

Predicting Malolactic Fermentation

► Why?

- Numerous conditions influence the development and activity of malolactic bacteria in wine.
- Malolactic fermentation (MLF) that is spontaneously triggered too early or too late can result in loss of wine quality.

Key Points



► **INTERACTIONS OF pH/ SO₂.** Free SO₂ has a powerful toxic effect on lactic acid bacteria, which is enhanced when the pH is low. However, total SO₂ must also be taken into account as the bacteria can dissociate the SO₂ into the active form. Attention should also be paid to high pH levels, which can lead to microbial growth often detrimental to the quality of the wine.



► **ALCOHOL/TEMPERATURE INTERACTIONS.** Bacteria are sensitive to ethanol. High temperatures (>25°C) increase the toxicity of alcohol to the bacteria. Low temperatures (<16°C) limit the multiplication of the bacteria and their activity.



► **INITIAL MALIC ACID CONTENT.** At very low levels of malic acid, the bacteria will have much more difficulty starting the fermentation process. Excessively high levels can also be harmful and cause delays.



► **ALCOHOLIC FERMENTATION DEVELOPMENT.** The yeast can consume amino acids in the must/juice that are required by the lactic acid bacteria, especially if the yeast has high nitrogen requirements. If the alcoholic fermentation is very fast or sluggish, toxins are generated, which may inhibit MLF.



► **TIMING OF INOCULATION.** Impacts the successful start of MLF. Please refer to the Practical Guide to Vinification No. 8 for more details.

Evaluating the Feasibility of MLF

Conditions	My Wine	Évaluation				Score
		1 point	2 points	8 points	10 points	
Alcohol (% vol.)		<13	13 - 15	15 - 17	> 17	
pH		>3,4	3,1 - 3,4	2,9 - 3,1	< 2,9	
Free SO ₂ (mg/L)		<8	8 - 12	12 - 15	> 15	
Total SO ₂ (mg/L)		<30	30 - 40	40 - 60	> 60	
Temperature (°C)		18 - 22	14 - 18 or 22 - 24	10 - 14 or 24 - 29	< 10 or > 29	
Yeast's nutritional requirements		Low	Medium	High	Very high	
Ease of alcoholic fermentation		No problems	Transient yeast stress	Sluggish/ stuck AF	Prolonged yeast contact	
Initial level of malic acid (g/L)		2 - 4	4 - 5 or 1 - 2	5 - 7 or 0,5 - 1	> 7 and < 0.5	
Maximum rate of alcoholic fermentation (maximum loss of brix/day)		<2	2 - 4	4 - 6	> 6	
Note: Other factors that are currently less well known not considered on this scorecard may include the level of dissolved oxygen content, polyphenolic content, lees compacting, pesticide residues, etc.						

Explanation: Carry over the result of each line to the column on the right. Add up the results from the right hand column to obtain the final score. According to the value obtained, you will have an estimation of malolactic fermentation feasibility.

Score	Feasibility
< 13	Favourable Pay attention to development of indigenous flora (<i>Brettanomyces</i> , contaminating bacteria, etc.) Inoculate rapidly with selected bacteria.
13 to 22	Not so favourable Choose the bacteria adapted to your wine. A specific bacteria nutrient may be necessary.
23 to 40	Difficult Give preference to a 1-STEP® bacteria adapted to your wine. Adjust conditions to optimize MLF: temperature, bacterial nutrition, etc.
> 40	Extreme Run quick test or consult your Lallemand representative. Decrease the obstacles before inoculating: blending, deacidification, temperature, bacterial nutrition, etc.