PROTOCOL P

Tools for acidification in musts and wines

Three acids are authorised for acidifying musts and wines:

- Tartaric acid (L(+) tartaric).
- Malic acid (L-Malic – D,L-Malic).
- Lactic acid (DL-Lactic).

These acids are naturally present in grapes. They differ in structure, acidification capacity and organoleptic impact.

Operations can consist of a mix of additions of different acids (especially appropriate on wines for organoleptic purposes).

The goals pursued must be the object of prior testing. Variations in pH and total acidity for the same treatment are not the same, the ionic strength and the buffering capacities can have a significant influence from one must or wine to another.

REGULATORY STANDPOINT

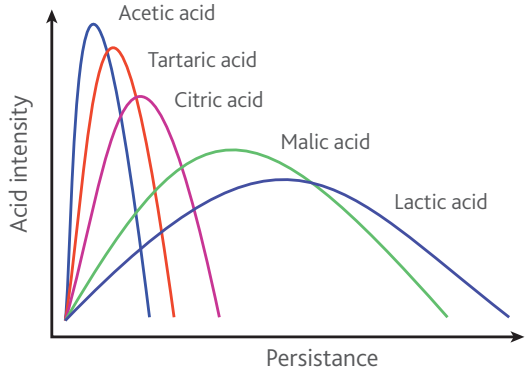
Acidification of fresh grapes, grape must, partially fermented grape must, new wine still in fermentation, and wine.

- Maximum dose of 4 g/L expressed as tartaric acid, i.e. 53.3 meq/L.

All treatments will be entered into a handling register and a custody register.

Acidification and enrichment (or chaptalisation) of one and the same product are mutually exclusive processes (for example a must or new wine still in fermentation can be enriched or chaptalised and the wine from the fermentation can be acidified), except by way of derogation ((CE) 1308/2013, appendix 8, part1, section C and D).

Acidification of musts and wines



Lactic: soft, balanced.
Tartaric: lively, immediate.
Malic: sharp, less immediate.

SUMMARY OF THE COMMERCIAL PRODUCTS AVAILABLE AND THEIR PRINCIPAL OENOLOGICAL CHARACTERISTICS.

	TARTARIC ACID	MALIC ACID	LACTIC ACID	COMMENTS
Chemical formula.	$C_4H_6O_6$ L	$C_4H_6O_5$ DL	$C_3H_6O_3$ DL	Malic and lactic acids are achiral molecules. They exist in the form of two enantiomers: L and D form. Only the L form of malic acid exists naturally in grapes. Lactic acid is a natural result of lactic bacteria metabolism produced by the latter only in the L form.
Note on label	Acidity regulator E334	Acidity regulator E296	Acidity regulator E270	
pKa	3.05 / 4.2 Di-acid	3.4 / 5.1 Di-acid	3.85 Mono-acid	The acids are classified according to their pKa (acidity constant). The higher the pKa, the weaker the acid.
Correspondence 1 Eq.	75 g	67 g	90 g	
Recommended targets.	Red - Rosé - White	Rosé - White	Red - Rosé - White	
Treatment of must (at 53.3 meq/L*).	4 g/L	3.57 g/L	4.80 g/L	
Effect on pH.	+++	++	++	Tartaric acid remains the most effective on pH. To avoid an excessive precipitation of salts, it is recommended to use it during fermentation on must.
Effect on total acidity.	++	+++	+++	
Chemical stability.	- Precipitation of K bitartrate, neutral calcium tartrate	+++	+++	Potassium or calcium salts from malic and lactic acids are significantly more soluble than tartaric acid salts, the risk of precipitation is thus lower.
Microbiological stability.	+ Only risk is acetic acid degradation (tourne disease) by certain lactic bacteria.	+++	++	
Organoleptic impact.	Lively. Immediate. Dryness. Hardness.	Freshness. Greenness (green apple).	Soft and tart acidity.	
Formulation.	Powder	Powder	Liquid	Lactic acid is in liquid form, powder formulations contain unauthorised lactates. Powders can be directly dissolved into the wine.

** Maximum dose – Consult the **LAFFORT®** technical department for more information on the dose to use.*