



## Minerality in Sauvignon Blanc – Part 2

A Research Summary

Dr. Carien Coetzee  
[Basic Wine](#)  
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[Part 1](#) of our Minerality in Sauvignon Blanc series investigated i) cultural differences in the perception of minerality, ii) how minerality is perceived and iii) sensory attributes associated with the perception of minerality.

**Part 2** is a research summary of a study titled [“Perceived minerality in Sauvignon Blanc wine: Chemical reality or cultural construct?”](#)<sup>1</sup> This study aimed to determine the relationship between the the perceived mineral character in wine and wine chemical composition. Certain chemical compounds were identified to be either positive or negative predictors of perceived minerality.

## Method

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### Sensory evaluation

Judges were asked to evaluate the wines by rating a list of given descriptors, including “minerality”, according to their intensity. For more information, please read [Part 1](#).

### Chemical analysis

Table 1 lists the range of chemical compounds and physical parameters measured using various analytical techniques. The compounds were tested to identify any correlations with the sensory perception of “minerality”.

Table 1. List of physical parameters and chemical compounds investigated to identify correlations with the sensory perception of “minerality”.

Basic Analyses	Fermentation derived volatile aroma compounds	Volatile organic acids	Volatile thiols	Elements
pH	Benzaldehyde	Acetic acid	3MH	Al
Residual sugar	Cis-3-hexen-1-ol	Isobutyric acid	3MHA	As
Total acid	Diethyl succinate	Butanoic acid	4MMP	B
Ethanol	Ethyl acetate	Hexanoic acid	Benzenemethanethiol (BMT)	Ca
Free SO <sub>2</sub>	Ethyl butanoate	Octanoic acid	Ethyl-2-mercaptoacetate (E2MA)	Cd
Total SO <sub>2</sub>	Ethyl decanoate			Cr
	Ethyl hexanoate	<b>Non-volatile organic acids</b>	<b>Methoxypyrazines</b>	Cu
	Ethyl isobutyrate	Tartaric acid	IBMP	Fe
	Ethyl octanoate	Malic acid		K
	Ethyl pentanoate	Malonic acid	<b>Volatile sulphur compounds</b>	Mg
	Hexanol	Shikimic acid	Hydrogen sulphide (H <sub>2</sub> S)	Mn
	Hexyl acetate	Lactic acid	Methylmercaptan (MeSH)	Na
	Isoamyl acetate	Acetic acid	Ethylmercaptan (EtSH)	Ni
	Isoamyl alcohol		Dimethyl Sulphide (DMS)	P
	Isobutanol		Diethyl Sulphide (DES)	Pb
	Phenylethyl alcohol		Dimethyl disulphide (DMDS)	S
	Trans-3-hexen-1-ol			Zn

## Results

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### Citrus as a positive predictor of minerality confirmed

- » In [Part 1](#) of this series, the sensory attribute, “citrus” was identified as being a good predictor of perceived minerality. In the current study, **3MH** (the chemical compound typically responsible for the citrus/grapefruit aroma) was proven to be a **positive predictor** of perceived minerality which is consistent with the sensory observations.
- » Another compound contributing to the fruity aroma in wine is **isoamyl acetate**, which also showed to be a **positive predictor** for the French participants.

## The more flavoursome a Sauvignon Blanc wine was considered to be, the less minerality was reported?

- » Considering the above information, the previous hypothesis of “The more flavoursome a Sauvignon Blanc wine was considered to be, the less minerality was reported” ([Part 1](#)), is **not supported** when looking at the chemical data alone. 3MH and isoamyl acetate are both compounds that contribute flavoursome fruity aroma to a wine and they both proved to be positive predictors.
- » The **detachment of the sensory observation with the chemical content** of the wine could be due to the complex interaction effects of the various compounds present as well as the specific concentrations at which these compounds were present.

## Is BMT the source of the mineral character in wine?

- » Previous studies identified benzenemethanethiol (BMT) as a potential source of perceived flinty characters<sup>2,3,4</sup>, however, in the present study, BMT was not found to be a significant predictor of minerality.

## Organic acids and the freshness of the wine. Is there an association with minerality?

- » In [Part 1](#), “freshness” was a sensory attribute which linked positively with minerality.
- » For the New Zealand participants, **malic acid was a positive predictor** of minerality while **lactic acid was a negative predictor**. Malic acid is a much sharper acid contributing to a larger extent to the freshness of a wine compared to lactic acid.
- » During MLF, the malic acid is converted to lactic acid together with the development of a range of aromatic compounds (such as **diethyl succinate which was also a negative predictor**). This could lead to a decrease in the perception of freshness and thus minerality. Another study<sup>5</sup> also reported the negative association between buttery and milky attributes (associated with MLF) and perceived minerality.
- » For the French participants, **tartaric acid and total acidity were negative predictors** of perceived minerality. This supports the sensory observation where **sour taste was negatively correlated to minerality**.

## Reductive sulphur compounds are not indicators of minerality in wine

- » **No correlation between the reductive sulphur compounds and perceived minerality were identified**. This also supports the sensory observations discussed in [Part 1](#) where perceived reduction notes were not an indicator of minerality in wine.

## Sulphur dioxide, the silent contributor

- » The most interesting result is probably the identification of **sulphur dioxide as a positive predictor of perceived minerality**.
- » For the New Zealand participants (who equally rely on olfaction and palate information)<sup>6</sup>, **bound SO<sub>2</sub> was the most important predictor**
- » **Free SO<sub>2</sub> was the most important predictor** for the French participants (who rely more on olfactory information)<sup>6</sup>.

- » This result is particularly relevant to the wine industry as **free and bound SO<sub>2</sub> are usually not considered when profiling the aromatic composition of wines**. This study shows that the **SO<sub>2</sub> content requires more serious consideration and should also be considered, maybe as chemical markers, during future sensory evaluations.**

### Minerals and minerality

- » The contribution of basic elements to the perception of minerality received some support in the study. **Ionic Ca<sup>2+</sup> and Na<sup>+</sup> were positive predictors** of perceived minerality for the New Zealand participants. Therefore, an increase in the basic elements, whether it be via the vineyard (which is unlikely<sup>7</sup>) or oenological treatments, could be a predictor of a higher perceived minerality in the wine. This is definitely an area that needs further investigation.

This work truly shows the complexity of the concept of minerality in wine both from a sensory and chemical perspective. Strong disagreement exist between wine experts regarding the minerality<sup>8</sup> and it remains an ill-defined sensory concept. A topic that needs more research.

More attention should be given to the sulphur dioxide content of a wine. The possibility of sulphur dioxide enhancing the perception of minerality through complex sensory interactions also exists.

Contact [Carien](#)

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