

Struck flint, struck match and gun smoke... linked compounds with a potentially large impact



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[Basic Wine](#)

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The term “**minerality**” is commonly used by wine critics and enthusiasts to describe a range of sensory experiences in wine, however, the concept of minerality in wines is ill-defined¹. Minerality in wine is usually a **positive quality** that adds complexity and depth to the wine². The terms typically associated with minerality include aroma attributes such as “earthy”, “flinty”, “stony”, “iodine”, and “salty”, among others².

Overall, the latest research on minerality in wine suggests that the topic is complex and multifaceted, with many **factors influencing the perception** of mineral character (see other blog posts on minerality on sauvignonblanc.com). While the precise chemical compounds responsible for perceived minerality are still being identified, **two polyfunctional thiols have been linked to aroma attributes “struck flint”, “struck match” and “gun smoke”** which is commonly associated with minerality^{5,7}.

1. Benzenemethanethiol (BMT)

- Other names: phenylmethanethiol (PMT) and benzyl mercaptan (BM)
- Aroma detection threshold³: 0.3 ng/L
- Formation: It is commonly believed that BMT is formed from the reaction of benzaldehyde with hydrogen sulfide, however, results from a study⁴ do not support the theory leaving unanswered questions about how BMT is formed.
- BMT in Sauvignon blanc vs non-Sauvignon blanc varieties⁵:

	BMT in 57 Sauvignon blanc wines (ng/L)	BMT in 73 non-Sauvignon blanc wines (ng/L)
Range	<0.5 - 131	<0.5 - 35.8
Mean	15.2	4.8
Median	5.1	3.5

2. 2-Furylmethanethiol (2FMT)

- Other names: (furan-2-yl)-methanethiol, 2-furanmethanethiol and 2-furfurylthiol (FFT)
- Aroma detection threshold³: 0.4 ng/L
- 2FMT in Sauvignon blanc vs non-Sauvignon blanc varieties⁵:

	2FMT in 57 Sauvignon blanc wines (ng/L)	2FMT in 73 non-Sauvignon blanc wines (ng/L)
Range	<0.5 - 225	<0.5 - 131
Mean	17.4	15.2
Median	3.9	5.1

- Formation: 2-Furylmethanethiol has previously been shown to form in white wines during alcoholic fermentation in the barrel from the furan-2-carbaldehyde (furfural) released by toasted oak staves reacting with the hydrogen sulfide produced by yeast⁶.

Studies showed that both of these compounds are **present in white wines, and specifically in Sauvignon blanc wines, at concentrations of sensory significance**^{5,7}. **2FMT played a major role in the sensory perception of “flint”-type aromas while these sensory attributes were modestly related to BMT**⁷. Even though 2FMT is reported to contribute a roasted coffee aroma in certain wines⁸, no evidence of this aromatic contribution was found in the study conducted by Espinase Nandorfy et al., 2023⁷. The sensory panels that evaluated wines spiked with both compounds described and rated **wines high in 2FMT and BMT as high in “flint”, “struck match” and “mineral” aroma** rather than any “roasted coffee”-related attribute. Higher levels of 2FMT did, however, contribute a character leaning towards “sulfurous/burnt”. It seems that the context set by other wine volatiles may affect the odour percept conferred⁷.

Sensory suppression effects

Sensory tests showed that **2FMT suppressed the perception of attributes** “apple/pear”, “peach”, “floral”, “pineapple” and “citrus”⁷. The presence of 2FMT could thus result in a wine with lower fruity and floral-driven characteristics. BMT also exerted some suppressive effects, however to a lesser extent when compared to 2FMT. It could be that the masking effect on fruity and floral notes enhances the perception of minerality. These suppressive effects might be concentration-dependent as other studies⁵ reported the **contribution of 2FMT** to “fruity”, “fresh” and “green” notes of white wines⁵ when present at low concentrations.

Conclusion

Aroma attributes “struck flint”, “struck match”, “gun smoke” and “mineral” are considered desirable in some styles of wines. It seems that the two compounds, benzenemethanethiol and 2-furylmethanethiol contribute significantly to these attributes, however, **it is still unclear to what extent other compounds and sensory interactions could contribute to the perceived minerality** of a wine. The impact of winemaking techniques on the concentration of these compounds also needs further investigation.

References

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