# ENARTIS NEWS
## FAQ ON WINE FINING

### WHY FINING?
Fining agents can be used for many purposes in winemaking, including clarification, filterability improvement, prevention of haze and sediment formation, organoleptic profile improvement, color adjustment and removal of undesirable elements or flavors. The fining process is therefore a crucial stage in the production of all wine types.

### HOW DOES FINING WORK?
Each fining agent has specific properties and reacts with various wine constituents depending on its origin, density of charge, molecular weight and chemical properties.

Fining involves two crucial reactions:

*Flocculation*: molecular interactions based on charge, chemical bonds, absorption or adsorption of compounds and formation of flocculates.

*Sedimentation*: flocculates formed are not soluble and heavier than wine/juice. They settle with time.

### WHAT ARE THE MAIN FACTORS THAT INFLUENCE FINING EFFECTIVENESS?
Product preparation and addition, temperature, pH, wine redox potential and previous fining treatments are factors that can influence the effectiveness of fining.

### HOW TO CHOOSE THE RIGHT FINING AGENT
Bench trials are essential to determine what fining agents to use and their dosages. To set up bench trials, follow these steps:

- Prepare fining agent solution in water as recommended on the technical data sheet. For liquid products, use solution as is or dilute, if necessary.
- Label each sample bottle. Keep one untreated sample as a control.
- Fill samples with wine and leave some space for the addition.
- Add the fining agent solution.
- Mix immediately after addition. Top each bottle with wine and mix again.
- Store wine at winery temperature for settling (usually 1-2 days).
- Evaluate the results (turbidity, volume of lees, color, sensory, stability, etc.)

### HOW TO EVALUATE FINING RESULTS
Depending on the goal, several parameters can be used to evaluate the results of a fining treatment: turbidity, volume of lees, filterability, color intensity and hue, color stability, protein stability, sensory quality, metal content, etc. Whatever the reason for treatment, any fining agent has an impact on wine sensory quality. For this reason, tasting must always be part of the final evaluation.

| PARAMETER | TYPE OF ANALYSIS |
|---|---|
| Clarity | Turbidimeter |
| Color | Absorbance at 420, 520, 620 nm |
| Polyphenols | Absorbance at 280 nm |
| Filterability | Fouling index or Vmax |
| Protein stability | Heat test |
| Color stability | Refrigeration test |

## WHEN USING MORE THAN ONE FINING AGENT, WHAT IS THE RIGHT ORDER OF ADDITION?

There many different opinions about the correct order of addition of fining agents, however a guideline can probably be found by answering the following question: what is the goal? Let's take a white wine as an example. If the goal of fining is to improve protein stability, adding bentonite first improves its stabilizing effect. Gelatin can be added as a co-fining agent to improve wine clarity. However, if the main goal is to reduce wine phenolic content, gelatin addition first and bentonite as second is recommended. If the goal is just to improve clarity, it's better to use the corrective agents (PVPP, carbon and potassium caseinate) first, then the negative-charged fining agents and lastly, the positive ones. Always allow one or two hours to elapse between additions

| FINING AGENT | CHARGE AT WINE pH | ORIGIN | ALLERGEN STATUS |
|---|---|---|---|
| Bentonite | - | inorganic | |
| Carbon | | organic | |
| Chitosan | + | organic | |
| Egg albumin | + | organic | allergenic |
| Gelatin | + | organic | |
| Isinglass | + | organic | non-allergenic for wine |
| Plant proteins | + | organic | |
| Potassium caseinate | + | organic | allergenic |
| PVI-PVP | - | synthetic | |
| PVPP | | synthetic | |
| Silica | - | inorganic | |

## WHAT IS THE CORRECT WAY OF INCORPORATING FINING AGENTS INTO WINE OR MUST?

Fining agents are very fast in reacting with wine compounds. For this reason they should be dispersed throughout the entire volume of wine or juice immediately, otherwise they are likely to finish coagulating before completely mixed with the liquid, thus reducing their effectiveness. Systems to aid complete dispersal are essential. If possible, incorporate finings using a Venturi tube or dosing pump during pump-over or racking. Avoid prolonged use of mechanical stirrers, which can delay the flocculation process.

## CAN I STORE FINING SOLUTIONS FOR A FEW DAYS?

Fining solutions must be used immediately after preparation (allowing only for swelling times, if applicable). If solutions need to be used over two or more days, add 2 g/L of potassium metabisulfite to the solution to inhibit microbial growth. Never store prepared solutions for more than one week.

## HOW LONG CAN FINING AGENTS REMAIN IN WINE?

Gelatin, casein and egg albumin should not remain in wine for more than 10-15 days. Isinglass can remain 3-4 weeks. Bentonite, silica sol, chitosan and PVPP can remain in wine for a longer time.

## ARE ALL BENTONITES THE SAME?

There are several types of bentonite in the market. Their enological properties and application mainly depend on the nature of the main exchangeable cation: sodium bentonites are the most effective in removing proteins; calcium bentonites have a better clarifying effect.

**Enartis Bentonites (4 drops more efficient; 1 drop less efficient)**

| | Kind of Bentonite | Physical Form | Swelling Capability | Protein Removal | Clarification Activity | Lees Compaction |
|---|---|---|---|---|---|---|
| **BENTOLIT SUPER** | Calcium bentonite sodium activated | Powder | ♦♦ | ♦♦ | ♦♦♦ | ♦♦♦ |
| **PHARMABENT** | Calcium bentonite sodium activated Pharmaceutical quality | Granulated | ♦♦♦♦ | ♦♦♦♦ | ♦ | ♦ |
| **PLUXBENTON N** | Natural sodium bentonite | Granulated | ♦♦♦ | ♦♦♦ | ♦♦ | ♦♦ |
| **PLUXCOMPACT** | Calcium bentonite sodium activated | Granulated | ♦ | ♦ | ♦♦♦♦ | ♦♦♦♦ |

## ARE ALL GELATIN PRODUCTS THE SAME?

Gelatins can have very different average molecular weights. High molecular weight gelatins have a better clarifying effect while low molecular weight gelatins are more efficient in removing tannins.

## WHY REMOVE METALS?

Through redox reactions, catalyzed by transition metals such as $Cu^{+}$ and $Fe^{2+}$, oxygen is converted into highly reactive radicals that oxidize wine organic compounds. Removing metals such as $Cu^{+}$ and $Fe^{2+}$ limits oxidation reactions, reduces reaction speed and increases wine resistance to oxidation.

## WHY DID THE LAB TRIAL WORK BUT FINING AT INDUSTRIAL SCALE DID NOT?

If at winery scale the result of the treatment is inferior to the one obtained in the lab, this may be due to:

- A very different wine temperature. Ideal temperature is between 13 and 15°C. Lower temperatures can slow down the sedimentation of some fining agents like bentonite, for example. Higher temperature can encourage microbial activity onset and production of $CO_2$.
- Absence of grounding of the fining tank. In this case the tank becomes like a battery with a positive and a negative pole that, attracting particles with opposite charge, are going to interfere with fining agent precipitation.

## FINING PROCEDURE

- Prepare fining agent as recommended on the technical data sheet.
- Slowly incorporate fining agent to at least 1/2 of the total volume of wine using a Venturi tube or dosing pump.
- Protein fining agents should not remain in wine for more than 10-15 days in the case of gelatin, casein and egg albumin, and 3-4 weeks in the case of isinglass.
- 13-15°C is the ideal temperature for fast and complete precipitation of the majority of fining agents.
- Avoid temperature differentials in the fining tank. These create convective movements within the tank that delay the settling of lees.
- Ground the tank in order to avoid accumulation of charges that can interfere with fining agent sedimentation.

**Enartis products in powder form: instructions for their correct preparation**

| Product | Composition | Solvent | Ratio Product/water | Time of hydration |
|---|---|---|---|---|
| **ATOCLAR M** | LMW gelatin | Cold water | 1:10 | |
| **BENTOLIT SUPER** | Sodium bentonite | Cold water | 1:20 | 3-6 hrs |
| **BLACK PF** | Carbon | Cold water | q.s. | |
| **CLARIL AF** | Bentonite, pea protein, PVPP | Cold water | 1:10 | |
| **CLARIL HM** | Activated chitosan and PVI-PVP | Water or wine | 1:20 | 1 hr at about 20°C |
| **CLARIL QY** | Inactivated yeast, chitosan | Cold water | 1:10 | |
| **COMBISTAB AF** | Pea protein, PVPP and silica | Cold water | 1:10 | 1 hr |
| **EnartisGreen GELATINA** | Hot soluble gelatin | Water 40°C | 1:20 | |
| **EnartisStab MICRO** | Activated chitosan | Cold water | 1:20 | |
| **EnartisStab MICRO M** | Activated chitosan + yeast hulls | Cold water | 1:20 | |
| **ENOBLACK PERLAGE** | Activated carbon | Water or wine | q.s. | |
| **FENOL FREE** | Activated carbon | Water or wine | q.s. | |
| **GOLDENCLAR INSTANT** | HMW gelatin | Cold water | 1:20 | |
| **NEOCLAR AF** | Bentonite, gelatin and carbon | Cold water | 1:10 | |
| **PHARMABENT** | Sodium bentonite | Cold water | 1:20 | 1 hr |
| **PLANTIS AF** | Pea protein | Cold water | 1:10 | |
| **PLANTIS AF-P** | Potato protein | Cold water | 1:10 | |
| **PLANTIS AF-Q** | Pea protein and activated chitosan | Cold water | 1:10 | |
| **PLUXBENTON** | Sodium bentonite | Cold water | 1:20 | 3-6 hrs |
| **PLUXCOMPACT** | Calcium bentonite | Cold water | 1:10 | 3-6 hrs |
| **PULVICLAR S** | HMW gelatin | Water 40°C | 1:20 | |
| **REVELAROM** | Bentonite, gelatin, copper salt | Cold water | 1:20 | 1 hr |
| **STABYL (G)** | PVPP | Water 40°C | 1:10 | 1 hr |
| **STABYL MET** | PVI-PVP and silica | Water 20°C | 1:20 | 1 hr at about 20°C |

**How to select the correct fining agent**

| ACTION | ENARTIS OPTIONS |
|---|---|
| **Metal removal** | CLARIL HM – STABYL MET |
| **Unstable color removal** | PLUXCOMPACT – NEOCLAR AF – CLARIL QY |
| **Clarification** | EnartisGreen GELATINA – ATOCLAR M – HYDROCLAR 45 -HYDROCLAR 30 – PULVICLAR S – GOLDENCLAR INSTANT |
| **Reduce astringency** | HYDROCLAR 45 – HYDROCLAR 30 – GREEN GELATINA – ATOCLAR M – PULVICLAR S – GOLDENCLAR INSTANT – CLARIL QY |
| **Reduce bitterness** | STABYL – PLANTIS AF – COMBISTAB AF – CLARIL AF |
| **Treat oxidation** | STABYL – PLANTIS AF – COMBISTAB AF – CLARIL AF – BLACK PF – PLANTIS AF-P |
| **Eliminate sulfur off-aroma** | NEOCLAR AF – EnartisStab MICRO M – REVELAROM |
| **Treat microbial taint** | FENOL FREE – EnartisStab MICRO M |
| **Treat smoke taint** | FENOL FREE – EnartisStab MICRO M |
| **Protein removal** | PLUXCOMPACT – BENTOLIT SUPER – PLUXBENTON N – PHARMABENT |



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