

## ENARTIS NEWS

### HOW TO IMPROVE FOAM QUALITY IN SPARKLING WINE

Foam and *perlage* are not only important in terms of visual impact, but they also influence the sensory quality of sparkling wine. The conditions during second fermentation and the base wine composition have a notable effect on bubble finesse and foam persistence. The use of mannoproteins and gum Arabic helps improve *perlage* quality and balance taste.

#### FOAM AND *PERLAGE* SENSORY EFFECT

Foam and *perlage* are components specific to sparkling wine and are an important part of its quality. A good quality sparkling wine must have a clear, compact and relatively persistent foam. The bubbles should be fine and numerous, they must travel upwards slowly and when they arrive at the surface should move to the sides of the glass to form a crown. Foam collars must be present the whole time it takes to finish the glass.

These characteristics are not just for aesthetic reasons but are linked with sensations on the palate and in the nose. A sparkling drink with strong effervescence and large bubbles will have an aggressive feel in the mouth and nose. On the other hand, a good sparkling wine pleasantly tickles the palate and delivers a creamy sensation. The slow rise of bubbles brings aromatic compounds to the surface, with positive effects on both the intensity and persistence of aromatic perception.

#### METHOD TO DETERMINE FOAM QUALITY

The Mosalux, a tool created in the 90s by Prof. Maujean of Reims University, is still used today as the best way to objectively evaluate the capacity of a base wine to form quality foam.

The Mosalux (Figure 1) consists of a test tube which is filled with base wine and into which carbon dioxide is injected at a controlled rate. An infrared sensor detects foam formation and sends data to a computer that provides three useful parameters to determine the foaming capacity of wine.

- **HM** is the maximum height expressed in mm reached by the foam after carbon dioxide injection through the glass frit in constant sized bubbles. This represents the wine's ability to foam (foamability).
- **HS** is the foam stability height during carbon dioxide injection, expressed in mm; this represents the foam stability.
- **TS** is the foam persistence expressed in seconds until all the bubbles collapse when CO<sub>2</sub> injection is interrupted. TS represents the foam stability time once effervescence has decreased.

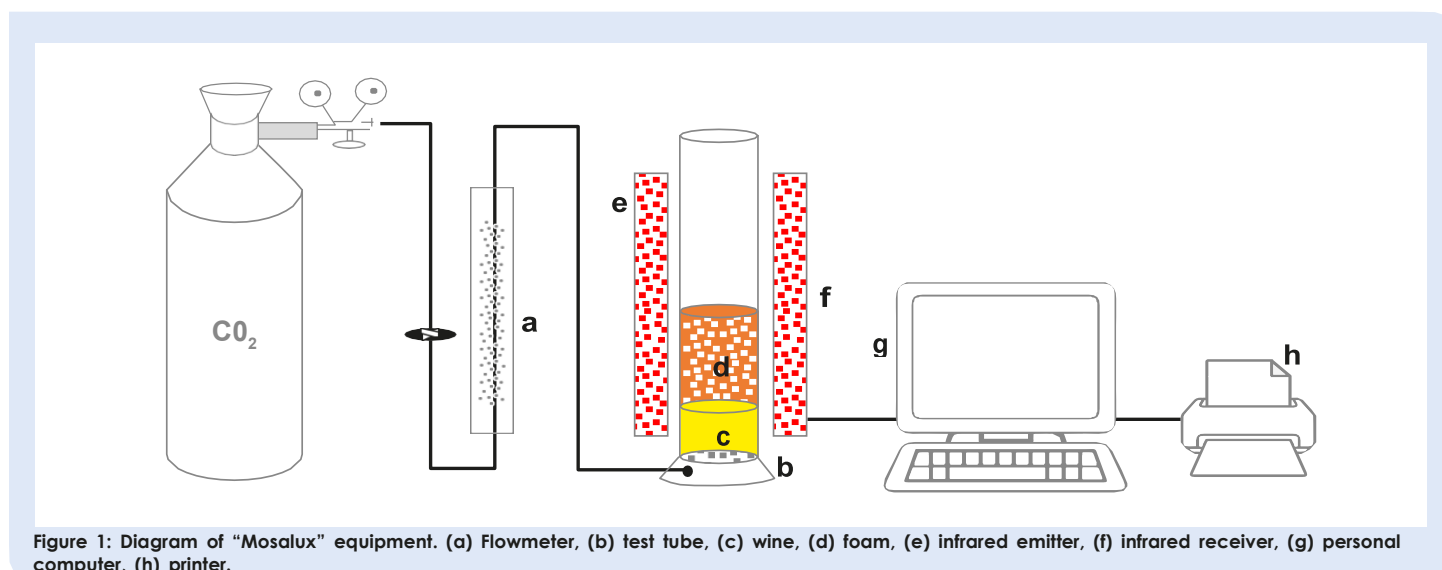


Figure 1: Diagram of "Mosalux" equipment. (a) Flowmeter, (b) test tube, (c) wine, (d) foam, (e) infrared emitter, (f) infrared receiver, (g) personal computer, (h) printer.

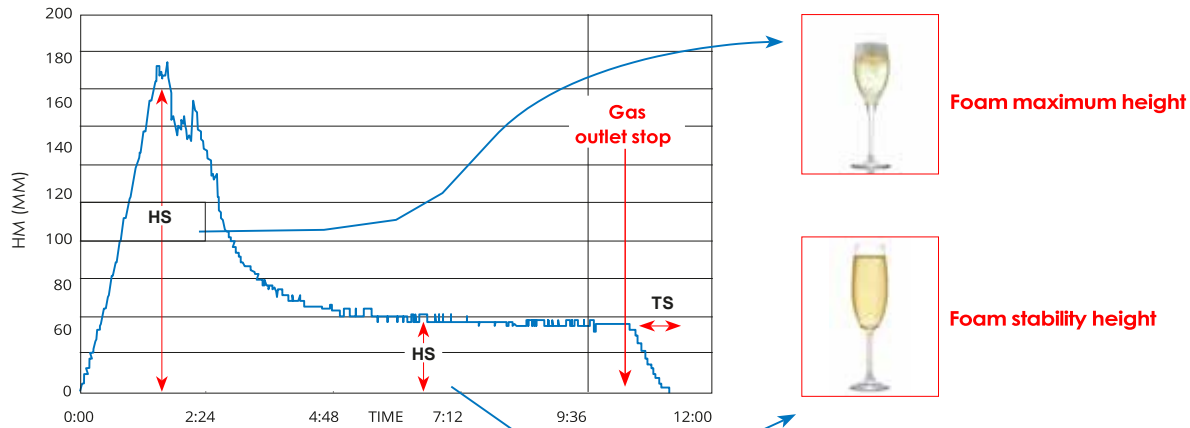


Figure 2: Example of foam profile obtained with Mosalux

Figure 2 shows a typical curve given by the Mosalux. The foam increases initially until it reaches a maximum height HM, and then decreases slowly until the lower level HS. When the carbon dioxide injection ends, TS is determined. This indicates the time that passes before all the foam disappears completely.

## SUBSTANCES THAT IMPROVE SPARKLING WINE FOAMABILITY

The foamability of a wine is highly correlated with its composition. A bubble is a structure where there is a separation between its content, the carbon dioxide, and its surroundings, the wine, which are separated by an interface. This interface is formed by amphipathic molecules, which means they have a hydrophilic portion and a hydrophobic portion. Amphipathic molecules can gather and form around a gas bubble, a film with a polar head facing outwards (wine) and an apolar chain facing inwards (carbon dioxide) (Figure 3). The presence of this type of molecule defines the effervescent characteristics of wine. Among the amphipathic components naturally present in wine that can have an important effect on effervescence, glycoproteins and mannoproteins should be mentioned. The addition of yeast derivatives rich in mannoproteins during second fermentation improves base wine foamability and foam stability (Table 1), as measured by the Mosalux.

	Foam Maximum Height (HM)	Foam Stability Height (HS)
Control	138 mm	40 mm
30 g/hL Bentonite	97 mm	44 mm
10 g/hL inactivated yeast rich in mannoproteins	150 mm	51 mm

Table 1: Effect of bentonite and mannoprotein addition on foam production and stability. The higher the number, the better wine foamability and foam stability.

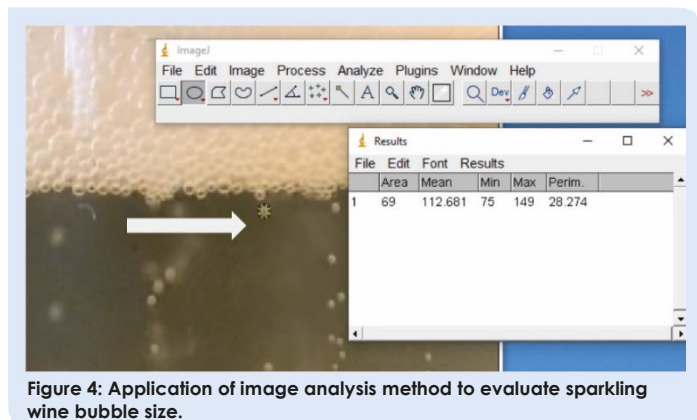


Figure 4: Application of image analysis method to evaluate sparkling wine bubble size.

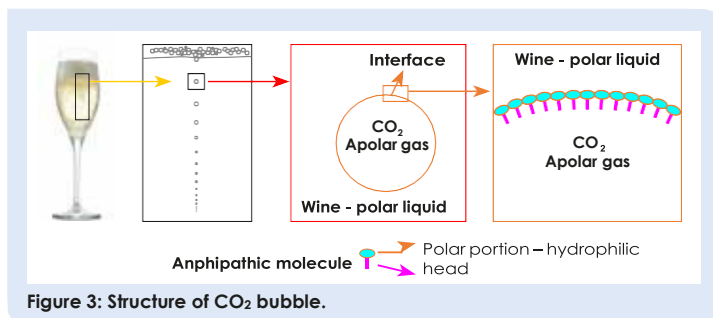
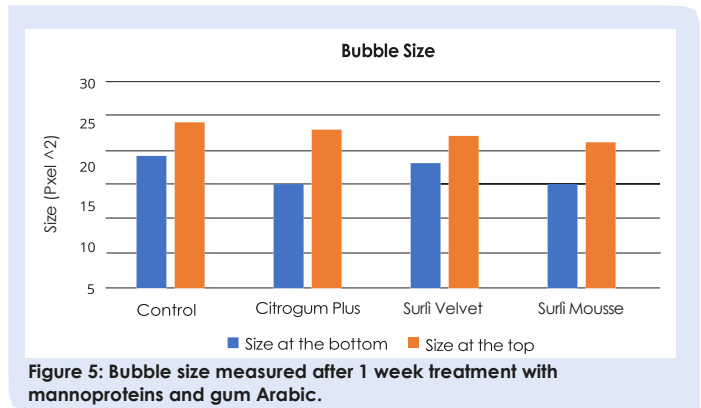


Figure 3: Structure of CO<sub>2</sub> bubble.

Recently at Enartis, the use of a program to examine images is being studied to determine the dimensions of bubbles by analyzing a series of picture frames (Figure 4).

By using this program it was possible to see the effects on *perlage* of different products made with mannoproteins or gum Arabic, which has an amphipathic nature. All the products tested resulted a reduction in the average size of the bubbles. This confirms the hypothesis that a high content of amphipathic substances improves the quality of *perlage* and, consequently, the sensory quality of the sparkling wine (Figure 5).



ENARTIS PRODUCTS FOR IMPROVING WINE FOAMABILITY			
Timing of Addition	Product	Effects	Recommended Dosage
Primary Fermentation	EnartisPro Perlage	Inactivated yeast rich in readily available mannoproteins and amino acids with antioxidant effects. EnartisPro Perlage is suitable for the production of base wines that are fresh, round and balanced. When used in must, it ensures that aromas and color have antioxidant protection and that base wines can be stored for several months before second fermentation.	20-30 g/hL
At Tirage	Surli Mousse	Yeast derivative rich in mannoproteins. When used during second fermentation, it improves the foam persistence in low-foaming potential wines or those with limited time of maturation on lees. Suitable for use in both Charmat and traditional methods, it also improves wine mouthfeel.	10-15 g/hL
With the Liqueur d'expedition	Surli Velvet	Yeast mannoprotein complex designed to improve wine stability, Surli Velvet increases the colloidal structure and enhances sensory characteristics including aromatic complexity, volume and reduced astringency.	5-10 g/hL
	Citrogum Plus	Solution of gum Arabic Seyal and mannoproteins, Citrogum Plus has the ability to enhance sweet sensations.	50-100 g/100 bottles

For more information, please call Enartis USA's technical services at (707) 838-6312.

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