



## **EVALUATION OF THE EFFECT OF BENTONITE ON THE RIBOFLAVIN CONTENT OF WINES**

### **INTRODUCTION**

Riboflavin is a vitamin that is often present in wine. On exposure to sunlight, riboflavin undergoes chemical modification and causes the so - called "lightstruck" effect. This effect gives wine a distinctive sulphide - like aroma and causes a reduction in quality. Bentonite is unique among winemaking materials in that it can reduce the concentration of riboflavin in wine. A study has been carried out to evaluate the effect of different bentonites on riboflavin concentration and to evaluate the relationship between bentonite dosage and riboflavin removal. The following summary of the study provides practical information that can be used in the cellar.

### **MATERIALS AND METHOD**

Twenty bentonites were used in this trial. All of these bentonites are commercially available for winemaking. Three bentonites supplied by Enartis were included in the study:

ENARTIS bentonite:

- PLUXBENTON N
- BENTOLIT Super
- PLUXCOMPACT

Market bentonite, classified in alphabetical order

The wine used for the study was obtained by blending Soave and Chardonnay. Riboflavin was added to this wine to give an initial concentration of 300 micrograms/litre.

The effect of all the bentonites on riboflavin concentration was initially tested at a bentonite dosage rate of 100 g/hl. This high dose was intentionally added to ensure that the properties of each product were clearly shown. In a second trial, the ENARTIS bentonites were added at different levels to evaluate the relationship between dosage and riboflavin removal effect.

The bentonites were prepared by addition to water 24 hours before use.

For the preparation of a standard solution, 7.2 g of riboflavin was diluted and made up to volume in a 250 ml flask with a solution of 20 % acetonitrile and 80 % of phosphate buffer (0.05 M of  $\text{NaH}_2\text{PO}_4$  at pH 3 with  $\text{H}_3\text{PO}_4$ )

The treated wine remained in contact with the bentonite for 24 hours.

After this time, the wines were microfiltered and analysed for riboflavin using HPLC.

### **RESULTS**

The following tables show the results for riboflavin concentration found in the samples of wine treated with different bentonites.

**Table 1: Bentonite treatment 100 g/hl**

Bentonite Used	Origin	Riboflavin (micrograms/liter)	Reduction %
Wine		26	
Wine + riboflavine test		306	
<b>PLUXBENTON N</b>	<b>Enartis</b>	<b>120</b>	<b>61</b>
<b>PLUXCOMPACT</b>	<b>Enartis</b>	<b>153</b>	<b>50</b>
Bentolit	Enartis	195	
A	Hungary	226	
B	Italy	223	
C	Italy	238	
D	Italy	243	
E	<b>Italy</b>	<b>179</b>	<b>42</b>
F	Italy	212	
G	Italy	239	
H	Germany	214	
I	Turkey	232	
L	Turkey	224	
M	Turkey	219	
N	Turkey	225	
P	Italy	218	
<b>R</b>	<b>Italy</b>	<b>181</b>	<b>41</b>
<b>S</b>	<b>Germany</b>	<b>166</b>	<b>45</b>
T	France	221	

There are differences in performance between the bentonites. The bentonites that gave the best results are shown in blue. The most effective removal was achieved with PLUXBENTON N.

PLUXCOMPACT and bentonites E, R and S also demonstrated good riboflavin removal properties.

In the second test, three dosages of each of the Enartis bentonites were added to the riboflavin-enriched wine to investigate the relationship between dosage and riboflavin reduction. Bentonite was added at 10 , 20 and 50 g/hl.

The following tables show the concentrations of riboflavin found in the wines treated with the different amounts of bentonite and the % reduction in riboflavin level.

**Table 2: treatment with 10 g/hl**

<b>Bentonite Used</b>	<b>Riboflavin (micrograms/litre)</b>	<b>Reduction %</b>
<b>Wine + riboflavin test</b>	316	
PLUXBENTON N	297	<b>6.6</b>
PLUXCOMPACT	288	<b>9.4</b>
BENTOLIT	291	<b>8.5</b>

**Table 3: treatment with 20 g/hl**

<b>Bentonite used</b>	<b>Riboflavin (micrograms/litre)</b>	<b>Reduction %</b>
<b>Wine + riboflavin test</b>	316	
PLUXBENTON N	257	<b>19.2</b>
PLUXCOMPACT	267	<b>16.0</b>
BENTOLIT	279	<b>12.3</b>

**Table 4: treatment with 50 g/hl**

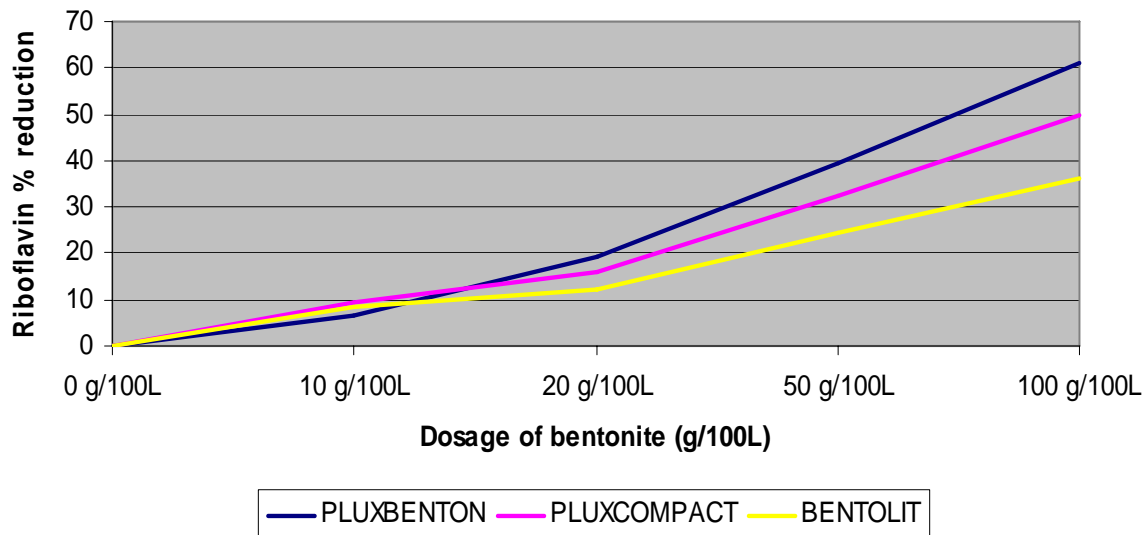
<b>Bentonite used</b>	<b>Riboflavin (micrograms/litre)</b>	<b>Reduction %</b>
<b>Wine + riboflavin test</b>	316	
PLUXBENTON N	192	<b>39.6</b>
PLUXCOMPACT	215	<b>32.4</b>
BENTOLIT	240	<b>24.5</b>

This study shows that there is a direct relationship between bentonite dosage and reduction of the riboflavin content.

The limit of riboflavin concentration at which the "lightstruck" effect does not occur is not well defined. It is clear that a bentonite dosage of 20-50 g/hl is needed to give a significant reduction of riboflavin.

When used at a low dosage, all three ENARTIS bentonites show similar riboflavin removal properties. At higher doses, Pluxbenton N and Pluxcompact are more effective. A graph of the results is shown below to illustrate the relationships between dose and effect:

## Relationship Between Bentonite Dosage and Reduction of Riboflavin



### **CONCLUSIONS**

The tests showed that the most effective bentonite for reducing riboflavin was Pluxbenton N. At a dosage rate of 100 g/hl, this bentonite can reduce the content of riboflavin in wine by more than 60%. Furthermore, the tests show that the reduction of riboflavin content is proportional to the dosage of bentonite that is used. This knowledge can be used to achieve targeted quantities of residual riboflavin in wine. Our sales support team is at your service to supply further details and studies.