



Phenolics in Chardonnay

Steve Price
ETS Laboratories

What are the differences between white and red grapes?

Not much,
just anthocyanins



Chardonnay

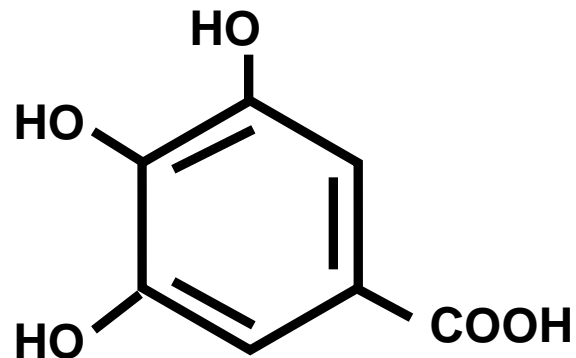
phenolic in
white grapes



- tannin in skins, seeds and stems
- flavonols in skins
- flavan-3-ols in seeds
- cinnamic acids in pulp and skins
- flavanones in skins

Phenolics

Benzoic Acids

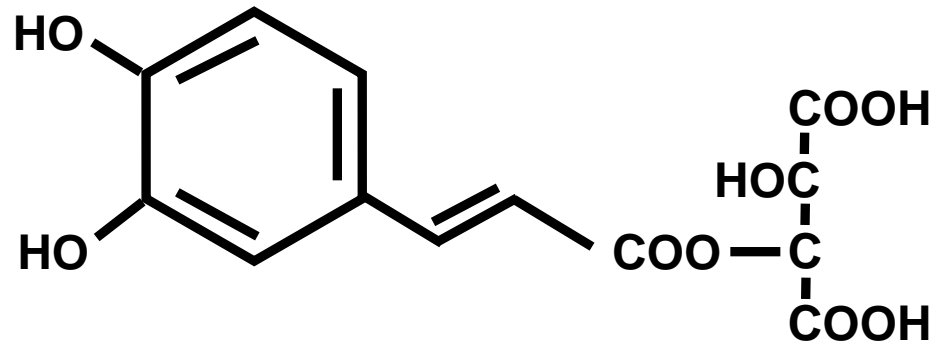


Gallic Acid
Syringic Acid
Vanillic Acid

from seeds and oak

Phenolics

Hydroxycinnamic Acids - Esters

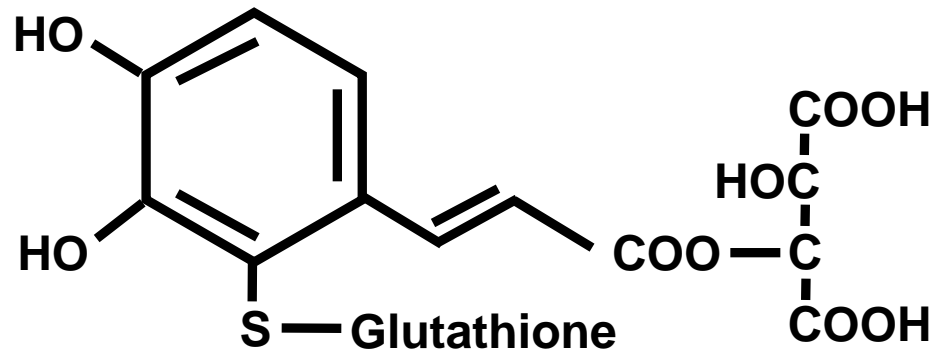


Caftaric Acid
Coutaric Acid
Fertaric Acid

from skins and pulp

Phenolics

Grape Reaction Product (GRP)

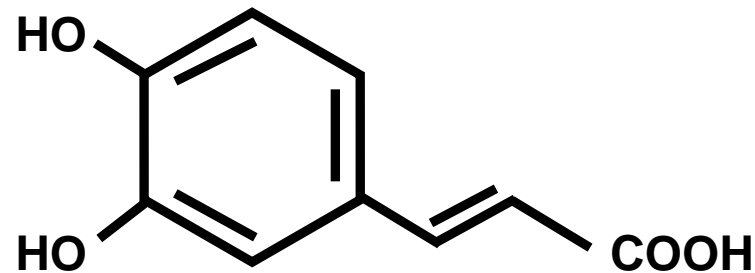


Caftaric Acid
Coutaric Acid
Fertaric Acid

from caftaric acid and glutathione

Phenolics

Hydroxycinnamic Acids



Caffeic Acid

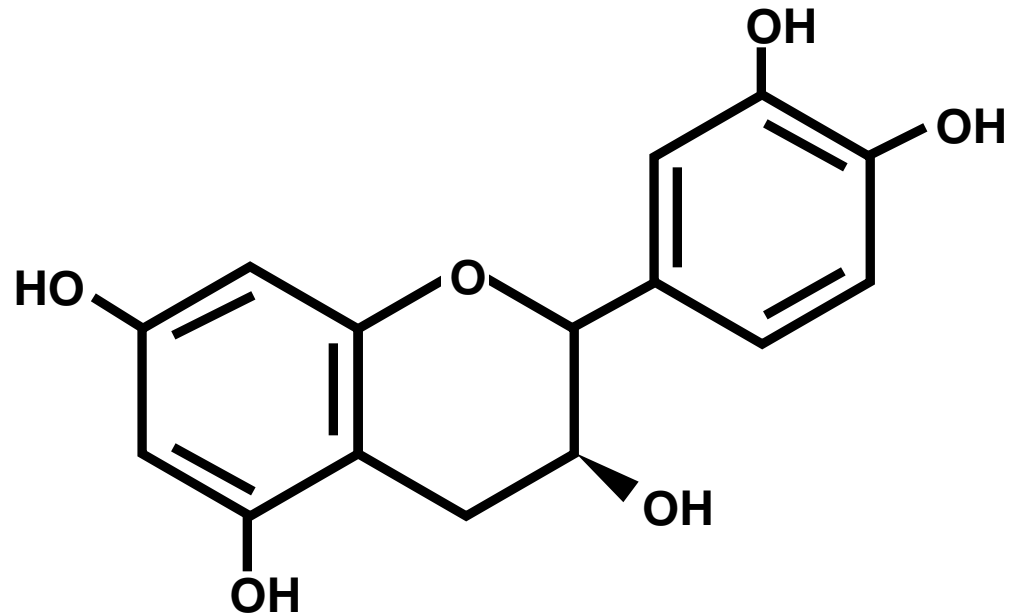
p-Coumaric Acid

Ferulic Acid

from cinnamate esters

Phenolics

Flavan-3-ols, Flavanols, Catechins,



Catechin

Epicatechin

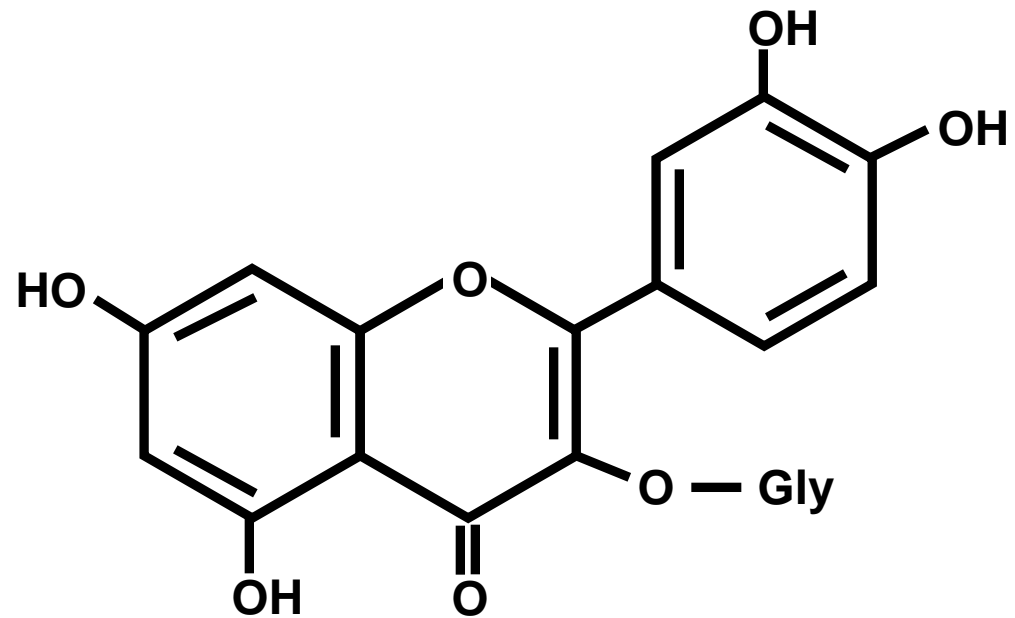
Epigallocatechin

Epicatechin gallate

from seeds

Phenolics

Flavonol Glycosides

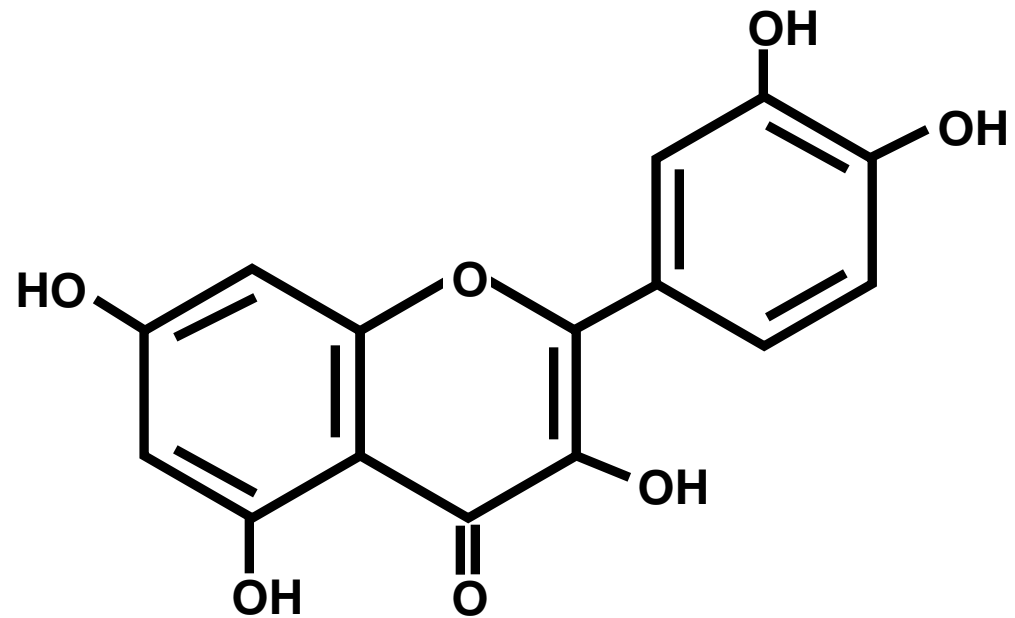


Quercetin
Kaemferol
Myricetin
Isorhamnetin

from skins

Phenolics

Flavonol aglycones

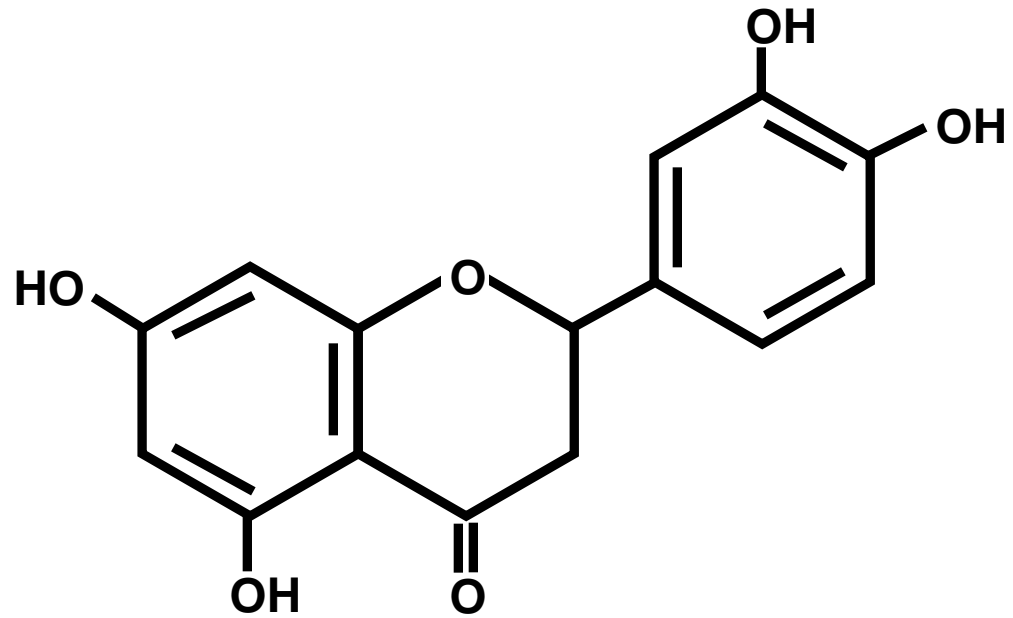


Quercetin
Kaemferol
Myricetin
Isorhamnetin

from flavonol glycosides

Phenolics

Flavanones



Astilbin

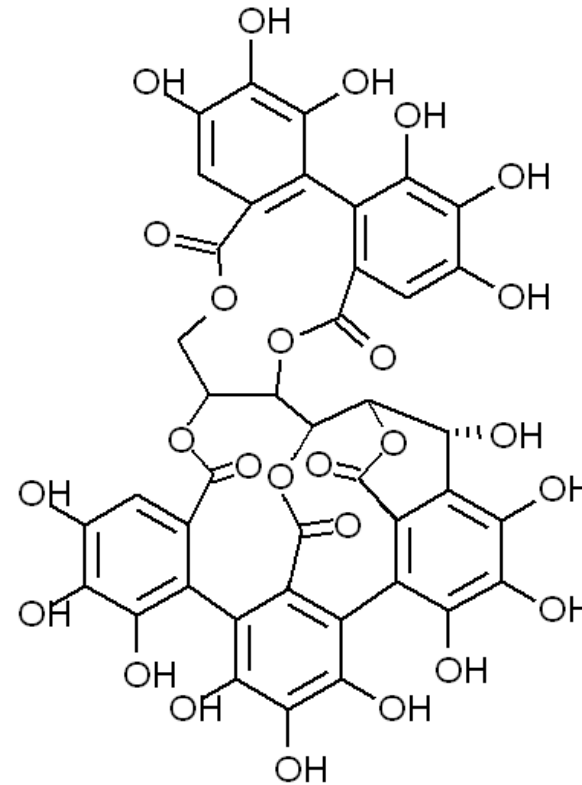
from grape skins

Phenolics

Tannins

Hydrolyzable Tannins

gallic acid
ellagic acid
sugars
simple phenolic acids



from oak

Phenolics

Tannins

Condensed Tannin or Proanthocyanidins

Catechin

Epicatechin

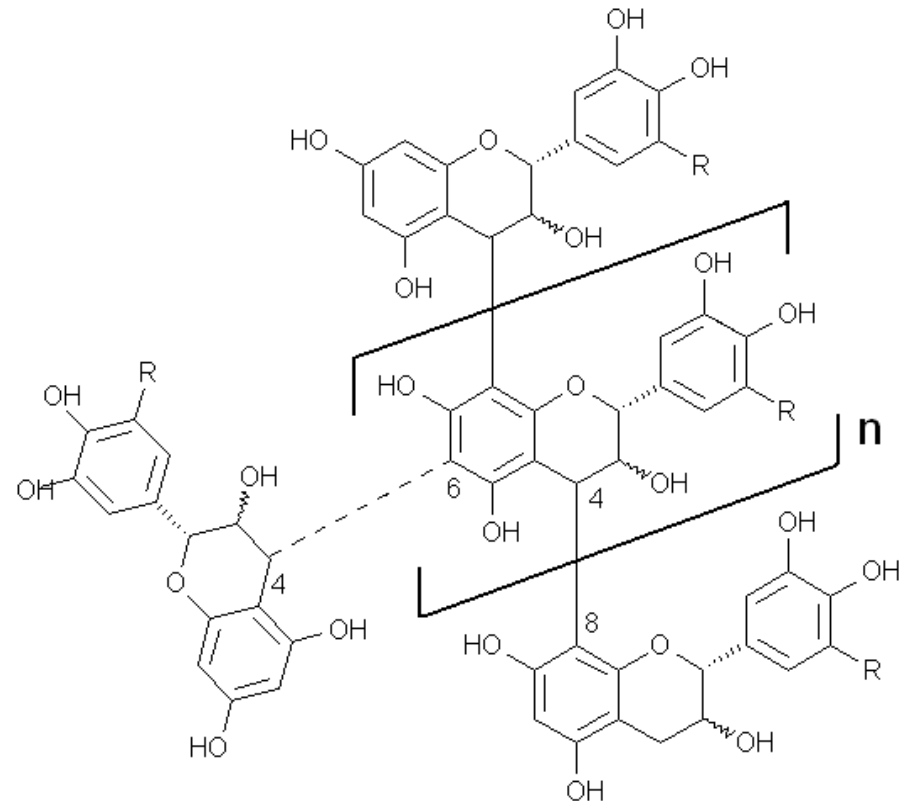
Epigallocatechin

Epicatechin gallate

2 to >30 subunits

Innumerable combinations

from grape skins and seeds



From: Jackson 1994

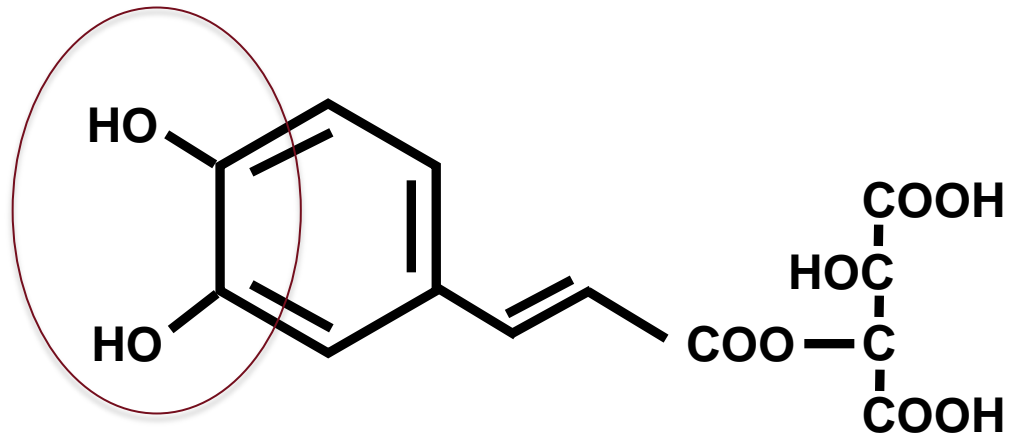
Phenolics

Caftaric Acid

polyphenol oxidase (PPO)

quinones

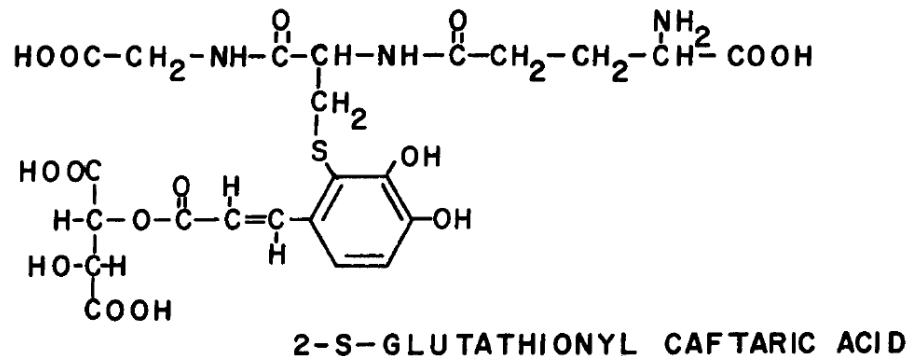
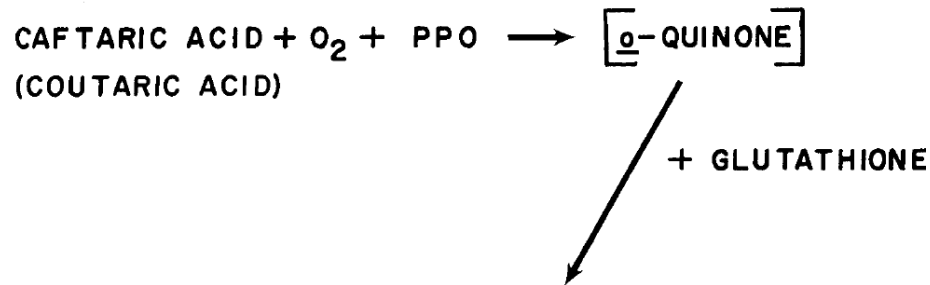
glutathione

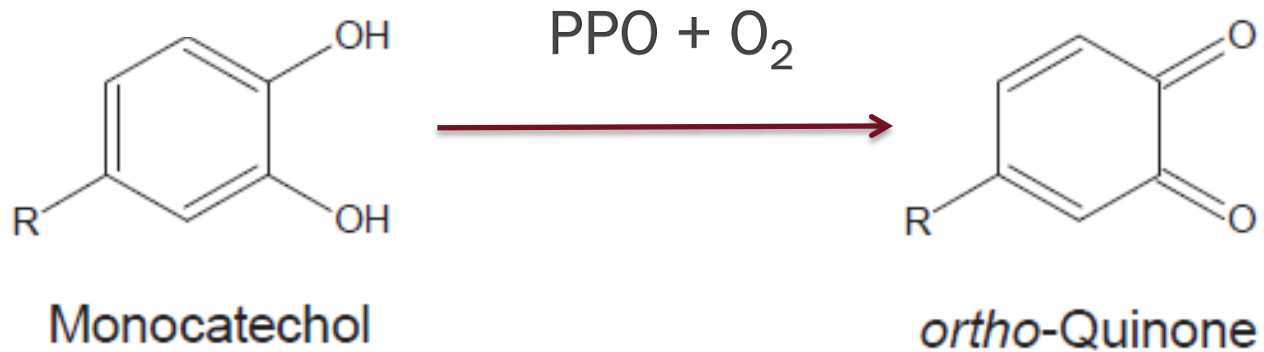


Phenolics

Caftaric Acid Disappearance and Conversion to Products of Enzymic Oxidation in Grape Must and Wine

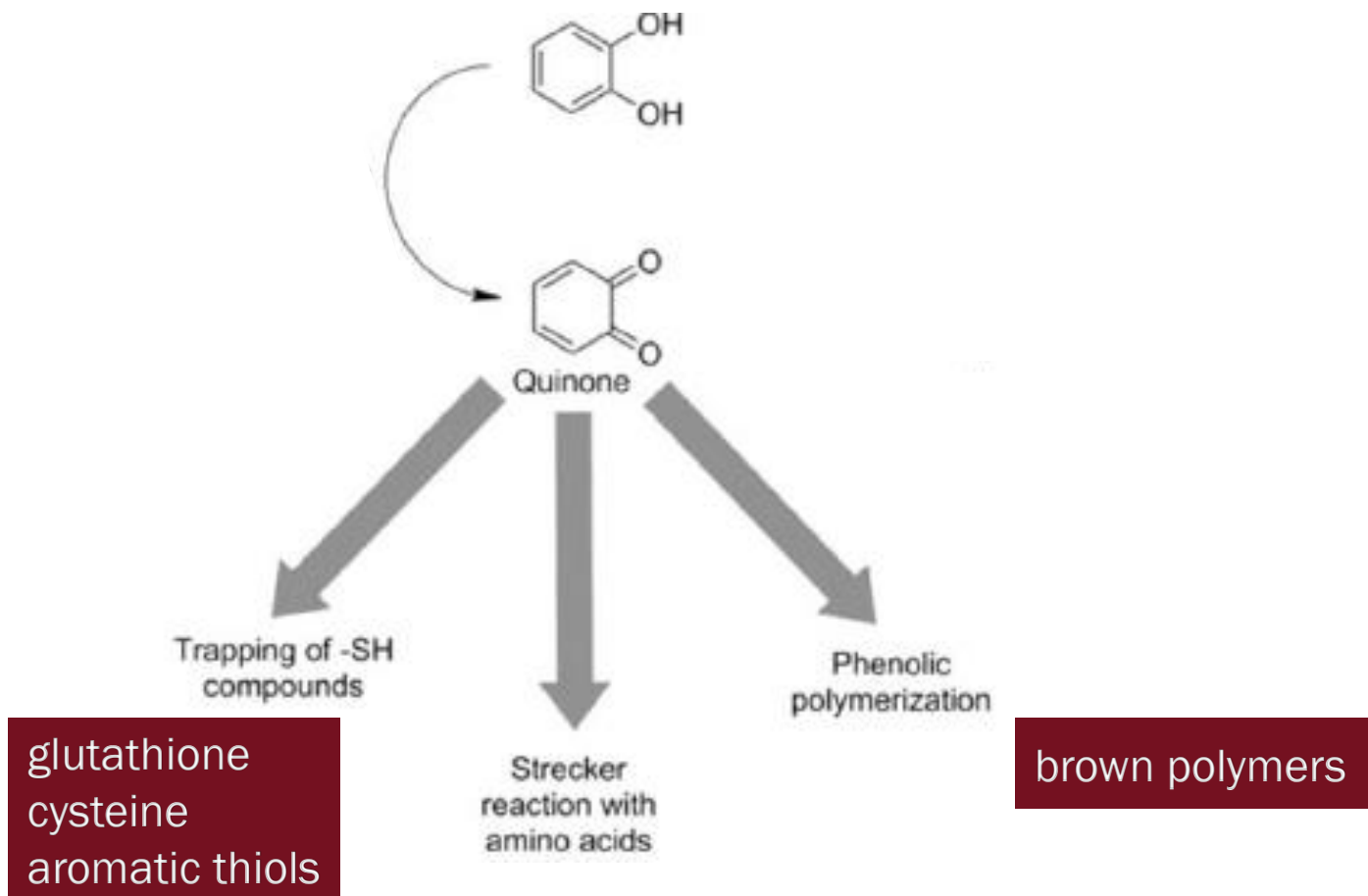
V. L. SINGLETON¹, M. SALGUES², J. ZAYA³, and E. TROUSDALE⁴



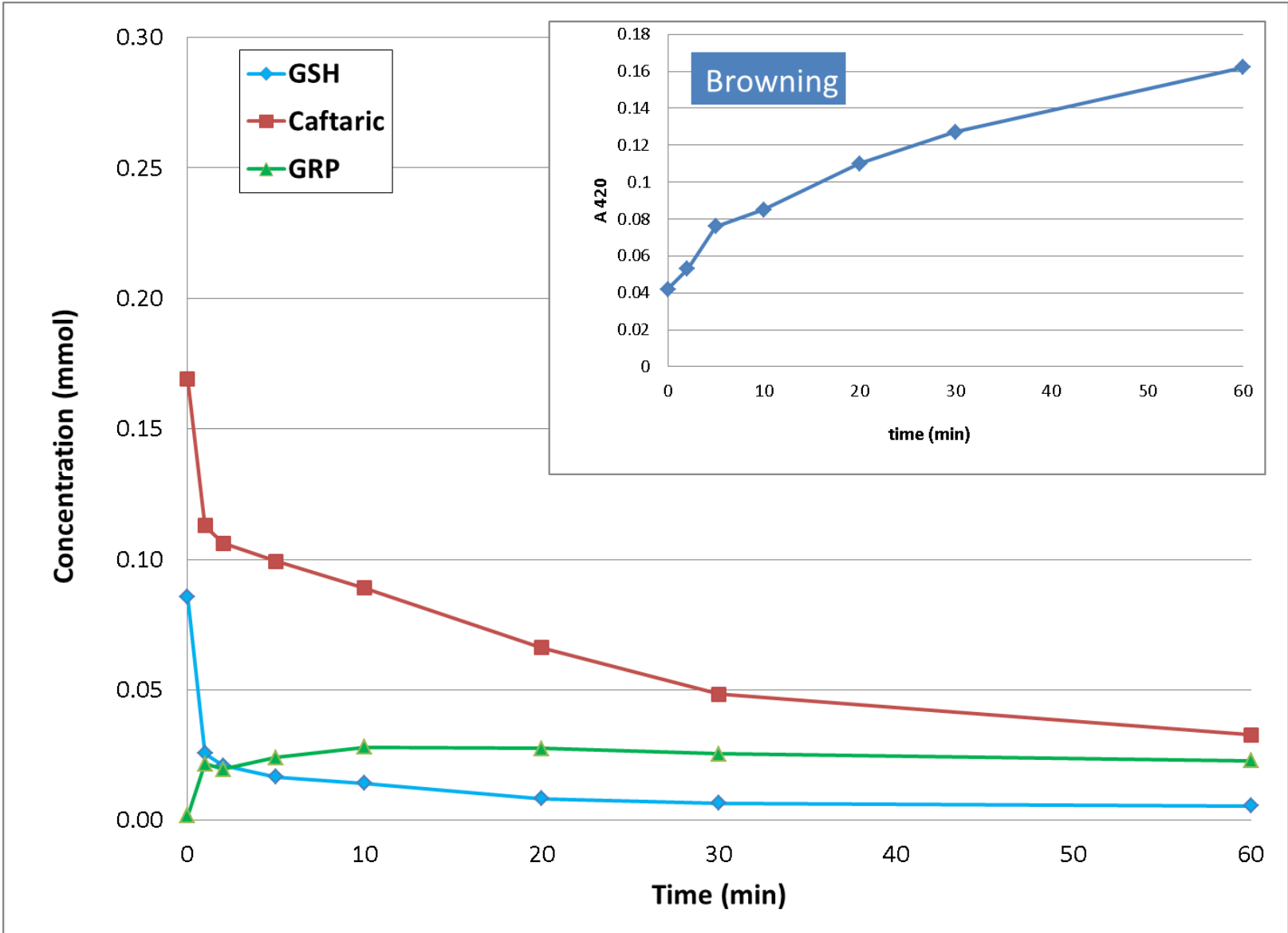


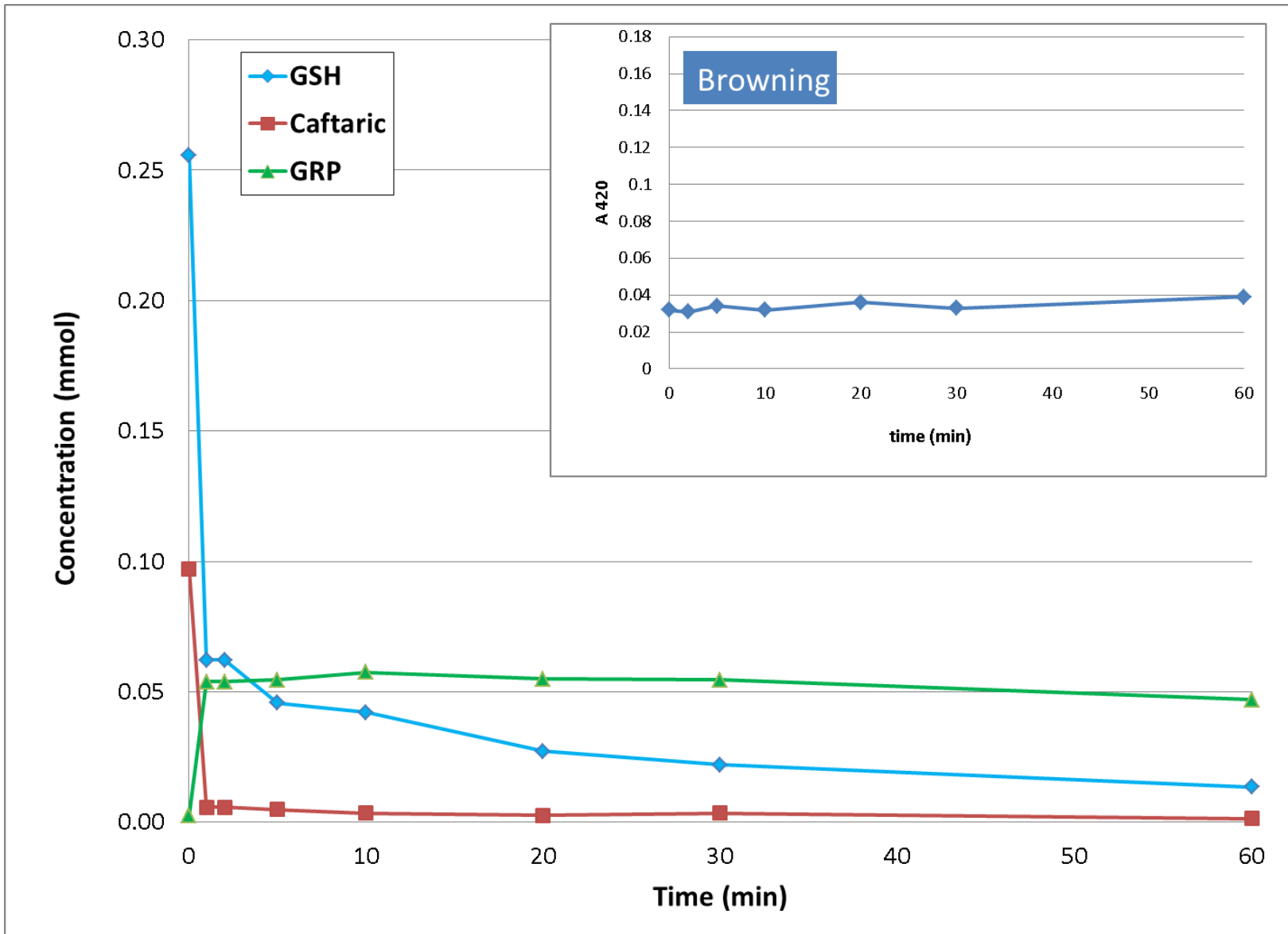
Li et al., 2008

Phenolics



Ugliano (2013). Copyright American Chemical Society, 2013.





Chardonnay Skin Contact Trials



Skin Contact Experiment

Variety: Chardonnay

600 clusters, hand destemmed, berries pooled

1.5 kg berries per container, 3 replicates, fruit lightly crushed at zero time

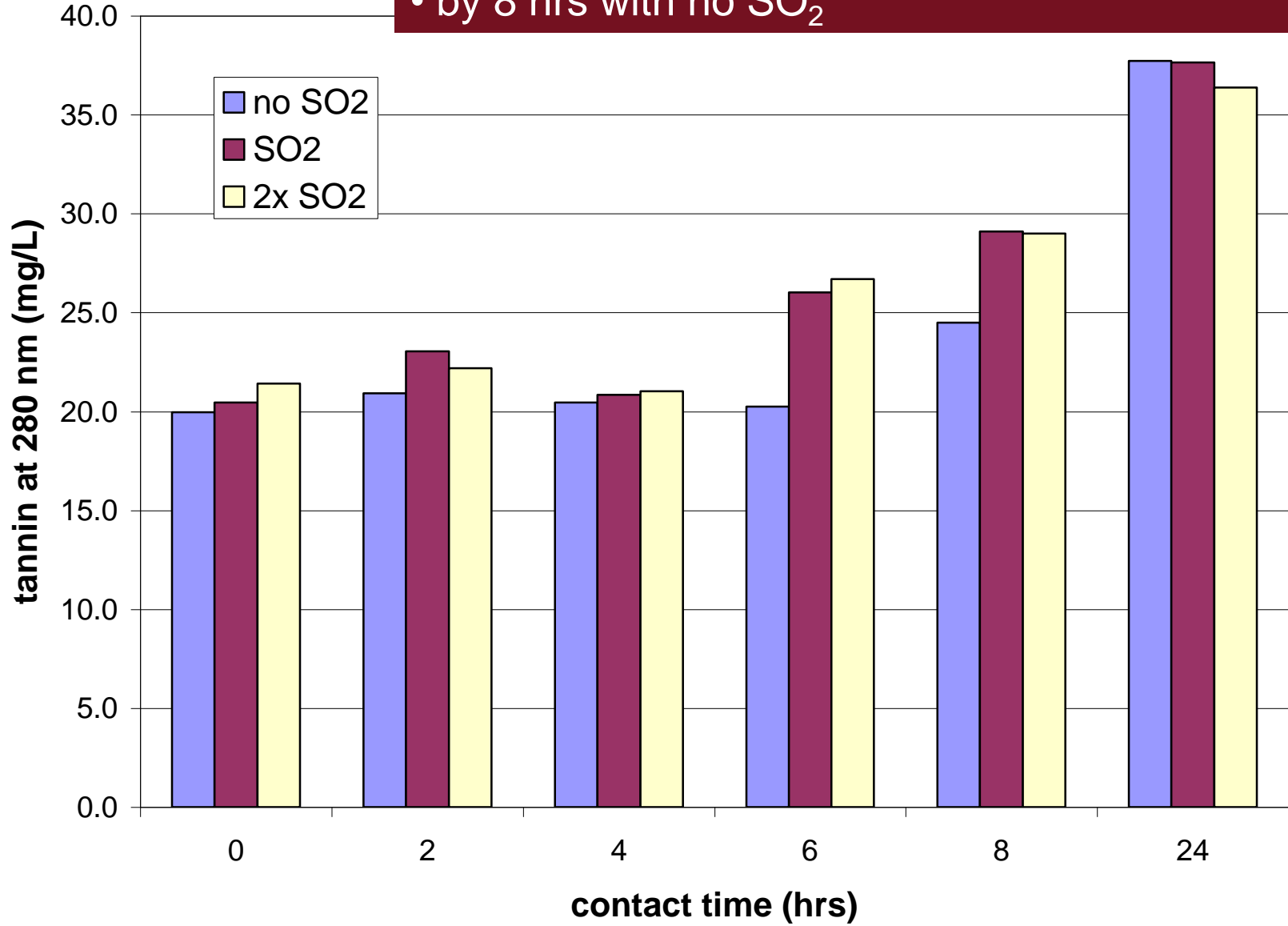
Temperature: 25°

SO₂: 0, 50ppm, 100ppm

Time: 0, 2, 4, 6, 8, 24 hrs

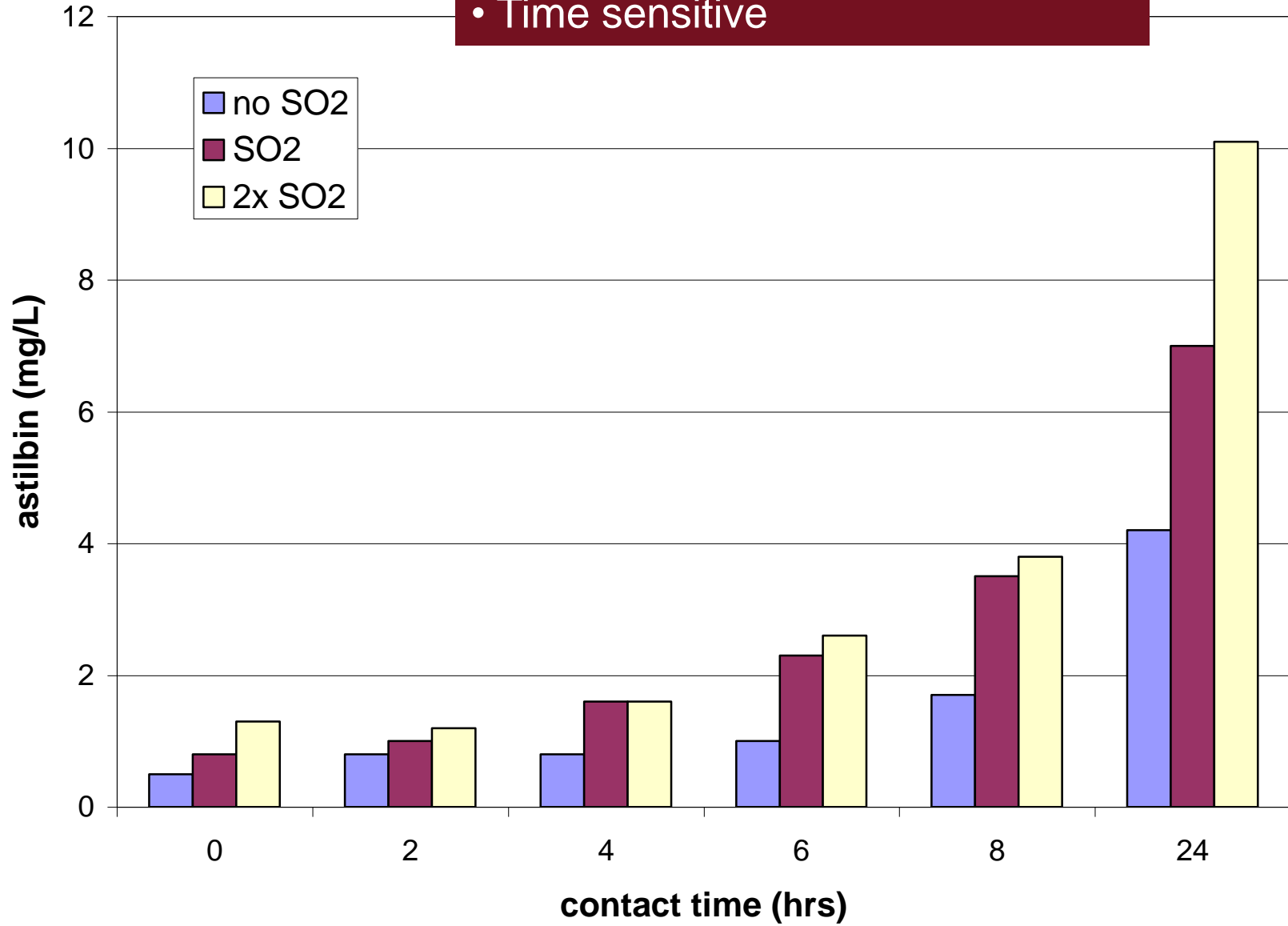
tannin

- Tannin extraction increases by 6 hrs with SO₂
- by 8 hrs with no SO₂



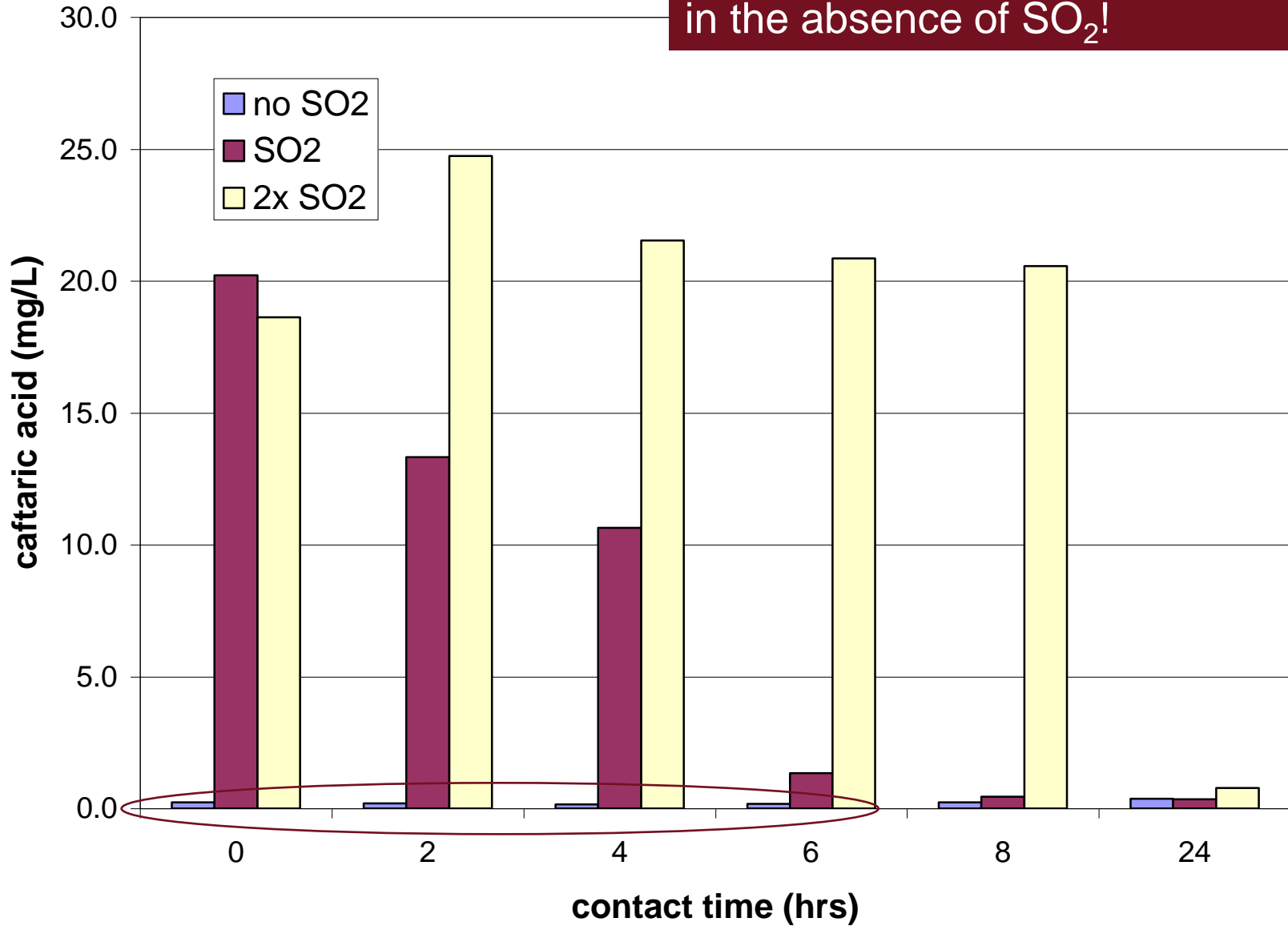
astilbin

- Skin extraction enhanced by SO₂!
- Time sensitive



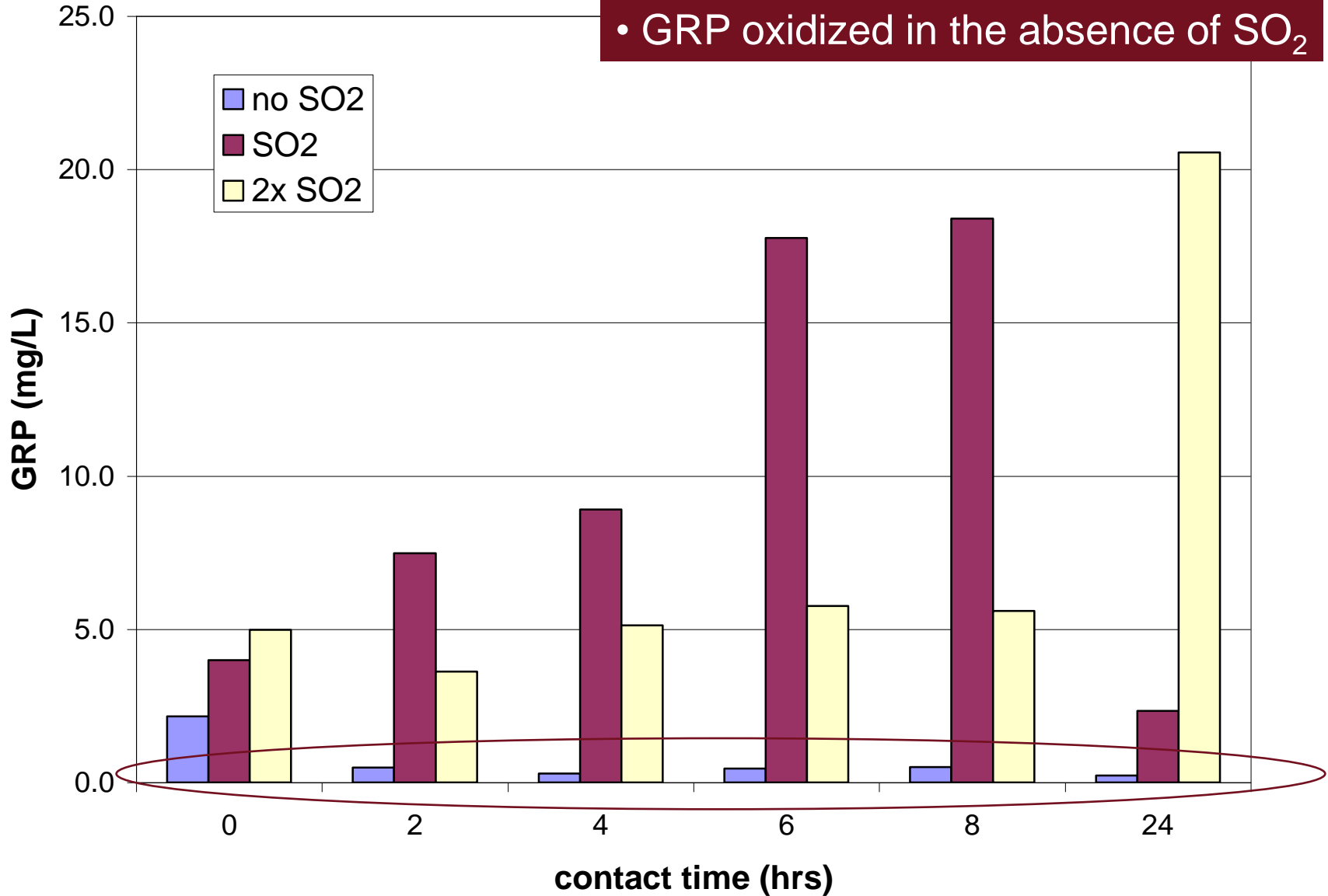
caftaric acid

caftaric acid immediately oxidized
in the absence of SO₂!



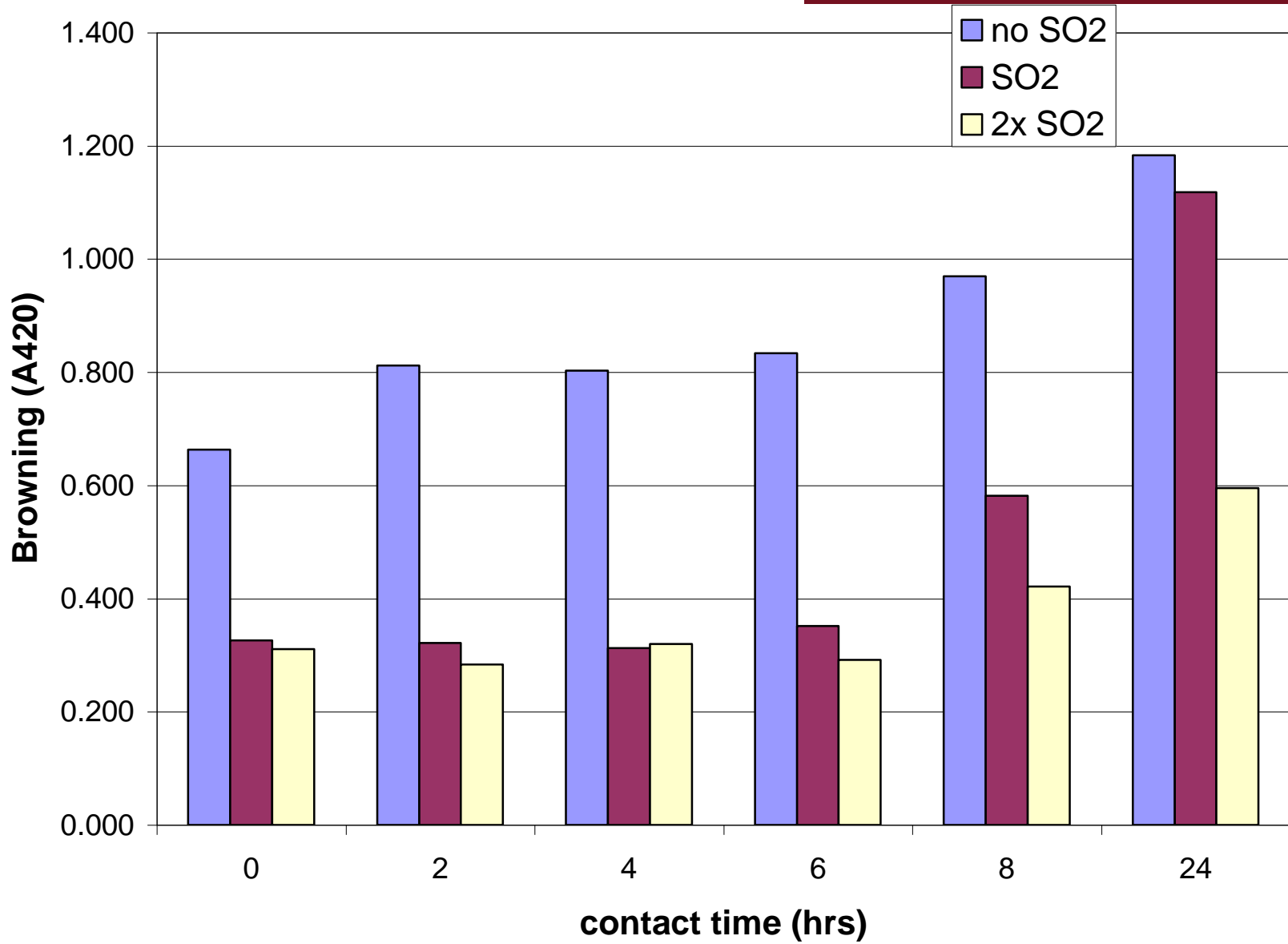
GRP

• GRP oxidized in the absence of SO₂

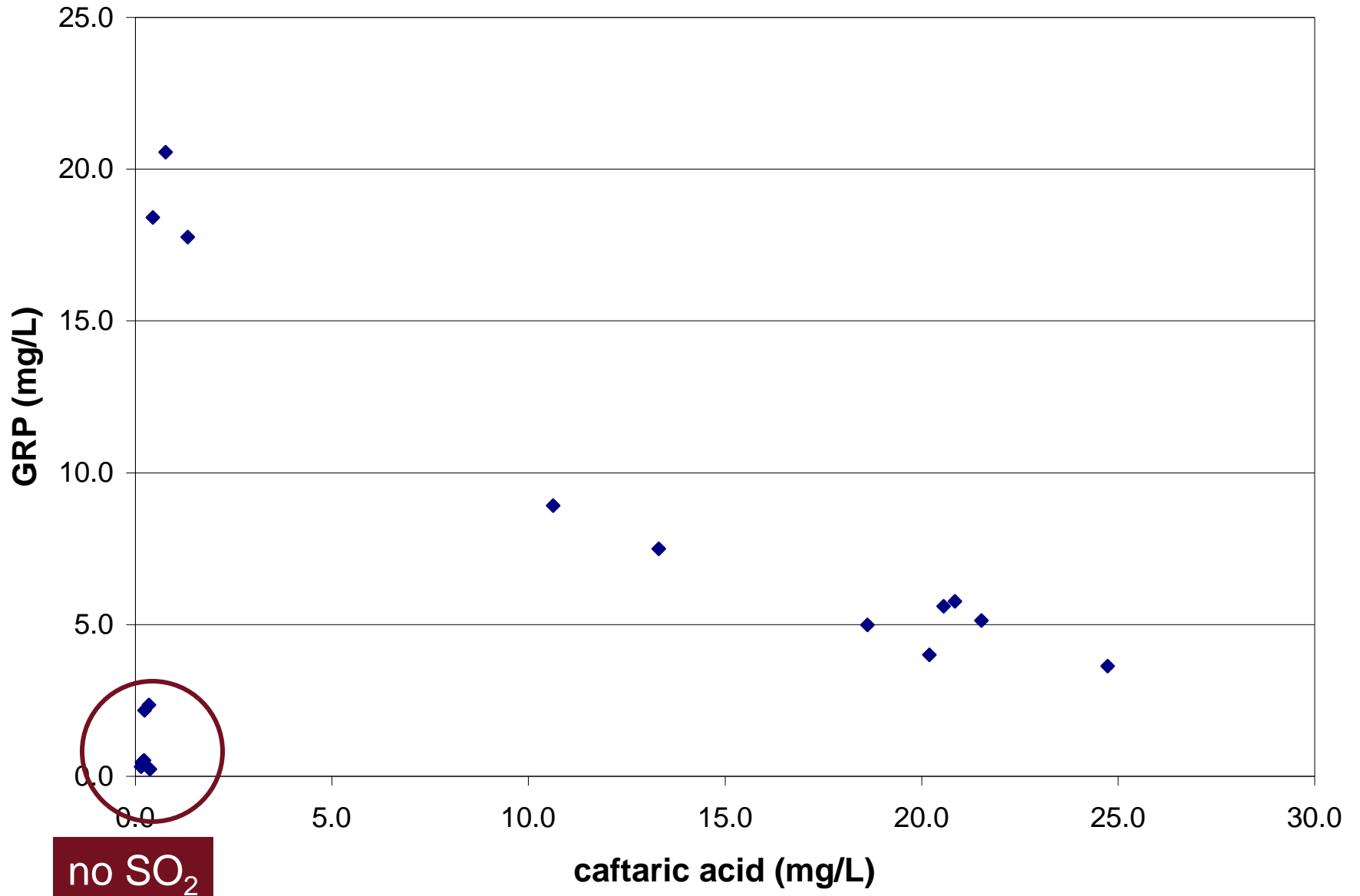


A420

• SO₂ delays onset of browning



inverse relationship of caftaric acid and GRP in the presence of SO₂



	Goodfellow		
	2016 B	2016	2017
gallic acid	4.9	1.7	0.8
catechin	0.8	<0.2	<0.2
astilbin	4.5	1.9	0.7
tannin	19.7	13.8	11.3
GRP	5	4.1	2.9
caftaric acid	8.5	6.8	6.3
caffeic acid	14.1	5.1	5
quercetin glycosides	1.3	0.5	0.4
quercetin	0.8	0.8	<0.2

	Winery X	
	2016	2017
gallic acid	2.8	1.1
catechin	<0.2	<0.2
astilbin	0.5	1
tannin	15.4	11.8
GRP	10.1	7.6
caftaric acid	4.8	18.2
caffeic acid	2	5.4
quercetin glycosides	<0.2	<0.2
quercetin	0.2	0.4

	Chehalem 2017			
	Oxidative	Reductive	Hard Press	Free Run
gallic acid	1.4	0.7	0.7	1
catechin	<0.2	<0.2	0.5	<0.2
astilbin	0.8	0.9	1	0.5
tannin	11.6	10.6	12.2	9.1
GRP	2.6	5.6	6.4	6.5
caftaric acid	6.6	10.1	15.6	10.8
caffeic acid	4.4	3.2	3.7	2.4
quercetin glycosides	0.2	0.7	0.7	<0.2
quercetin	0.2	0.2	0.2	<0.2

THANKS

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Dr. Steve Price
(541) 908-4279
sprice@etslabs.com
price.s@comcast.net