

Resistance to Oxidation of White Wines. Relationship between potentiometric measurements and substances responsible for aroma degradation.

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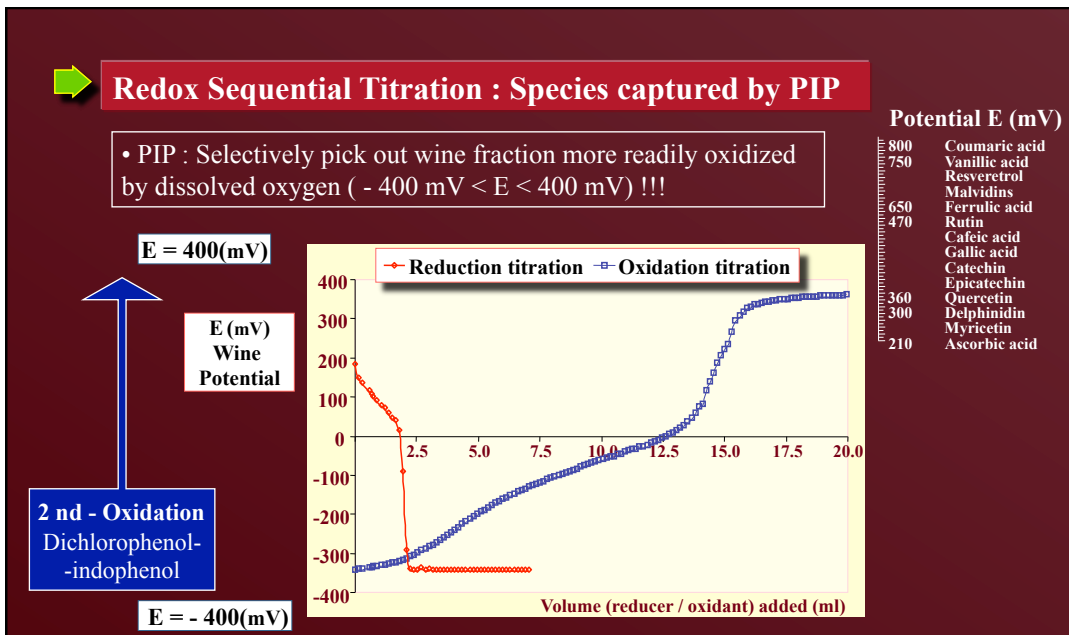
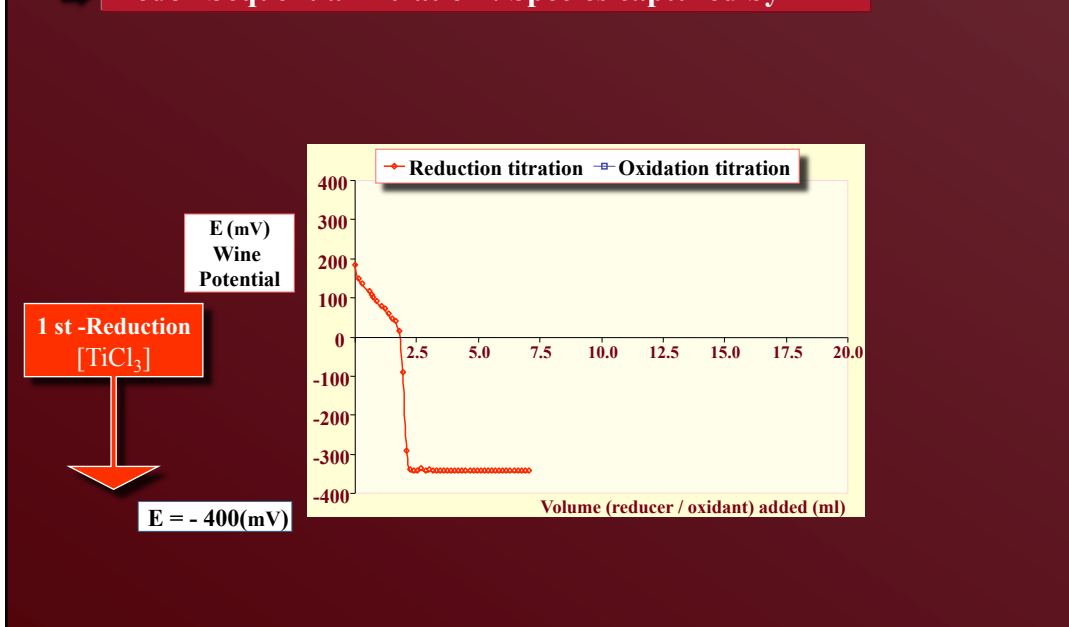


Relationship between potentiometric measurements and substances responsible for aroma degradation.

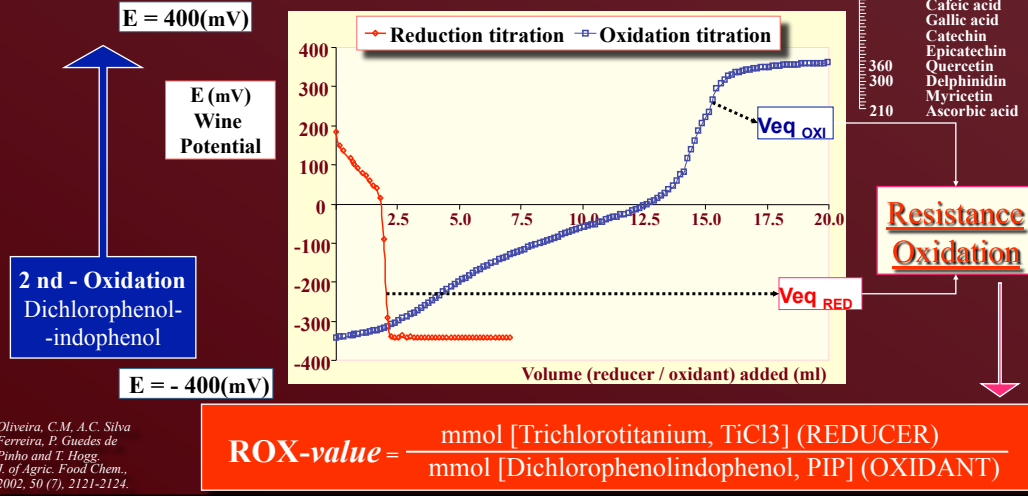
➔ Objectives

Evaluation the Oxidation “status” of a white wine and in what extent this measure could be related with the typical aroma of “Oxidative Spoiled” character :

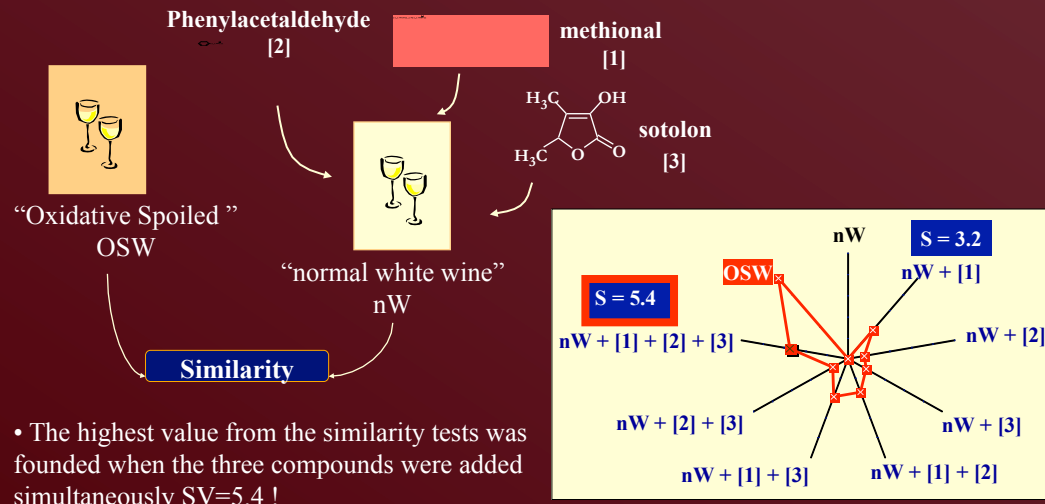
- Index of degradation (ID) measured by sensorial analysis.
- Levels of substances responsible for “off-flavors” in white wines.
- The “Resistance to Oxidation” (ROX) measured by potentiometric

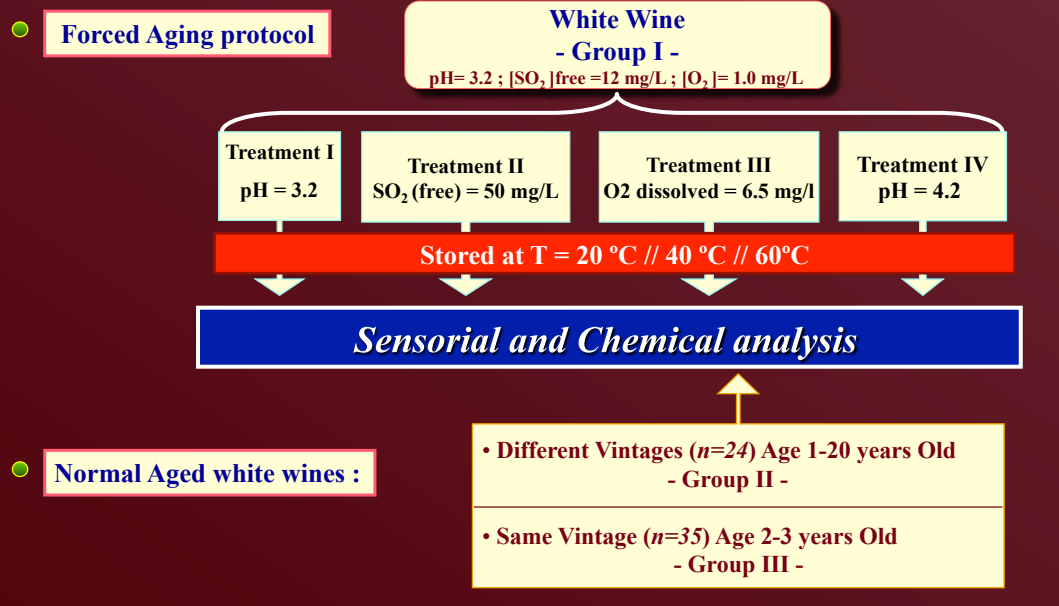


• PIP : Selectively pick out wine fraction more readily oxidized by dissolved oxygen (- 400 mV < E < 400 mV) !!!



Previous Works : Recombinant additions



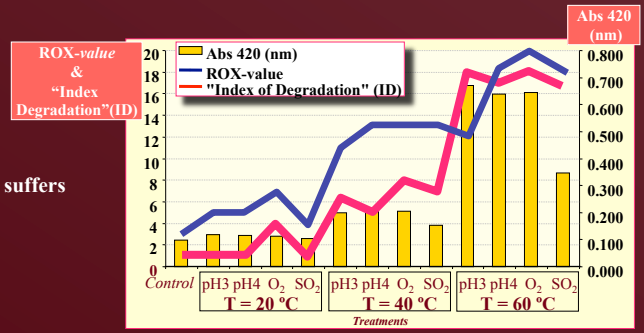


Relationship between potentiometric measurements and substances responsible for aroma degradation.

ROX-value : Relation with Sensorial Data

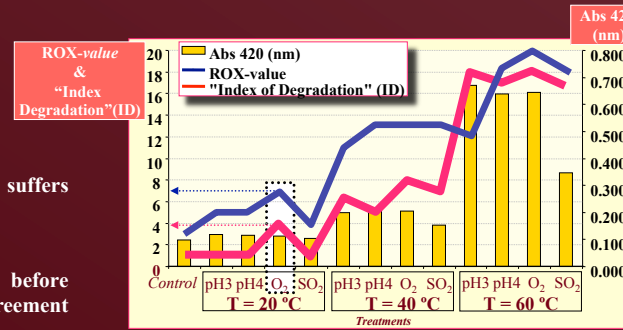
Sensorial Degradation

• Samples saturated with oxygen suffers faster aroma degradation !



Sensorial Degradation

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- Aromatic degradation occurs before chromatic degradation which is in agreement with published data !



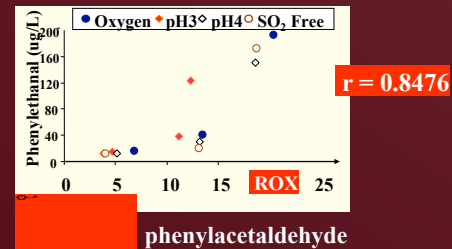
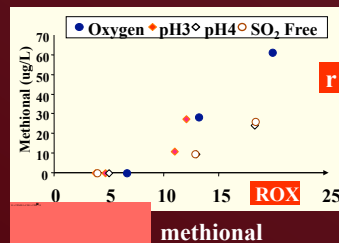
• The ROX-Values curve closely follows the “Index of degradation” curve ! $R = 0,8869$

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➔ ROX-value : Relation with Key-Odorants

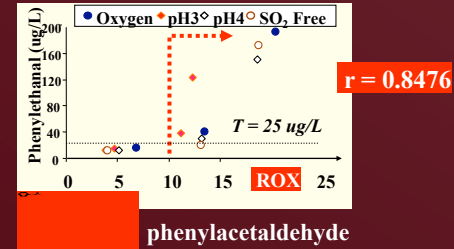
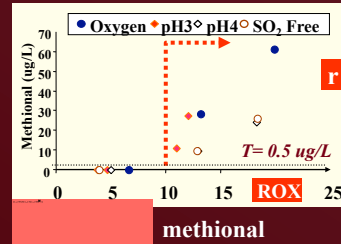
Chemical analysis : Samples from Group I

- Levels of methional and phenylacetaldehyde are highly dependent on temperature and oxygen regimes : Useful indicators of “aroma spoilage” !
- ROX-values, are highly correlated with methional and phenylacetaldehyde, respectively $r = 0.8430$ and $r = 0.8476$!



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ROX > 10 Concentrations are above the odor threshold !

Relationship between potentiometric measurements and substances responsible for aroma degradation.

ROX-value : application to normal aged wines

- Samples from Group II : Ranked by ROX-value

Age	ROX	Index Degradation	Methional (ug/L)	Phenylacetaldehyde (ug/L)	TDN (nor area)	Abs 420 (nm)
18	13	17	4.1	5.9	4.2	0.495
9	12	15	13.0	16.6	8.2	0.292
7	11	15	0.9	2.8	5.3	0.180
20	11	15	1.4	7.0	3.3	0.322
17	10	17	14.5	33.3	5.6	0.433
14	9	17	2.5	6.7	6.8	0.307
17	9	16	1.7	4.6	4.0	0.252
4	9	12	0.8	3.4	5.9	0.171
7	8	12	7.4	10.9	7.0	0.135
9	8	12	n.d.	3.9	4.4	0.218
19	8	14	2.4	4.3	4.8	0.314
5	7	7	n.d.	1.8	4.0	0.126
8	7	15	4.7	13.8	9.4	0.231
6	5	12	n.d.	4.2	8.5	0.215
7	5	13	1.7	4.1	6.2	0.175
10	3	9	n.d.	0.9	3.2	0.167
4	3	7	n.d.	0.9	2.6	0.128
6	3	7	n.d.	0.9	4.2	0.147
3	2	2	n.d.	n.d.	1.6	0.122
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1	1	2	n.d.	2.8	0.1	0.054

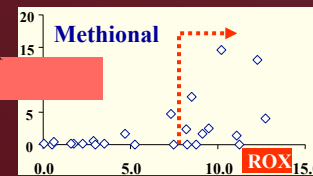
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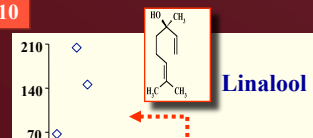
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- f(ROX) : r = 0.8725
- f(AGE) : r = 0.7491
- f(Abs 420 nm) : r = 0.6966



ROX close 10

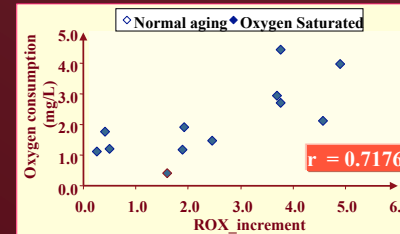


- Samples from Group III :

- The ROX-value for samples (n=35) same Vintage ranged from 0.4 to 4.4.

- Seven samples From Group III analyzed after one year.

- Five samples from Group III - supplemented with O₂, Stored at 30 °C (10 days).



• A positive impact of Oxygen consumption on ROX was observed : $r = 0.7176$!

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➡ Conclusions

- A potentiometric method based upon a sequence of redox titrations in order to quantify the “first line of defense” of white wine, against “aroma spoilage” is proposed.
- “Resistance to Oxidation” were strongly correlated with the “Index of Degradation” rated by the sensorial panel, both in normal aged wines and in “forced aged” experiments, respectively $r = 0.8725$ and $r = 0.8869$.
- ROX-values higher than 10 the concentration of methional and phenylacetaldehyde were respectively above odor threshold.
- Finally, it was observed a positive relationship between consumed oxygen and the respective ROX. These last results needed to be further complemented in order to