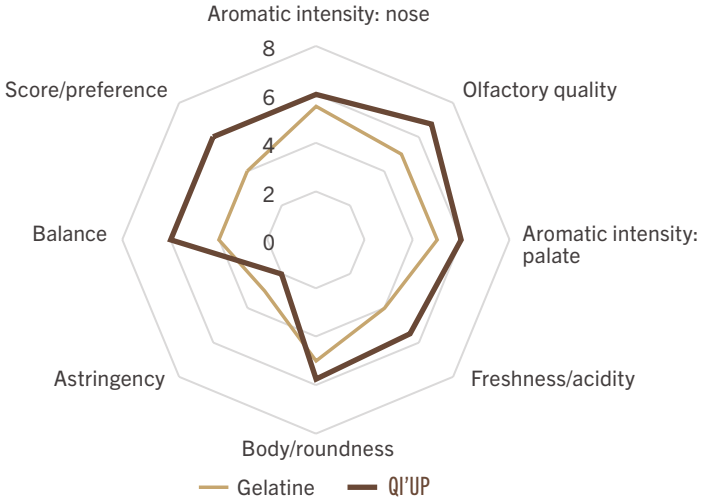
- Qi'Up XC is a unique and innovative chitin-derived flotation adjuvant, free of all allergens and synthetic products, vegan and organic compatible. Its efficacy and fast action allow it to float all types of must, while preserving the organoleptic qualities of the juice.
- Application: Enhance the speed and performance with which the particles separate from the suspension; alternative to the use of gelatine; increase fresh fruit aromas.
- Dosage: 3 - 10 g/hL (white or rosé must).
- SKU: 1 kg

QI'UP XC preserves all the organoleptic qualities of the must, as well as the wines made from them. Here are two examples of white and rosé must, comparing the action of **QI'UP XC** with a solution of gelatine and a solution of pea proteins. All treatments followed the same vinification process. Sensory analyses were performed during the three months following the end of alcoholic fermentation.

A white wine from Aligoté (Burgundy).
The QI'UP treatment differs significantly by its greater balance and reduced astringency.



Mean of analysis of variance in rosé wine from Syrah and Grenache from Côtes du Rhône.
The QI'UP treatment differs significantly by its greater aromatic intensity and greater freshness.



IOC BENT'UP

Bentonite for flotation.

- High-performance, active sodium bentonite powder for improved flotation. Brings about excellent cap compaction for optimal juice recovery. This adjuvant is used in addition to the flocculation aid and requires at least two hours swelling before use. Vegan and organic compatible.
- Application: Effective clarification and sediment compaction; rapid flotation times; remove protein fractions, oxidation enzymes and unstable phenolic fractions; remove thermosensitive proteins; use together with Acticarbone.
- Dosage: 30 - 80 g/hL
- SKU: 25 kg

IOC ACTICARBONE

Remove discolouration.

- This active vegetal charcoal is created for the treatment of discolouration in must. This product should be incorporated approximately one hour before the start of flotation in order to give it sufficient reaction time. Vegan and organic compatible. If using Acticarbone, it must be used first and then followed with the mandatory use of Bent'Up to remove fine carbon particles.
- Application: Remove discolouration without affecting the aroma profile; use in flotation, combined with enzymes and fining additives; treat must as soon as possible, in combination with a pectolytic enzyme.
- Dosage: To determine dosage, contact your Technical Sales Manager (authorised legal dosage: 100 g/hL). The dosage is to be determined according to the colour of the must.
- SKU: 15 kg

FINING THE JUICE

During the processing of the base wine, it is important to consider quality variations from the various press fractions and adapt the winemaking process and treatments accordingly. Removal of undesired elements present in the juice (solids, polyphenols, colour, proteins, lipids, etc.) before starting the fermentation is fundamental. It is important to select fining agents that remove unwanted elements while respecting foaming properties.

IOC QI FINE

Fining must during settling to improve the mouthfeel.

- A natural, biodegradable, non-allergenic product for fining must. Qi Fine is a blend of chitosan with a high charge density and unmatched flocculation and sedimentation rate and pea protein, specifically selected for its strong reactivity to phenolic compounds.
- Application: Effective in the absorption of polyphenolic compounds involved in the oxidation chain; correct the brown colour of oxidised must; reduce defects linked to bitterness and astringency; reduce harsh phenolic taste of tannins.
- Dosage: 10 - 30 g/hL (white and rosé free-run must) or 20 - 50 g/hL (white and rosé press juice).
- SKU: 1 kg

Prevention and treatment of oxidation

The oxidation of wine results in a loss of clean, fruity characters, together with the appearance of bitter notes and browning. This is in contrast to consumers wanting fresh, crisp, clean wines with a floral or fruity expression. Whether in the must or the wine, the oxidative mechanisms, as well as the molecules involved, are similar. Three entities contribute to oxidative spoilage: polyphenols (particularly ortho-diphenols linked to browning), oxygen and catalysts.

Catalysts may be chemical (cupric or ferric salts) or biological (e.g. laccase enzymes). Without catalysts, the oxidation of polyphenols is unlikely. All these reactions contribute to the formation of compounds that reduce fruity or floral notes and the appearance of oxidative notes.

Qi No[Ox] is a unique and innovative technological aid, made from plant polysaccharides, free from allergenic or synthetic products. Its effectiveness and fast action combat the production of oxidative by-products, both in the must and in the wine. Qi No[Ox] softens the bitter taste and oxidative notes in wine while preserving the sensory properties.

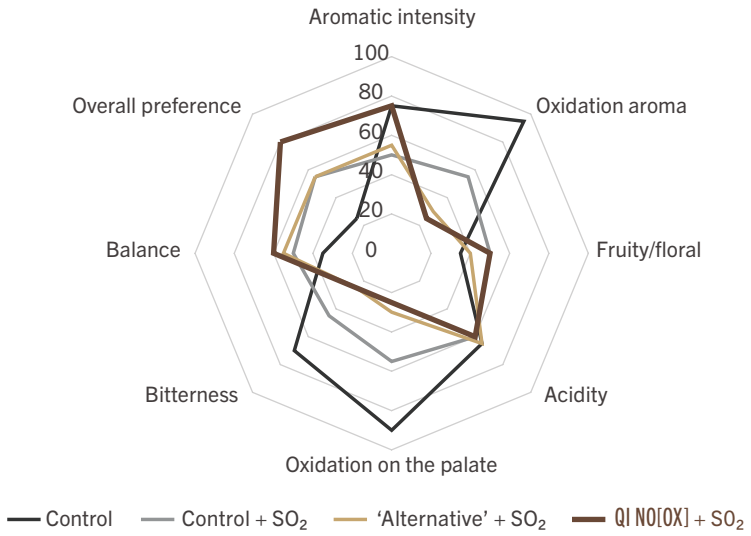
| IOC QI NO[OX]

Remove discoloured, oxidised compounds and improve the sensory profile.

- Consists of pea protein, chitosan and selected, ultrafiltered bentonite that assists with rapid sedimentation. It is an alternative to casein. It has been developed for its anti-oxidative properties, to be used in must.
- Application: Remove the brown discolouration, as well as caramel and Madeira notes; increase freshness; reduce vegetal notes and bitterness.
- Dosage: 30 - 80 g/hL
- SKU: 1 kg

The anti-oxidative action of Qi No[Ox] was compared to that of an 'alternative' treatment (PVPP, plant protein and bentonite) in a blend of Pinot noir and Chardonnay, particularly affected by oxidation. Before the treatment, the wine had distinctive oxidative notes on both the nose and the palate, accompanied by a bitterness typical of intense oxidation and a lack of fruity/floral character.

Each of the two formulations tested (**QI NO[OX]** and the 'alternative') was able to change the quality of the wine from average to being appreciated by the tasting panel. However, wines treated using the 'alternative' formulation were scored as weaker and more unbalanced, unlike the treatment with **QI NO[OX]**, which fully preserved the sensory characteristics of the wine.



PRIMARY FERMENTATION

YEAST

Traditional and neutral

| IOC 18-2007

Reference strain for base wine production.

- *S. cerevisiae*.
- Sensory: Traditional, neutral and elegant.
- Application: All base wine varieties.
- Notes: Isolated by IOC in Epernay; well adapted to fermentation under difficult conditions (low temperature and pH; high alcohol); respects varietal character; good glycerol production; producer of low volatile acidity, SO_2 and foam quantities; good implantation, complete breakdown of sugars and low nutrient requirements; ideally suited to making wines with the Traditional Method and Charmat Method.
- Dosage: 20 g/hL
- SKU: 500 g

Neutral

| LEGACY N 96

Strong fermenting, all-purpose wine yeast.

- *S. cerevisiae* subsp. *bayanus*.
- Sensory: Neutral sensory contribution allows varietal character to dominate.
- Application: All white base wine varieties.
- Notes: Robust and respects varietal character.
- Dosage: 20 g/hL
- SKU: 1 kg; available on pre-order: 5 kg

FERMIVIN CHAMPION

Robust yeast for respecting varietal characters.

- *S. cerevisiae* subsp. *bayanus*.
- Sensory: Neutral.
- Application: All base wine varieties.
- Notes: Respects varietal character; adapted for fermentation under extreme fermentation conditions of low pH and temperatures.
- Dosage: 20 - 30 g/hL
- SKU: 500 g

Aromatic

ALCHEMY I

White base wines with fruity and floral esters.

- Yeast blend.
- Sensory: Fruity and floral esters, tropical fruit and citrus aromas and some volatile thiols add to complexity.
- Application: Aromatic base wine production of white varieties.
- Notes: Cold fermentation; high alcohol tolerance; enhanced ester production.
- Dosage: 20 g/hL
- SKU: 1 kg

ALCHEMY II

White base wines with volatile thiols.

- Yeast blend.
- Sensory: Enhanced thiol aromas.
- Application: Base wine fermentations of white, thiolic varieties.
- Notes: Cold fermentation; high alcohol tolerance.
- Dosage: 20 g/hL
- SKU: 1 kg

LEGACY NT 116

Crisp, aromatic white and fruity rosé base wines.

- *S. cerevisiae* x *S. cerevisiae* hybrid.
- Sensory: Tropical, fresh and volatile thiols, like guava and gooseberry aromas, enhances neutral varieties.
- Application: Enhanced neutral base wine varieties; rosé base wines.
- Notes: High sugar, alcohol and cold tolerance; intense ester production.
- Dosage: 20 g/hL
- SKU: 1 kg; available on pre-order: 5 & 10 kg

LEGACY VIN 13

Aromatic white and fruity rosé base wines.

- *S. cerevisiae* subsp. *cerevisiae* x *S. cerevisiae* subsp. *bayanus* hybrid.
- Sensory: Fresh, fruity and floral in white base wines; red fruit in rosé base wines.
- Application: All white base wine varieties; rosé base wines.
- Notes: Robust and aromatic; fast fermentation rate; extremely sugar, alcohol and cold tolerant; good mouthfeel at low fermentation temperatures.
- Dosage: 20 g/hL
- SKU: 1 kg; available on pre-order: 5 & 10 kg

IOC BE FRUITS

White and rosé base wines with fruity esters.

- *S. cerevisiae*.
- Sensory: Pineapple and citrus notes.
- Application: All white and rosé base wine varieties.
- Notes: Reduced formation of acetaldehyde; none to low SO_2 production.
- Dosage: 20 g/hL
- SKU: 500 g

IOC BE THIOLS

White and rosé base wines with fruity thiols.

- *S. cerevisiae*.
- Sensory: Citrus, exotic fruits and pineapple.
- Application: All white base wine thiol varieties, as well as Chenin blanc; rosé base wines.
- Notes: Reduced formation of ethanal; none to low SO_2 production.
- Dosage: 20 g/hL
- SKU: 500 g

Rosé

IOC FRESH ROSÉ

Complex and round rosé base wines.

- *S. cerevisiae*.
- Sensory: Floral, citrus, spice and varietal characters.
- Application: Rosé base wines from red varietals.
- Notes: Contribute to mouthfeel; reduce aggressive sensations like acidity, dryness and bitterness; express the varietal notes; enhance floral notes.
- Dosage: 20 g/hL
- SKU: 500 g

YEAST SUMMARY

APPLICATION	YEAST STRAIN	BASE WINE VARIETALS								BASE WINE STYLE						Relative nitrogen requirement	Temperature range °C	Fermentation speed	Sensory effect	MLF compatibility
		Chardonnay	Chenin blanc	Sauvignon blanc	Pinot blanc	Pinot gris	Pinot meunier	Pinot noir	Other red varietals	Rosé	Classic fermenter	Enhances structure	Fruit forward	Neutral whites	Aromatic whites					
TRADITIONAL & NEUTRAL	IOC 18-2007	●	●	●	●	●	●	●	●	●	●			●		Low	10 - 25	Fast	Neutral; mouthfeel	
NEUTRAL	LEGACY N 96	●	●		●									●		Low	12 - 25	Moderate	Neutral	
	FERMIVIN CHAMPION	●	●		●									●		Medium	15 - 25	Moderate	Neutral	
AROMATIC	ALCHEMY I	●	●	●		●									●	Medium	13 - 16	Fast	Enhanced varietal character; esters	
	ALCHEMY II			●								●	●			Medium	13 - 16	Fast	Enhanced varietal character; thiols	Good
	LEGACY NT 116		●		●	●						●	●		●	Medium	12 - 16	Fast	Esters	
	LEGACY VIN 13	●	●	●						●			●		●	Low	12 - 16	Fast	Enhanced varietal character; esters	
	IOC BE FRUITS		●	●						●			●		●	Low	12 - 20	Medium-fast	Enhanced varietal character; esters	
	IOC BE THIOLS			●						●			●			Medium	15 - 18	Fast	Enhanced varietal character; thiols	
ROSÉ	IOC FRESH ROSÉ						●	●	●	●						High	14 - 24	Moderate	Enhanced varietal character; floral notes	

NUTRIENTS

It is imperative to understand the nutritional requirements of the yeast in order to ensure successful fermentations and prevent sluggish or stuck fermentations. Being aware of and managing the nutrient requirements of the yeast will:

- Ensure regular and complete fermentations.
- Enhance sensory profiles.
- Reduce the risks for off-flavour production like sulphur compounds.

During the preparation of the starter culture, the yeast requires amino acids (organic nitrogen) and micronutrients to ensure strong, robust and resistant yeast cells, whilst inorganic nitrogen sources, together with survival factors, are required to complete the fermentation without the risks of off-flavour formation.

The completion of the alcoholic fermentation in sparkling base wines can be challenging due to the acidic environment. Initially, during the growth phase, the yeast requires amino acids, vitamins and minerals to build sufficient biomass and sufficient stress resistance. The presence of ethanol and a high concentration of inorganic nitrogen inhibit the assimilation of amino acids. Therefore the optimal time of addition for organic nitrogen is during the preparation of the starter culture. The optimal use of a rehydration agent will shorten the lag phase and prevent the production of H_2S and volatile acidity. Due to the challenging conditions during fermentation, it is important to ensure that the yeast has access to essential vitamins, minerals, sterols and nitrogen. This can be ensured with the use of complex nutrients during the fermentation.

The optimal use of rehydration and nutritional products will minimise the impact of stress factors on the yeast performance.

Glutathione solution

Glutathione addition to the must results in greater oxidative protection, while a lower phenolic concentration can be observed in the corresponding wines. Results indicate that glutathione has a promising role in the future of sparkling wine production, particularly due to the possible reduction of SO_2 usage.

| IOC GLUTAROM EXTRA

Early preservation and protection of wines with low sulphur levels.

- Glutarom Extra is an inactivated yeast product rich in glutathione, protecting the wine against browning and oxidation.
- Composition: Inactivated yeast.
- Application: Oxidative protection of the wine; protect aroma compounds; the preservation of fruitier aromas and increased mouthfeel in white and rosé base wines; add as early as possible before or at the start of alcoholic fermentation.
- Dosage: 15 - 30 g/hL
- SKU: 1 kg

Rehydration

| ANCHOR REVIVE

Enhanced yeast viability, stress resistance and wine quality.

- A 100% yeast-derived formulation that provides high levels of essential growth factors like vitamins (pantothenate and biotin) and minerals that act as enzymatic co-factors (magnesium, manganese and zinc).
- Composition: Inactivated and autolysed yeast.
- Application: Improve yeast acclimatisation, implantation, viability and metabolism; increased stress resistance to challenging fermentation conditions; reduced risk of off-flavour formation.
- Dosage: 30 g/hL
- SKU: 1 & 5 kg

Organic

| IOC ACTIVIT NAT

Organic source of amino acids and vitamins.

- Activit Nat is a fermentation activator that provides amino acids, small peptides and stress resistance factors that are absorbed by the yeast throughout alcoholic fermentation. This activator is intended for musts with low or moderate nitrogen deficiencies.
- Composition: Inactivated yeast.
- Application: Balanced alcoholic fermentation; completion of alcoholic fermentation; contributes to organoleptic quality of the wine; reduces the risk of the production of sulphur compounds; enhance varietal aroma characters.
- Dosage: 20 - 40 g/hL
- SKU: 1 kg

Complex

| IOC ACTIVIT

Prevent and treat nutrient deficiencies.

- A mixture to be used during a sluggish alcoholic fermentation and it will also maintain the fermentation when there is a nitrogen deficiency in the must.
- Composition: Inactivated yeast, DAP and thiamine.
- Application: Provides inorganic and organic nitrogen; adsorption of short chain fatty acids that can inhibit fermentation; provides sterols and long chain fatty acids which are essential precursors in maintaining yeast viability, especially in challenging conditions; provides vitamins and minerals to ensure uniform yeast development.
- Dosage: 20 - 40 g/hL (preventative treatment and mid-fermentation) or 40 - 50 g/hL (more challenging fermentation conditions).
- SKU: 1 kg

MALOLACTIC FERMENTATION

Malolactic fermentation (MLF) is dependent upon winemaker preference. Conducting MLF in the base wine helps to soften high-acid wines and reduce the malic acid for better microbial stability. It is common to put a portion of the base wine through MLF and then blend it with wine that has not undergone MLF in order to achieve a balance of acidity, freshness, rounded mouthfeel and fruity aromas. Stylistically, some winemakers prefer not to have the base wine go through MLF to maintain the freshness and fruity aromas in the wine.

There are various options in terms of the timing of inoculation, each with its own benefits and considerations.

When to inoculate for MLF

The unfavourable conditions in base wines can make MLF very difficult. Temperature, pH, alcohol, SO_2, polyphenols, medium chain fatty acids and nutritional levels all affect malolactic bacteria growth and activity. Low temperatures can inhibit malolactic bacteria. High temperatures (above 25 °C) and high levels of alcohol or SO_2 can kill malolactic bacteria.

If MLF is desired, co-inoculation is generally recommended. The low pH and alcohol of a base wine can be inhibitory to MLF. With co-inoculation, not only does the heat of the primary fermentation help the MLF to complete at a faster rate, but the active yeast also metabolise the diacetyl and diminish or eliminate it completely, resulting in fresher and more fruity wine styles. If the pH is lower than 3.1, a standard 7 - 10 day build-up bacteria culture is recommended.

Stuck or sluggish MLF may be caused by difficult conditions in the wine or by the malolactic bacteria not being able to multiply and reach the minimum population required for fermentation. A selected bacteria starter culture will ensure a faster start to the MLF, increase survival rates and lower the risk of problems from undesirable bacteria (biogenic amines, VA, off-flavours and aromas, etc.).

Options for the timing of MLF:

TIMING	Good for:	Requirements:
CO-INOCULATION (at start of AF)	• Fruity wines • Early release wines • Protection against microbial spoilage	• Temperature control • Potential alcohol level below 15% • A yeast suited for co-inoculation
EARLY INOCULATION ($^2/_3$ through AF)	• Roundness & intensity • Early release wines • Protection against microbial spoilage	• Temperature control • A yeast suited for co-inoculation
SEQUENTIAL INOCULATION	• Complex & structured wines • Preservation of aromas	• Robust MLF strain depending on the conditions
DELAYED INOCULATION (during month after AF)	• Adjust oxygenation levels • Stabilise colour	• Monitor & stabilise potential contaminants • Potentially increase the temperature

Recommendations for successful MLF

- Moderate use of sulphites:
  - Free SO_2 <10 mg/L.
  - Total SO_2 <50 mg/L.
  - Where the SO_2 is higher, alternative measures must be considered.
- Temperatures that are optimal for the selected bacteria culture:
  - Temperatures between 17 and 24 °C maximum, ideally: 18 - 20 °C.
- Alcoholic fermentation:
  - Use a yeast that is compatible with MLF, especially with early or co-inoculation.
- Nutrition can be key to successful MLF.
- MLF should be completed (malic acid <0.2 g/L) before the second fermentation commences as bacteria do not settle well during riddling.

BACTERIA

| IOC INOBACTER

Low pH must and wine.

- *Oenococcus oeni*.
- The strain was isolated by the Le Comité Interprofessionnel du vin de Champagne and is the strain of choice for many sparkling wine producers when MLF is desired. Contributes a neutral sensory effect, especially in lower pH wines. It is able to conduct MLF in the most difficult wine conditions.
- Application: Tolerant of very low pH conditions (>2.9); ensure MLF under challenging conditions; requires three steps: reactivation, starter culture and inoculation.
- Dosage: 0.72 g/hL (bacteria) or 4 g/L (reactivation medium).
- SKU: 25, 100 & 1 000 hL kits

NUTRITION

Factors that increase the need for sufficient bacteria nutrition:

- *Oenococcus oeni* (*O. oeni*) bacteria grow slowly and are not as competitive for nutrients.
- Some musts have naturally low nutrient levels.
- Indigenous microflora compete for the same nutrients.
- Highly clarified wines are often stripped of their nutrients.

The compatibility of the selected yeast for AF and the selected bacteria for MLF is very important. The nutritional requirements of the yeast during the primary fermentation will influence the nutrients available for the bacteria. A smaller yeast population with little autolysis or a yeast strain that does not fully undergo autolysis may not release sufficient nutrients.

Oenococcus oeni have complex nutrient needs and wine is often a poor source of these nutrients. Malolactic bacteria require sugar (fructose, glucose), organic acids (malic, citric, pyruvic), organic nitrogen (amino acids, peptides), vitamins (B group, pantothenic acid) and trace minerals (Mn, Mg, K, Na).

| IOC NUTRIFLORE FML

Nutrient to accelerate malolactic fermentation.

- Nutriflore FML is selected for its high level of nutrition and survival factors and is designed to accelerate MLF.
- Composition: Inactivated yeast.
- Application: Provides elements required for the proper growth of the bacteria in wine (amino acids, minerals and vitamins); provides peptides needed by the bacteria to increase resistance to the wine acidity; effective for wines with a low pH (<3.4), especially sparkling base wines.
- Dosage: 20 g/hL
- SKU: 1 kg

PROTECTION

SULPHUR DIOXIDE

| INODOSE 5

Sulphur adjustment in barrels.

- Inodose 5 contains effervescent potassium metabisulphite tablets that release sulphur dioxide when added to must or wine.
- Application: For the easy adjustment of the sulphur in wines being aged in barrel; useful when low dosages of sulphur dioxide is required; allow gradual, uniform release of the required dosage of SO_2.
- Dosage: One tablet of Inodose 5 releases 5 g of SO_2.
- SKU: 42 tablets

FINING THE WINE

Fining agents can be used for many purposes in winemaking, including:

- Clarification.
- Filterability improvement.
- Prevention of haze and sediment formation.
- Improvement of organoleptic profile and wine colour.
- Removal of undesirable elements from wine.

Each fining agent has specific properties and reacts with various wine constituents depending on its origin, charge density, molecular weight and chemical properties. Product preparation, temperature, pH, metal content of the wine and previous fining treatments are factors that can influence the effectiveness of the fining process.

Fining base wines is a safer and more manageable practice than fining finished wines:

- It is especially important in the case of rosé base wines.
- It is necessary to reduce the polyphenolic and colloidal charges.
- A lack of fining could result in some very light sediment (colouring matter) that can appear with time.
- It avoids future issues that cannot be rectified with the use of riddling aids and adjuvants.

IOC BENT'UP

Bentonite for protein stabilisation.

- High-performance, active sodium bentonite granules for stabilisation. Proteins are also involved in bubble formation, therefore over-fining with bentonite should be avoided.
- Application: Clarification and improved stability; protein elimination in white wines prevent potential cloudiness; removal of reactive polyphenolic fractions reduce the precipitation of colour in the bottle; reduce percentage loss.
- When sending your wine samples to Vinlab to determine protein stability, you can request the analysis to be performed with IOC Bent'Up. This ensures true, reliable and accurate results when determining the correct product dosage.
- Dosage: 30 - 80 g/hL
- SKU: 25 kg

IOC QI NO[OX]

Treat oxidised wines and improve the sensory profile.

- Consists of pea protein, chitosan and bentonite that assist with rapid sedimentation. It is an alternative to casein. It has been developed for its anti-oxidative properties, to be used in wine.
- Application: Efficient removal of oxidised compounds while preserving the intrinsic qualities; restore freshness and fruitiness, as well as reviving the colour of oxidised wines; lessen organoleptic defects by eliminating bitter notes and oxidative aromas, while preserving aroma and taste properties.
- Dosage: 20 - 60 g/hL (white and rosé wine).
- SKU: 1 kg

IOC FYNEO

Reduce bitterness and astringency.

- An innovative, granulated yeast protein extract for fining white and rosé base wines. Can be used as an alternative to isinglass, gelatine and albumin.
- Application: Refine wines by eliminating harsh and bitter back palate notes; reduce astringency and bitterness; preserve aromatic profile.
- Dosage: 1 - 15 g/hL
- SKU: 1 kg

IOC QI FINE

Improve colloidal stability.

- A natural, biodegradable, non-allergenic product for fining wine. Qi Fine is a blend of chitosan and pea protein, specifically selected for its strong reactivity to phenolic compounds.
- Application: Correct colour and reduce bitterness and astringency; improve filterability and colloidal stability.
- Dosage: 10 - 30 g/hL
- SKU: 1 kg

MCC PRODUCTION | WHOLE BUNCH PRESS AND FLOTATION

CHARDONNAY		PINOT NOIR
Add to juice bin while grapes are loading. **SULFITANIN** 30 mL/hL Time lapse: 60 min	**HARVEST**	Add to juice bin while grapes are loading. **SULFITANIN** 30 mL/hL Time lapse: 60 min
INOZYME TERROIR Cuvée: 2 g/hL | Tailles: 3 g/hL Pectin test. **SULFITANIN** 20 mL/hL	**PRESS**	**INOZYME TERROIR** Cuvée: 2 g/hL | Tailles: 3 g/hL Pectin test. **ACTICARBONE** (if necessary) Cuvée: 10 - 40 g/hL Tailles: 30 - 80 g/hL **SULFITANIN** 20 mL/hL
COLORPROTECT V 20 - 80 g/hL **QI'UP XC** 5 g/hL	**FLOTATION** OR (if using charcoal) **BENT'UP** 10 - 20 g/hL (prepare 3 h in advance) Time lapse: 90 min	**INOFINE V MES** 70 mL/hL
	RACKING	
BE FRUITS OR **18-2007** 20 g/hL	**ALCOHOLIC FERMENTATION**	**FRESH ROSÉ** OR **18-2007** 20 g/hL
ACTIVIT 30 g/hL	1/3 Fermentation: **NUTRITION**	**ACTIVIT** 30 g/hL

TO BUBBLES

The secondary fermentation (*prise de mousse*) is done in the bottle, which are then left to rest on their side, allowing for completion of the fermentation. It can take anywhere from weeks to months to complete (average time of 6 - 8 weeks), after which it is up to the discretion of the winemaker to decide the length of time the wine will age on the lees, depending on the style of wine desired (or prescribed legislation).

The main aim of the secondary fermentation is to obtain a sparkling wine with about six bar of pressure at 10 °C. At the start of the fermentation, an initial concentration of 1-2x10^6 cells/mL must break down approximately 24 g/L of sugar. This consumption of sugar is accompanied by an increase in alcohol of 1.0 - 1.5%, with a final concentration of carbon dioxide of about 10 - 12 g/L.

Base wine parameters

There are various parameters that should be considered. Not just for the impact they will have on the success of the secondary fermentation, but also the role they will play in determining the processing of the wine, downstream decision making and final wine quality.

- pH 3 - 3.2. It is important to avoid a pH above 3.3 and below 2.9. Below this value, yeast activity is negatively impacted.
- High total acidity of more than 7 g/L.
- Free SO_2 of 10 - 15 mg/L. SO_2 strongly influences the yeast activity.
- Temperature >10 °C.
- Alcohol of below 11.5%. During the second fermentation, the alcoholic percentage will increase by 1.0 - 1.5%.
- Dissolved CO_2. It is estimated that 0.4 g/L of dissolved CO_2 can inhibit yeast activity by as much as 40%.
- Microbiological stability. MLF will de-acidify the wine and stabilise it in terms of microbiological contamination. In the absence of MLF, careful work in the winery and impeccable filtration will be necessary to guarantee the absence of any spontaneous MLF in the bottle.
- Tartrate stability. In the case of potentially unstable wines, suitable fining, followed by tartrate stabilisation in order to prevent the crystallisation of potassium bitartrate or calcium tartrate is important, as these may cause serious problems later during disgorgement. In the great majority of cases, careful filtration may be carried out after stabilisation in order to ensure the wine's clarity. During the stabilisation-filtration stages, it is important to minimise oxygen exposure.

Considerations for the second fermentation

In bottle

- **Temperature.** The minimum temperature for tirage to ensure a good second fermentation in bottle is 11 °C. The ideal temperature is 15 °C. It helps with the survival capabilities of the yeast (tolerating molecular SO_2, the assimilation of toxins and better viability). Ideally, the temperature must not exceed 18 °C. Above this temperature, there can be a higher production of biomass, which can result in riddling and disgorging issues. When preparing the tirage mixture (blend of base wine, starter culture and adjuvant), ensure that the temperature difference between the starter culture and the base wine is less than 10 °C. When tirage is complete, it is imperative that bottles be stored horizontally to maximize the surface area of the yeast to the wine and thus to the sugar, for a complete alcoholic fermentation.
- **Tartaric stabilisation.** Tartaric stabilisation must be completed prior to tirage. Several tartaric stabilisation techniques exist (e.g. cold stabilisation or electrodialysis) and it is important that the wine is tartrate stable in order to avoid gushing.
- **Protein stability.** Proteins may contribute to bubble finesse, but conversely could cause haze formation in the bottle by flocculating when their concentration is too high. It is important to use a suitable bentonite to remove proteins from the base wine to avoid issues such as haze or gushing.
- **Fining/filtration.** These processes must be carefully completed prior to tirage to help with the riddling stage and avoid potential issues. In the case of base wine without complete MLF, sterile filtration is imperative.

In tank

If the base wine is not protein and/or tartrate stable, it is still possible to stabilise the wine in the pressure tank. It is preferable to make these stabilisation operations prior to the second fermentation in order to have the flexibility to mature the sparkling wine on lees for a longer period.

- **Temperature.** The choice of temperature is determined according to the desired wine profile and the required release date of the sparkling wine. For early release, it is recommended to increase the temperature to around 20 °C to boost the fermentation kinetics. At high temperatures, the fermentation is faster and produces extra biomass that can be easily eliminated by filtration prior to the final bottling.
- **Inoculation rate.** For a faster fermentation, you could increase the inoculation rate of the starter culture by 10%.

Factors that increase the risk of sluggish or stuck fermentations

- Base wine alcohol >12.5%.
- Base wine free SO_2 >15 - 20 mg/L (a lower pH will also influence the SO_2 effect).
- Yeast have not been prepared or acclimatised adequately and sufficiently.
- Insufficient yeast nutrition.
- Temperature of the cuvée is too low.
- Temperature fluctuations occur during the secondary fermentation.
- Too high CO_2 levels.

FERMENTATION

Tirage is the addition of yeast to the bottle for secondary fermentation. Care must be taken to have a clarified base wine and a healthy yeast starter culture. The tirage addition is a mixture of yeast, sugar, nutrients and an adjuvant/riddling aid (*liqueur de tirage*) that is added to the base wine and kept in suspension by mixing. This is then added to each bottle for the secondary fermentation.

YEAST AND REHYDRATION

The characteristics of a base wine are extremely unfavourable when it comes to fermentation, in comparison to the optimum conditions for yeast growth:

BASE WINE PARAMETERS	
Temperature: 11 - 15 °C	**Free SO_2:** 5 - 15 mg/L
Alcohol content: 11 - 11.5%	**pH:** 3.0 - 3.2

As a result, the selection of the yeast strain has to take into consideration the following:

- Suitability to the process and challenges of the second fermentation. Ideally the yeast should have the following characteristics: alcohol, cold, SO_2 and pressure tolerance, minimum SO_2 production, ability to ferment to dryness, autolysis after fermentation completion, not stain the wall of the bottle, desirable flocculating ability (efficient riddling), produce no off-odours and have a desirable effect on carbonation.

- Meeting the specific requirements of sparkling wines in terms of the required sensory profile. The autolytic capability of the yeast plays a vital role. Some yeast strains are selected for their autolytic capacity, i.e. their ability to fragment rapidly and completely at the end of their life cycle, and in so doing release compounds that contribute to full-bodied and aromatic complexity. In a sparkling wine, contact between the wine and lees is vital for product quality and a yeast with a high autolytic potential can prove to be a powerful tool in balancing sensations of acidity and roundness, while at the same time contributing to length on the palate.

Creating the starter culture (*prise de mousse*)

The aim of this step is to gradually acclimatise the yeast to the difficult fermentation conditions the yeast will encounter in the base wine. Therefore, this is considered to be a key step in the success of the secondary fermentation. The choice of yeast strain is also essential.

Three essential stages in preparing a starter culture:

1. **Protection and rehydration of the yeast.** The use of a rehydration agent, naturally rich in vitamins, minerals and sterols, reinforces the yeast membrane and helps intra-cellular exchanges. It increases the robustness of the yeast and enhances the ability to resist difficult conditions (pressure) at the end of alcoholic fermentation.
2. **Yeast starter culture acclimatisation to alcohol.** During this stage, the yeast metabolise sugar and adapt, due to a gradual increase in alcohol content. It is important to add a nitrogen source to optimise the fermentation and increase biomass production in the final stage.
3. **Multiplication (production of biomass).** This step allows the starter culture to multiply in order to achieve, at the addition of the tirage mixture, an active fermentative culture with a high cell concentration. To maintain sufficient activity and increase effectiveness of the biomass, it is strongly recommended to add a second dose of organic nutrition. It is essential to follow recommendations in terms of temperature and aeration for a good starter culture.

IOC 18-2007

Reference strain for secondary fermentation.

- *S. cerevisiae*.
- Sensory: Traditional, neutral and elegant, with enhanced mouthfeel.
- Application: All base wine varieties.
- Notes: Isolated by IOC in Epernay; well adapted to fermentation under difficult conditions (low temperature and pH; high alcohol); respects varietal character; good glycerol production; producer of low volatile acidity, SO_2 and foam quantities; good implantation, complete breakdown of sugars and low nutrient requirements; ideally suited to making wines with the Traditional Method and Charmat Method.
- Dosage: 20 g/hL
- SKU: 500 g

ANCHOR REVIVE

Ensuring enhanced yeast viability and wine quality during rehydration.

- A 100% yeast-derived formulation that provides high levels of essential growth factors like vitamins (pantothenate and biotin) and minerals that act as enzymatic co-factors (magnesium, manganese and zinc).
- Composition: Inactivated and autolysed yeast.
- Application: Improve yeast acclimatisation, implantation, viability and metabolism; increased stress resistance to challenging fermentation conditions; reduce risk of off-flavour formation.
- Dosage: 30 g/hL
- SKU: 1 & 5 kg

BOTTLING

NUTRITION

Alcohol present in the base wine is a stressor that negatively impacts the yeast, reducing fermentation and nitrogen assimilation ability. In order to complete the fermentation and increase their resistance to alcohol, the yeast requires survival factors, oxygen, detoxifying agents and ammonium ions.

Due to the depletion of nutrients during the primary fermentation, this must be addressed in the secondary fermentation to minimise the risk of a stuck fermentation. Due to the adverse conditions (low temperature, low pH and alcohol), providing sterols is essential during the yeast acclimatisation and tirage stage. During the fermentation process, the yeast should, at a minimum, be supplied with ammonia salts and thiamine.

IOC EXTRA PM

Optimise bottle fermentation and enhance the sensory profile.

- Extra PM is a fermentation activator specifically intended for bottle fermentation and contains inactivated yeast that is naturally rich in glutathione.
- Application: Guarantee optimal yeast activity; retain membrane exchange capacity, especially in the case of continuous yeast starter cultures; guarantee the optimal physiological state of the yeast, especially after 2.5 kg pressure; improve wine ageing potential; limit reduction phenomena during bottle fermentation; conserve varietal and fruity aromas; enhance roundness, elegance and length in sparkling wines.
- Dosage: 10 - 30 g/hL
- SKU: 1 kg

IOC PHOSPHATES TITRES

Promote significant yeast biomass.

- Phosphates Titres is a blend of DAP and thiamine (vitamin B1) for nutrient supplementation of deficient must/juice. Wine yeast requires a supply of thiamine for cell growth. Phosphates Titres can help ensure regular yeast multiplication and sugar utilisation. For secondary fermentation, add Phosphates Titres to the wine being used for the starter culture.
- Application: Thiamine is an essential growth factor and helps to maintain yeast viability and vitality; encourage fast start to fermentation activation; ensure an even supply of nitrogen right to the end of fermentation; optimise fermentation efficiency.
- Dosage: 5 g/hL
- SKU: 1 & 5 kg

ADJUVANTS AND RIDDLING AIDS

Riddling is the movement of the bottles after the secondary fermentation. The bottles are gently moved to an inverted position over a period of time either manually or by machine. This brings the yeast lees down into the bottle necks making them ready for disgorging. Riddling is initiated after the secondary fermentation is complete and can take anything from a couple of days (gyropalette) to three weeks (manually). Riddling agents are used to help move the yeast and sediment from the secondary fermentation smoothly into the neck of the bottle without sticking to the glass.

IOC CLARIFIANT S

[ORGANIC]

Clarification during riddling.

- Clarifiant S is a liquid preparation of sodium bentonite specifically selected for riddling. This product helps to create compact sediment in bottle and assist its movement during riddling. It has a gentle mode of action producing brilliantly clear wine. Robust and multi-purpose, it is suitable for all types of wine and various riddling methods. It perfectly respects the profile of base wines. It is suitable for bio-certified wines.
- Application: A high degree of clarification and sedimentation during riddling; suitable for manual and automated riddling; Clarifiant S can be added directly to the wine after the yeast and sugar have been added.
- Dosage: 60 - 80 mL/hL
- SKU: 1 L

IOC CLARIFIANT XL

Clarification during riddling.

- Clarifiant XL is an optimised riddling agent, consisting of pure bentonite and silicate, which results in excellent compaction of the sediment. This is a liquid riddling additive offering excellent fining properties. This product gives a high degree of clarification and sedimentation, which is particularly effective for difficult riddling operations. No other additives are required for riddling operations. Clarifiant XL provides compact deposits that are non-adherent and easy to remove.
- Application: A high degree of clarification and sedimentation during riddling; suitable for manual and automated riddling; no other co-adjuvant is required for the riddling operation; forms compact, easy to remove sediment.
- Dosage: 60 - 80 mL/hL (sparkling white wines) or 80 - 100 mL/hL (sparkling rosé or red wines).
- SKU: 1, 5 & 10 L

IOC SOLUTION ST

Add structure during ageing on lees.

- Solution ST is a liquid preparation comprising of gallic tannins and copper sulphate, stabilised with SO_2. It prevents off-odours and enhances clarification during riddling. Solution ST enables the preservation of the sensory qualities in wines destined for bottle fermentation. It also improves the wine's potential for ageing and makes riddling easier. Solution ST also helps to prevent oxidation and acts as a preventative and curative treatment for reductive odours. For full-bodied sparkling wines, it increases the structure.
- Application: Prevents oxidation; acts as preventative and curative treatment for reductive odours; assists clarification during riddling; reinforces the ageing potential of the wine; adds structure.
- Dosage: 20 - 40 mL/hL
- SKU: 1 & 10 L

Product summary for tirage mixture

CATEGORY	PRODUCT	APPLICATION	DOSAGE
YEAST	IOC 18-2007	Traditional yeast for Champagne Extremely high fermentation capacity	20 - 30 g/hL
NUTRIENTS	IOC EXTRA PM	Inactivated yeast rich in glutathione Limits reduction & protects aroma Adds roundness, elegance & length	10 - 30 g/hL
	or		
	IOC PHOSPHATES TITRES	Thiamine & DAP Ensures even supply of nitrogen	5 g/hL
TANNINS	IOC SOLUTION ST	Essential for clarification during riddling Prevents oxidation	20 - 40 mL/hL
RIDDLING AGENTS	IOC CLARIFIANT XL	Ensures high degree of clarification & compact sedimentation Assists sediment movement down the bottle Produces brilliant & clear wines	60 - 90 mL/hL
	or		
	IOC CLARIFIANT S	Assists with the riddling process for organic wine production	60 - 90 mL/hL

PROTOCOL FOR YEAST REHYDRATION AND BOTTLING

DAY BEFORE YEAST REHYDRATION

Volume for this step	100 hL of base wine for 2nd fermentation
Add sugar to the wine tank	23 - 25 g (dependent on RS)

DAY 1

Morning

Volume for this step	100 L
Add 2 kg of 18-2007	(20 g/hL)
Add 3 kg of Revive	(30 g/hL)
To 20 L of water at 37 °C	(10 x volume of yeast)
Leave for 20 minutes Mix very well	
Add 2.5 kg sugar to yeast tank Mix until dissolved	
Add 50 L of wine and aerate for 20 min	
Add 25 L of water	

Afternoon

Volume for this step	100 L
Add 5 kg of sugar to yeast tank Mix until dissolved	
Add 50 L of wine and aerate for 20 min	
Add 50 L of water	

Total volume of yeast tank after day 1: 200 L

DAY 2

Morning

Volume for this step	100 L
Add 7.5 kg of sugar to yeast tank Mix until dissolved	
Add 50 L of wine and aerate for 20 min	
Add 50 L of water	

Afternoon

Volume for this step	100 L
Add 10 kg of sugar to yeast tank Mix until dissolved	
Add 50 L of wine and aerate for 20 min	
Add 50 L of water	

Total volume of yeast tank after day 2: 400 L

DAY 3 | 1 HOUR BEFORE BOTTLING

Step 1

Choose one:

Dissolve 2 kg of Extra PM in 20 L of wine	(20 g/hL in 10 x the amount of wine)
Add to wine tank	
OR	
Dissolve 0.5 kg of Phosphates Titres in 5 L of cold water	(5 g/L in 10 x the amount of cold water)
Add to wine tank	

Step 2

Add 400 L of yeast tank to bottling wine tank Mix for 10 minutes	
Add 3 L of Solution ST Mix of 10 min	(30 mL/hL)
Add 9 L of Clarifiant XL Mix for at last 30 minutes before bottling Continue mixing for duration of bottling	(90 mL/hL)

Ageing on lees and riddling

- Adequate ageing sur-lie is one of the most important production steps.
- It is required to develop roundness, body, general flavour and complexity of the wine.
- 'Yeasty' characters develop during this stage and result in increased levels of amino acids, esters, fatty acids, amides and terpenoids, that alter flavour and complexity and may also enhance bubble formation.
- Higher pH and temperatures increase the rate of autolysis, but it might have negative effects on the bubble retention and sensory attributes. The optimal temperature for proteolysis has been reported to be around 12 ˚C.
- Yeast strains vary in their autolytic capacity, influence on foaming properties and therefore their impact during lees ageing.
- The sediment collected during riddling consists of yeast cells, protein material, tartrate deposits and riddling aids. The longer the ageing period, the more homogenous the sediment will be and less separation of the insoluble particles will take place. Therefore, wines that have spent longer periods on the lees are usually easier to riddle. Other factors that affect successful riddling includes yeast strain, sediment volume, fermentation rate, storing conditions, the use of riddling aids and riddling method.

DISGORGEMENT

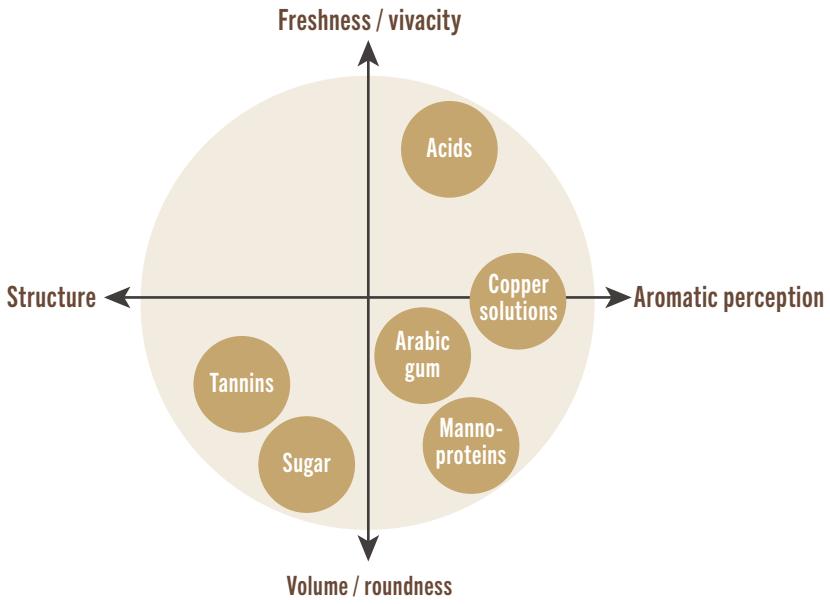
After the wine has gone through the secondary fermentation, ageing, and riddling, the bidule stopper, which now holds the yeast plug in the neck of the bottle, is removed via disgorgement (if done mechanically). Prior to removing the crown cap the bottles, on point, are cooled (4 - 10 °C) and the top 2.5 cm of the neck is frozen in a glycol solution (-27 °C). This allows the crown cap to be removed and the bidule containing the yeast plug to be expelled. Disgorging may take place manually or by machine and should be done at lower temperatures to reduce CO_2 loss. If done correctly, disgorging should not decrease the pressure by more than 2 bar and volume loss is normally about 2%.

DOSAGE

The dosage is the final opportunity to add a distinctive element to the wine. The dosage may include a mixture of sugars, wines, distilled spirits, etc. It also helps determine the sugar level in the finished wine that relates to the dosage classification from brut nature to doux. The dosage solution should be filtered and stable before addition to the bottles.

Aim of dosage

- Preserve quality.
- Mask defects.
- Adjust deficiencies.
- Adapt to market tastes:
  - Supermarket: 12 - 14 g/L.
  - Amateurs: 5 - 8 g/L.
  - Trend: zero dosage.
  - Differences according to countries and time of consumption.
- Create a house style.



- The millilitres of dosage required: $$mL = \frac{\text{(Bottle volume in mL) (Desired sugar level in g/L)}}{\text{(Sugar concentration of stock solution in g/L)}}$$

Optional products for the dosage liqueur

SO_2

- Make prior trials to validate the best dosage.
- Potassium bisulphite gives between 30 and 60% of the free SO_2 dose, according to the disgorging conditions.

ASCORBIC ACID

- Maximum dosage: 15 g/hL.
- Make prior trials to validate the best dosage.
- Usual dosage is between 2.5 - 7 g/hL.
- Long-term effect.
- Always use ascorbic acid in a mixture with SO_2 solution in order to preserve the anti-oxidant action.

CITRIC ACID

- Maximum dosage: addition up to 0.5 g/L, provided that the final concentration is less than 1 g/L.
- Make lab trials to determine the best dosage.
- Always use in conjunction with SO_2 to avoid potential degradation by lactic bacteria and volatile acidity increase.
- Usual dosages are between 2 - 7 g/hL.

METATARTARIC ACID OR CMC

- Crystallisation inhibitors that block nucleation and crystal growth.
- Metatartaric acid maximum legal dosage: 10 g/L.
- CMC is a synthetic cellulose-based polysaccharide.
- CMC prevents crystal growth by altering the crystal face.
- CMC maximum legal dosage: 100 mL/hL.

LACTIC ACID

- Make lab trials to determine the best dosage.
- Usual dosages are between 2.5 - 20 mL/hL.
- Application: light acidification without the aggressive acidic taste of citric acid.

ARABIC GUM

- Arabic gum is polysaccharides rich in D-Galactose, L-Arabinose, L-Rhamnose and proteins.
- Application: to give roundness, softness and balance acidity.
- Maximum dosage: 30 g/hL.
- Dosage: 25 - 100 mL/hL according to the gum and the level of softness required.
- Also stabilise colour in rosé.

COPPER CITRATE OR SULPHATE

- Application: to remove reductive characters.
- Maximum addition of 1 g/hL of copper sulphate or citrate allowed, provided that the residual concentration of copper is not more than 1 mg/L.

TANNINS

- Impact of tannins: structure, eliminate reduction, aromatic persistency.
- Make lab trials to determine the best dosage.
- To improve structure, use 0.7 - 2.7 g/hL of ellagitannin (oak, chestnut) or grape tannins.

BRANDY

- The addition must not increase the alcohol percentage by more than 0.5%.
- Impact on the taste: gives complexity and ageing notes; contribution to the balance on the palate; gives volume in the mid-palate.
- Make lab trials to determinate the best dosage.
- Cognac spirit is used between 25 - 70 mL/hL.

MANNOPROTEINS

- Soluble proteins extracted from yeast cell walls.
- Initial aim: tartaric stabilisation.
- Secondary impact: interaction with aromas (increase or decrease perception and impact the length on the palate); impact on astringency, bitterness and saltiness.
- Make lab trials to determine the best dosage.
- Dosage range from 5 - 15 g/hL according to the mannoproteins used.

Tools for dosage liqueur

Classical dosage liqueur:

- Mix of wine and sugar.
- Different concentrations (500 - 750 g/L).
- Cane or beet sugar.

Liqueur from wine:

- Choice of wine and sugar source important.
- Young and neutral wine: neutral liqueur.
- Young and aromatic wine: aromatic contribution of the liqueur.
- Aged wine: ageing flavours and softness contribution.
- Barrel-aged wine: oak flavours and roundness contribution.

FINISHING TOOLS

Arabic gums

Due to their viscosity, arabic gums are recommended to enhance sparkle consistency in the glass, as well as the finesse and persistence of bubbles, by slowing down the dissolving of the film which separates the bubbles. Some arabic gums are known to contain surface-active molecules in the form of protein fractions. Consequently, these proteins can directly contribute towards stabilising bubbles.

From another angle, the polysaccharide fractions of arabic gums are capable of bonding with proteins at bubble interfaces. The gum's polysaccharides enhance the stability of the film, which separates the bubbles through viscosity, thereby slowing down the draining and future bursting of the bubbles. Consequently, the combination of proteins at wine/gas interface and polysaccharides within the film extend bubble life.

Arabic gums will increase bubble finesse at the surface (collar) while enhancing stability over time. Two bubbles only combine if the film separating them is fine and unstable. The size and structure of arabic gums prevent bubbles from approaching each other and slow down draining, thereby reducing the probability of the bubbles bursting.

IOC FLASHGUM R MF

Improve mouthfeel, volume and fullness.

- A micro-filtered arabic gum in liquid solution, from Seyal acacia. It is a solution of 20% arabic gum, filtered, sulfured at 0.5% and selected for its stabilising and organoleptic properties
- Application: Harmonise the structure of thinner wines and increase the impression of volume and fullness in the mouth; provide wines with protection against various forms of chemical and physical instability; used as protective colloid to stabilise phenol compounds; a solution with a high level of clarity and stability and therefore recommended for treating wines whenever it is necessary to avoid clogging, flocculation or precipitation after bottling.
- Dosage: 20 - 50 mL/hL (white and rosé wines).
- SKU: 25 kg

Mannoproteins

FINAL TOUCH POP

Improve the quality of sparkling wines.

- This is a unique mannoprotein-based solution that enhances the organoleptic qualities of sparkling wines, while also preserving their elegance, freshness and balance. The fermentation aromas and minerality of wines treated with Final touch Pop remain predominant during ageing and storage. The development of oxidative aromas (hints of ripe fruit, nuts and honey) is attenuated and tannins are less astringent.
- Application: Improve the wine's structure and bubble quality; provide a refined aromatic profile and persistence; aid in elegance, freshness and balance; provides smooth and round mouthfeel; limit oxidation to increase longevity; reduce astringency of rosé and tannic sparkling wines; can also refresh base wines.
- Dosage: 20 - 40 mL/hL
- SKU: 1 L

SECOND FERMENTATION PROCESS

TRADITIONAL METHOD

01 | BASE WINE

Base wines intended for secondary fermentation must be high-quality and respect many physical, chemical and flavour criteria. It is important to also consider the impact of the blending, stabilisation and filtration steps.

02 | BOTTLING

The wine is bottled together with the racking solution consisting of the yeast culture, sugar, riddling aids and fermentation starters. Secondary fermentation takes place at 12 - 15 °C over 6 - 8 weeks.

03 | AGEING

During this stage, the lees consist mainly of yeasts in the form of a deposit. Autolysis of the yeast helps improve the wine's sensorial features (aroma, volume, etc).

04 | RIDDLING

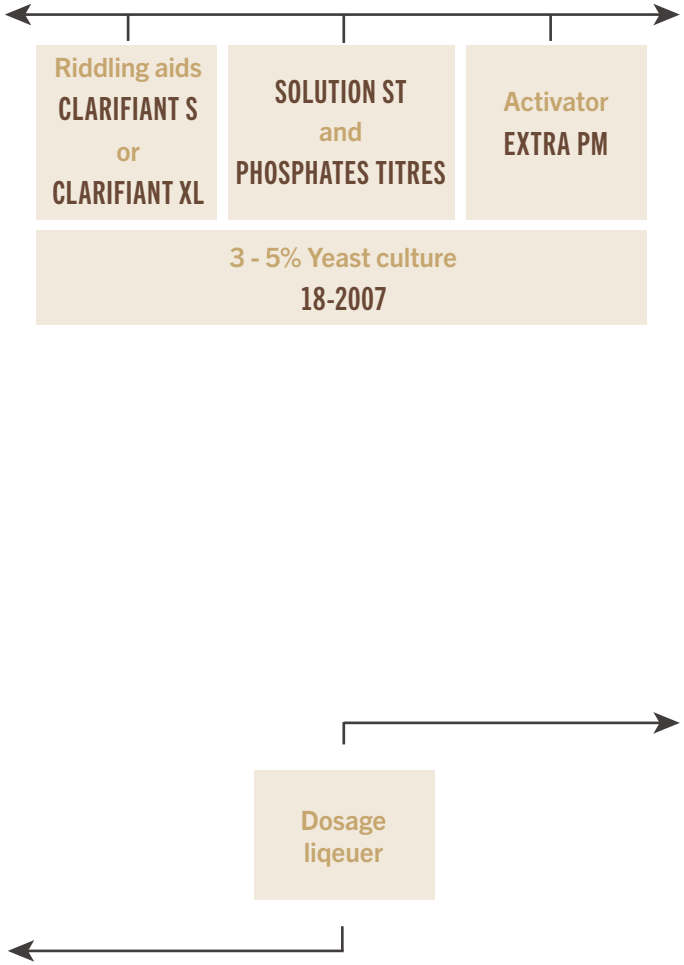
Riddling helps to collect the sediments in the neck of the bottle. This stage affects the quality of the finished product by helping to obtain a brilliant clear wine, perfectly separated from its lees. Ideally, plan for testing before riddling.

05 | DISGORGING

The neck of the bottle is plunged into a -25 to -30 °C glycol solution in order to form an ice plug. On opening, internal pressure helps eject this plug. This process is done mechanically.

06 | DOSAGE

A dosage liqueur is now added to the wine. The amount of liqueur depends on the desired wine type. It is essential to carry out tests for dosage. This stage plays a major part in the quality of the blend. The bottles are then corked, caged and labelled.



CHARMAT METHOD

01 | BASE WINE

Base wines intended for secondary fermentation must be high-quality and respect many physical, chemical and flavour criteria.

02 | BOTTLING

Secondary fermentation is achieved by adding yeast culture, sugar and a fermentation starter within a pressure resistant tank. It generally takes place at 12 - 25 °C over approximately 10 days.

03 | AGEING

Ageing is not always practised. Where it is, it takes place in a tank fitted with an agitator and the duration depends on the character of the sparkling wine desired.

04 | STABILISATION & FILTRATION

Stabilisation by refrigeration at -2 °C, where carried out, may either be on the base wine or at this stage. The wine is filtered at low temperatures.

05 | DOSAGE

The wine is transferred, under pressure, to a buffer tank, thus preserving the dissolved carbon dioxide. The dosage liqueur is now added to the tank. Its nature and quantities need to be evaluated to match the type of wine desired.

06 | BOTTLING

Bottling is carried out at the same pressure. The bottles are then corked, caged and labelled.

Anchor OENOLOGY

CHAPTER 05

CONTACT US

CONTACT DETAILS

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In collaboration with IOC *Révélons votre différence*

CHAPTER 06

PRODUCT SUMMARY

Anchor OENOLOGY

BASE WINE

Primary fermentation

Legacy N 96
Alchemy I
Alchemy II
Legacy NT 116
Legacy VIN 13
Anchor Revive

TO BUBBLES

Fermentation

Anchor Revive

IOC

Révélons votre différence

BASE WINE

Press & downstream processing

IOC Inozyme
IOC Inozyme Terroir
IOC Sulfitanin
IOC Tanin Cristallin

Clarification & juice fining

IOC Colorprotect V
IOC Colorprotect V Mes
IOC Inofine V
IOC Inofine V Mes
IOC Qi'UP XC
IOC Bent'Up
IOC Acticarbone
IOC Qi Fine
IOC Qi No[Ox]

Primary fermentation

IOC 18-2007
IOC Be Fruits
IOC Be Thiols
IOC Fresh Rosé
IOC Glutarom Extra
IOC Activit Nat
IOC Activit

Malolactic fermentation

IOC Inobacter
IOC Nutriflore FML

Protection

Inodose 5

Fining the wine

IOC Bent'Up
IOC Qi No[Ox]
IOC Fyneo
IOC Qi Fine

TO BUBBLES

Fermentation

IOC 18-2007
IOC Extra PM
IOC Phosphates Titres
IOC Clarifiant S
IOC Clarifiant XL
IOC Solution ST

Disgorgement

IOC Flashgum R MF

RAPIDASE

HIGH SPEED ENZYMES SINCE 1922

BASE WINE

Press & downstream processing

Rapidase Expression Aroma
Rapidase Clear
Rapidase Clear Extreme
Rapidase Flotation

Fermivin®

BASE WINE

Primary fermentation

Fermivin Champion

FINAL touch®

WINE PERFECTION

TO BUBBLES

Disgorgement

Final touch POP