Ion exchange resins for tartrate stabilization: Impact on Rose wine quality

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Introduction and Aims

To prevent wine tartaric precipitates, potassium hydrogen tartrate (KHT) and calcium tartrate (CaT), several treatments can be used. Even though not harmful to consumer health, these wine precipitates leads to a decrease in consumer's acceptance and, as a consequence, to a decrease in their commercial value. Besides treatment with oenological products, such as metatartaric acid and carboxymetilcelulose (CMC's), the ion exchange resins is an accepted stabilization process by the OIV, according to Resolution 43/2000.

The aims of this work was to compare the impact of ion exchange resins with oenological additives, CMC's - different structural features - and metatartaric acid, on wine quality.

Material and Methods

Parameters analyzed	Method
Conventional oenological parameter	FTIR Baccus
Conductivity	Mini contact test
Metallic composition	Atomic absorption spectroscopy
Color intensity	OIV (2015)
Total phenols, flavonoids and non-flavonoids	Kramling and Singleton (1969)
Anthocyanins profile by HPLC	Guise et al. (2014)
Sensory analysis	ISO 13299:2016 (en)

Wine conventional oenological parameters	Rose wine (Douro 2015)
Alcohol content (% v/v)	11.13
Specific gravity (g/cm^3)	0.9897
Titratable acidity (g/L tartaric acid)	6.6
pH	3.22
Volatile acidity (g/L de acetic acid)	0.18

CMC structural characteristics. Adapted from Guise et al. (2014)

CMC	Viscosity (mPas^{-1}) Solution 0.1%	Degree of substitution (DS)	Degree of polymerization kDa	Potassium g/100g	Sodium g/100g	Calcium g/100g	Magnesium g/100g
CMC1 5 %	1.21±0.02^a	0,96±0.03^b	441±5^a	6.72±0.03^b	4.59±0.01^b	0.15±0.01^b	0.035±0.008^b
CMC2 20%	1.15±0.04^a	1.12±0.05^c	441±7^{a,b}	0.044±0,001^a	7,68±0,02^a	0,055±0,002^a	0,008±0,001^a
CMC3 solid	1.35±0.02^b	0.63±0.04^a	512±27^b	0.010±0.001^a	7.68±0.02^a	0.012±0.004^c	0.001±0.000^a

Oenological additives

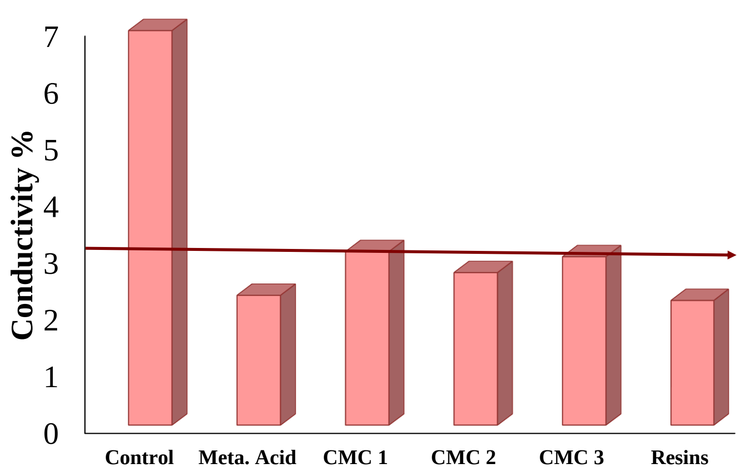
CMC1- 5% solution
CMC2- 20% solution
CMC3- solid
Metatartaric acid

Ion exchange resins:
pH-Stab/AEB laboratory

Experiments were carried out at Gran Cruz winery.

Treated wine was 30%.

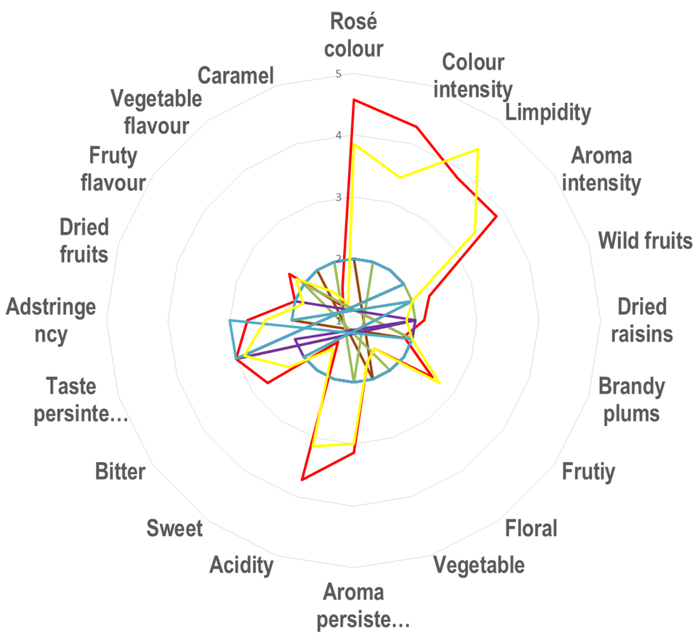
Tartaric wine stability



Results

Treated Rose wines pH, total acidity and mineral composition

	pH	Total Acidity (g/L tartaric acid)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)
Control	3.10 ± 0.01^a	5.85 ± 0.00^a	19.10 ± 0.85^a	59.95 ± 0.83^a	436.69 ± 41.13^a
Meta. Acid	3.10± 0.00^a	5.81 ± 0.05^a	20.00 ± 0.42^a	63.57 ± 2.38^a	465.80 ± 11.23^a
CMC 1	3.15± 0.02^b	7.24 ± 1.96^b	19.10 ± 0.00^a	49.19 ± 0.36^b	468.58 ± 45.01^a
CMC 2	3.16 ± 0.00^b	5.78 ± 0.00^a	19.70 ± 0.00^a	65.33 ± 0.59^a	511.16 ± 21.84^b
CMC 3	3.17 ± 0.01^b	5.85 ± 0.11^a	19.10 ± 0.85^a	63.90 ± 0.71^a	548.20 ± 35.66^b
Resins	2.93 ± 0.00^c	6.58 ± 0.08^b	13.40 ± 0.42^b	38.76 ± 4.40^c	334.54 ± 23.78^c



Final remarks

- ✓ All treatments studied stabilized the Rose wine
- ✓ Wine treated with resins showed lower pH and higher acidity comparing to other treatments
- ✓ Lower calcium , magnesium and potassium content was observed after treatment with resins
- ✓ There are no differences between all treatments in total phenolic compounds, flavonoids and non-flavonoids and total anthocyanins
- ✓ A decrease in colour intensity was observed mostly after treatment with resins
- ✓ Sensory analysis revealed that wine treatment with resin was more scored for fruity aroma and limpidity attributes and lesser scored for astringency and colour attributes

Data suggest that Rose wines treated with ion exchange resins, maintained or improved their quality.

Acknowledgements

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