MARTIN VIALATTE

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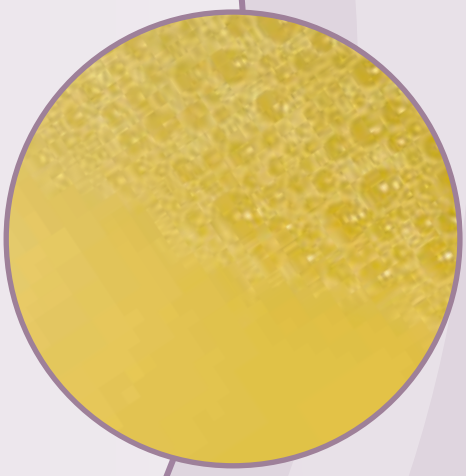
FLOTATION

TECHNOLOGICAL GUIDE

The origins of flotation

Flotation is an ancient practice that has existed for over 2000 years. It is a separation technique based on the difference in hydrophobicity of the surfaces of the particles to be separated. Commonly used in mineral processing for separating different types of mineral and in waste water treatment for removing fats, this traditional technique has proven itself over time. Flotation was first used in wine-making in 1987. Today, it is often used in wine cellars and is highly suitable for musts with a high content of must deposits. This practice thus allows the clarification process to be automated, with a very rapid separation of the solid and liquid phases.



The principle of flotation

Flotation is a dynamic clarification system, where the (relatively simple) principle is fairly similar to an inverted static clarification.

Static clarification consists in separating the deposits from the must before fermentation using spontaneous sedimentation/settling.

After pressing, the must, with its high content of deposits (grape skins, seeds, stalk debris, etc.), contains pectins. These pectins are partially responsible for the viscosity of the must, and have an impact on clarification. In a flotation system, the deposits rise to the surface, forming a froth that is then eliminated.

In order for the deposits to float, it is necessary to:

- encapsulate them in flocs
- incorporate bubbles of gas into the flocs, making them lighter than the must

They are then removed using appropriate suction in a continuous system or after racking of the clear must in a batch system.

Although the principle of flotation is relatively simple to understand, the theory behind the phenomenon is complex. This theory refers to fluid physics such as Stoke's law.

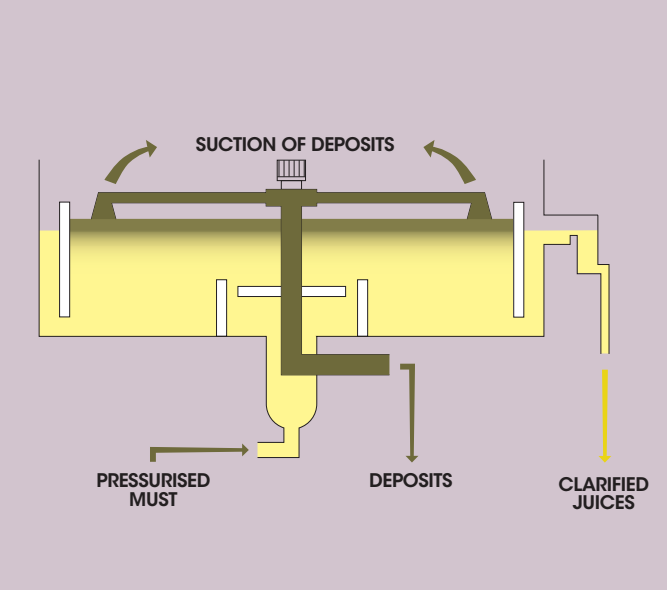
The settling speed of a particle as stated by Stoke's law:

$$\nu = \frac{D_2{}^{*} g}{18\eta} \Delta\rho$$

With
ν = particle speed
D = particle diameter
g = gravitational acceleration
η = fluid viscosity
$\Delta\rho$ = difference in density between fluid and solid

Different types of flotation

Two types of flotation are possible:
1°) continuous
2°) batch

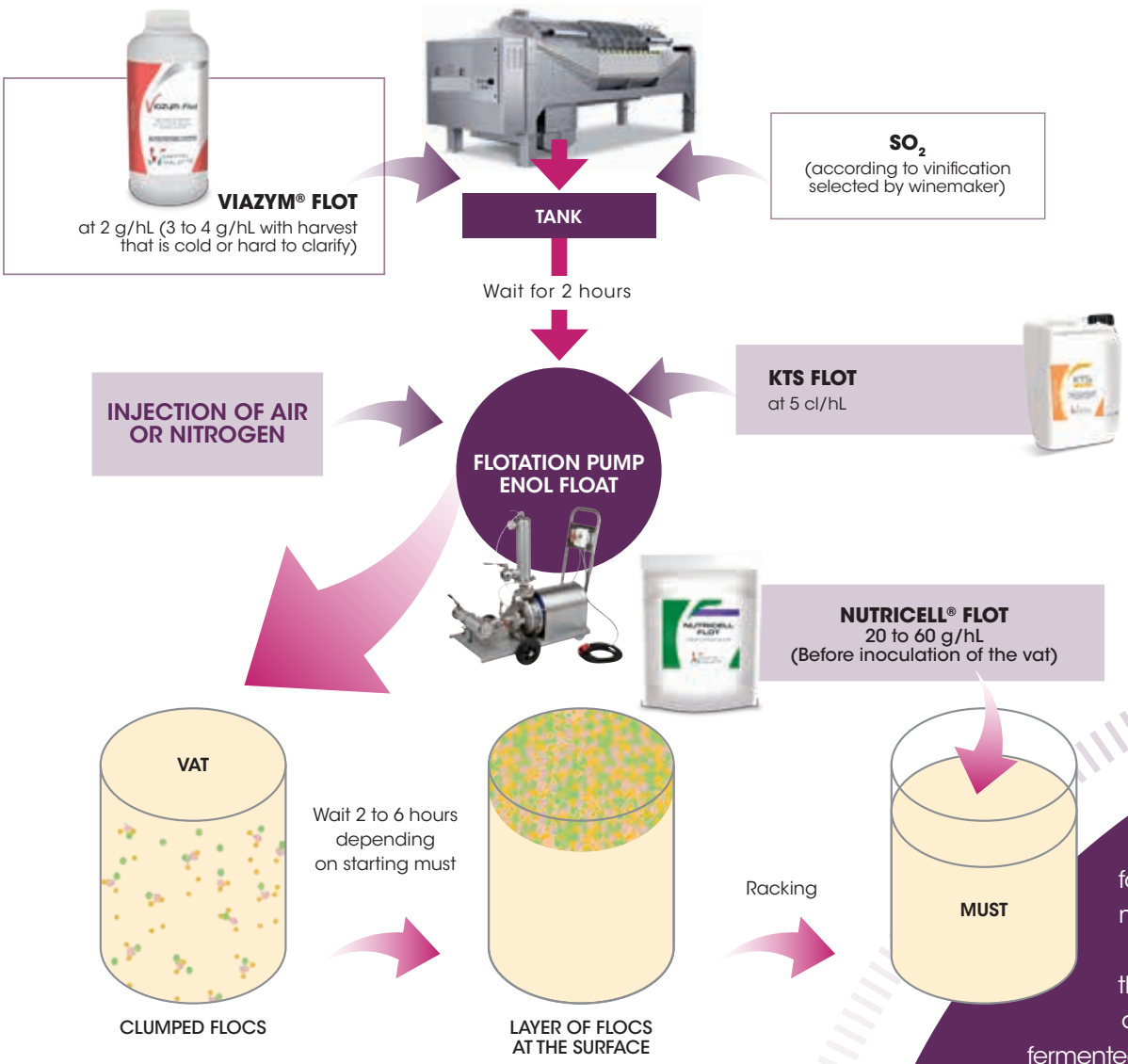


1° Continuous flotation

The unclarified must is fined in-line then passed through the flotation cell, where it is saturated with gas. It is then sent to a flotation vat, where the deposits, combined with the gas, are suctioned or scraped off the surface, depending on their viscosity. The clear must is then collected continuously.

2° Batch flotation

Batch flotation is based on the same principle as continuous flotation. The difference is that this flotation takes place in a closed circuit. The unclarified must is fined, then passed through the flotation pump and sent into the vat. The sudden release of the pressurised gas causes micro-bubbles to form, bringing the small and medium-sized particles to the surface. There is a waiting period of several minutes to several hours as the deposits rise to the surface.
Once all the suspended particles have risen to the top of the vat, the clear must can be drawn from the bottom of the vat.



Flotation is used for white and rosé musts, but also for red musts from thermovinification and which will be fermented in liquid phase.

HOW TO ENSURE A SUCCESSFUL FLOTATION?

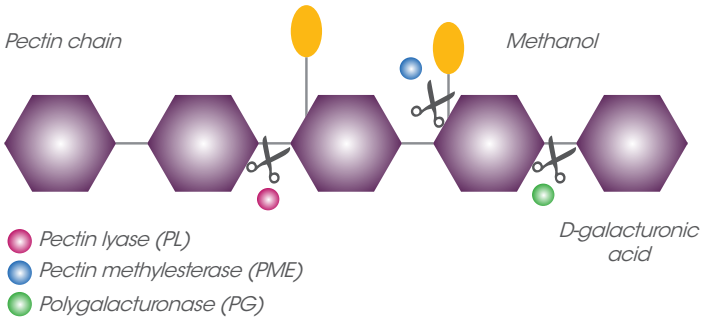
For many years, **Martin Vialatte has worked on the formulation and application of specific** products for flotation processes.

In order to ensure a successful flotation, it is important to respect the following parameters:

Treatment of the must before flotation

Enzyme treatment

Enzymes must be added to the must in advance in order to break down the pectins that keep the particles in suspension. Indeed, the viscosity of the must is a limiting factor for the smooth running of the flotation process. The pectic enzymes play an essential role for this parameter. They ensure the breakdown of the pectin, thus reducing the viscosity of the must. Furthermore, enzymes like **VIAZYM® FLOT** are perfectly suited to the requirements of flotation (rapid action at low temperatures).



The PL rapidly decreases the viscosity of the must. The action of the PG requires the prior action of the PME, which leads to the formation of charged pectin particles that react with the fining agents. Pectinases thus encourage the formation of flocs, while reducing viscosity.

Fining

Fining agents, made from gelatine and plant proteins (**PROVGREEN® FLOT ou KTS FLOT**), ensure flocculation of the particles. They play a pivotal role in the formation of the flocs. Their action can be improved and supplemented by the addition of bentonite, which enables the deposits to be better compacted. Bentonite (such as **ELECTRA**) ensures the coherence of the flocs and binds the gas bubbles to the flocs, thus encouraging them to rise to the surface of the must.

Its use depends on the grape variety, the equipment available and the processing aids selected. It is therefore essential to carry out tests in advance in order to adjust doses at the start of each season.

How the device **works**

Gas used

Gas	Advantages	Comments
CO_2	Protects musts from oxidation	Large bubbles that struggle to bring the flocs to the surface. The CO_2 can cause significant surface agitation with continuous flotation.
O_2	Small bubbles.	Oxidation of musts
N_2	Right size of bubble for transporting flocs. No risk of oxidation.	
Compressed Air	Low cost. Oxygenation of musts helps to start alcoholic fermentation.	Requires an oil filter/deodorizer in the compressor. Regular cleaning of the filter.

Must and gas flows

Poor synergy between must flow and gas flow will affect the quality and clarity of the must.

Turbidity of the must on exiting the flotation cell

This check enables the dose of fining agent and/or flows to be adjusted to meet the objectives. Flotation that is too well-adjusted (must turbidity < 30 NTU) may cause problems with the alcoholic fermentation stage. Indeed, the presence of deposits is important as the deposits provide a significant lipid content and also because they play a purely physical role in CO_2 nucleation, thus helping bubbles to form and releasing CO_2.

Using a nutrient like **NUTRICELL® FLOT,** suitable for flotation and combining an organic source of nutrients with cellulose (increasing the insoluble fraction and thus affecting turbidity), will ensure smooth running of the start of alcoholic fermentation of musts subjected to flotation.

In conclusion

Following numerous trials carried out over many years by MARTIN VIALATTE, the R&D department confirmed the benefit of flotation for all types of must, and particularly musts that are difficult to clarify. The prior addition of enzymes to musts is necessary to ensure the flotation process proceeds correctly. This leads to a reduction in viscosity and the formation of charged pectin particles that react with fining agents.

Plant-based protein fining agents are very effective at flocculating suspended particles and forming the required flocs that are then transported to the top of the vat by the injected gas.

As in static clarification, bentonite facilitates the flocculation of all the plant-based fining agent. Studies need to be carried out on must turbidity and nutrition with the aim of combining effective clarification with good alcoholic fermentation.

This research shows that oenological products are essential for optimising the flotation process. Which ones are used, the dose applied and how they are combined are crucial elements.

Oenological products for flotation

VIAZYM® FLOT

VIAZYM® FLOT is a liquid pectolytic enzyme preparation for must flotation. It encourages a layer of well-compacted deposits to rise to the surface.

PROVGREEN® FLOT

PROVGREEN® FLOT 100% plant-based preparation formulated from pea proteins. This fining agent ensures rapid clarification of musts and wines and limits the deposit volume significantly versus animal-based fining agents. PROVGREEN® FLOT also helps to eliminate oxidised polyphenols in treated musts and wines.

KTS FLOT

KTS FLOT is a next-generation production for flotation. It is suitable for whites, rosés and thermovinification reds. It contains plant-based polysaccharides and proteins. KTS FLOT enables thorough, rapid clarification of musts with improved compacting of the deposit layer. It also helps to protect against oxidation and refines the must before alcoholic fermentation.

NUTRICELL® FLOT

NUTRICELL® FLOT is a complex nutrient (without a source of mineral nitrogen) that contains the elements needed to ensure good growth and nutrition of yeasts during the first third of alcoholic fermentation. This nutrient offsets deficiencies in solids in musts that are too clear after flotation (turbidity < 50NTU).

ELECTRA

ELECTRA is an activated calcium bentonite. It has a high bulking power, which makes bentonite effective with regard to unstable proteins. Thanks to ELECTRA, a medium deposit volume is obtained.

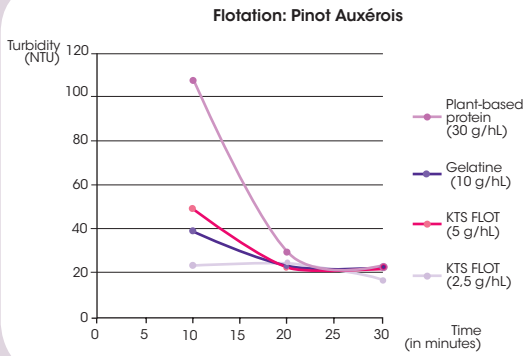
Add image from catalogue

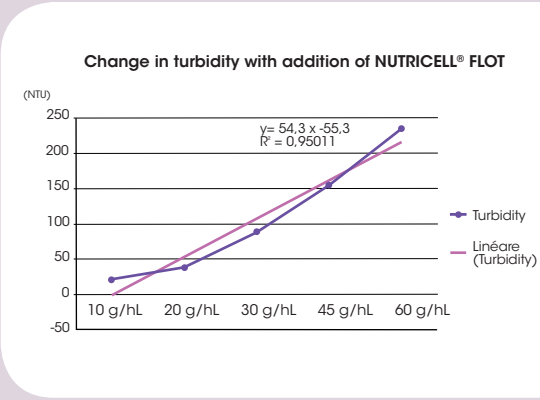
ENOLFLOAT

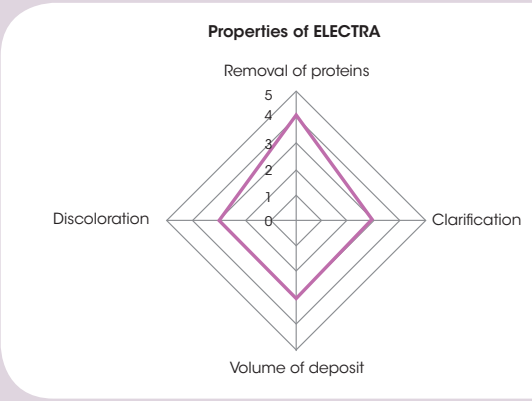
Flotation pump adaptable to every stage of vinification:

- Flotation at harvest
- Pump can be used throughout the year, with included fining connector and deoxygenation.

ALLERGEN FREE AF SANS ALLERGENE







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