Weinakademiker Thesis (D7) Abstract

The Science of Minerality

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June 2022

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Motivation

Tasting minerality has been fashionable and a highly regarded wine quality for decades. Its current understanding is mainly based on geological perception which regards rocks and stones with no taste and minerals as solids not easily evaporating into the air to be detected. Furthermore, minuscule minerals in wine are usually considered below human detection threshold. The perceived minerality was proposed to originate from organic compounds such as lipids rather than any minerals. Hence, mineral related terms in wine tasting are often advised to be used with care among wine professionals. Although the viewpoint provides an important insight, the physicochemical origins and the associated chemical elements/pathways of minerality are largely unclear and elusive.

Objective

This thesis aims to illustrate scientific principles of minerality in wines. To gain a deeper understanding of minerality and to effectively use the related descriptions in wine tasting and wine quality assessment, it is of prime importance to address the following questions:

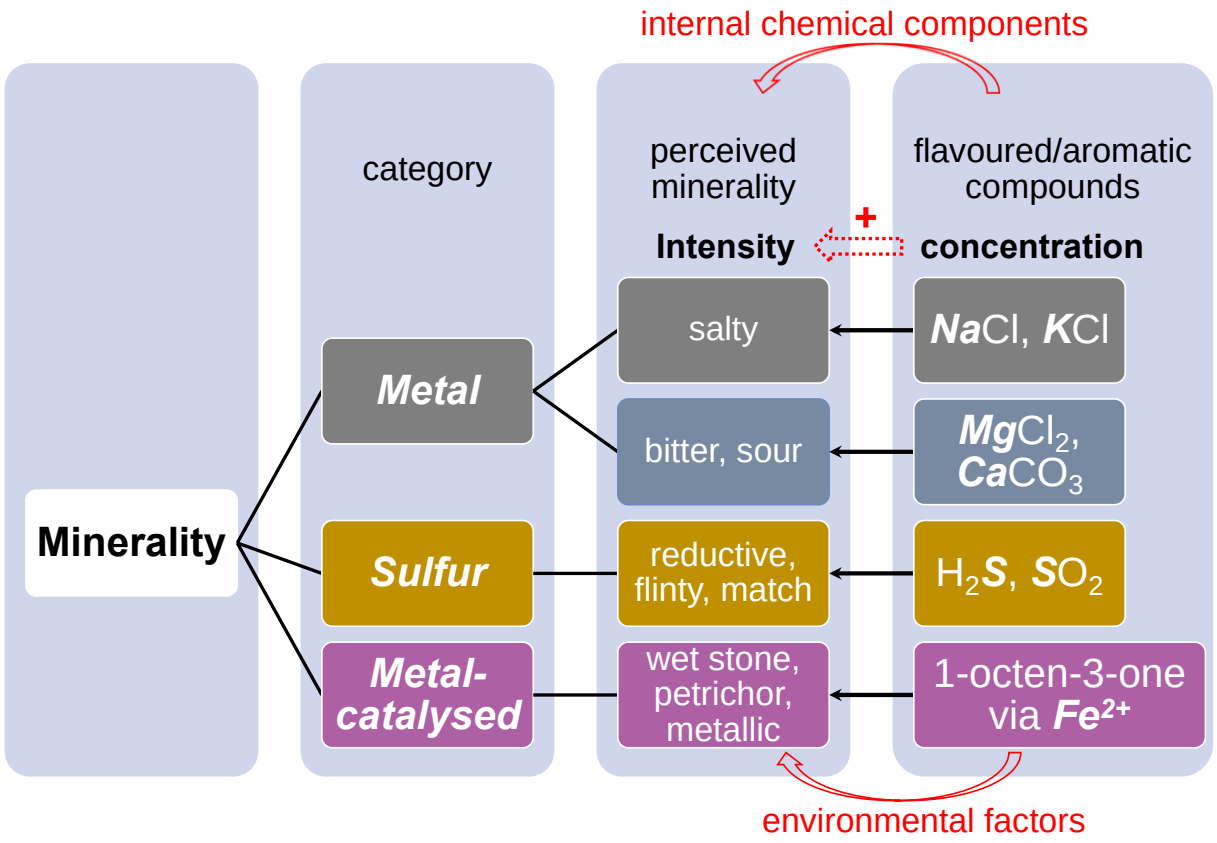
(1) Does minerality arise from specific wine components as most aromas in wine?
(2) Do various descriptions for minerality in wine originate from distinct groups of wine components and what are the associated chemical pathways?
(3) What factors can affect intensity of perceived minerality in wine?

Methodology

Perception thresholds of minerals in water and wine and mineral concentrations in selected wine samples around the world available in the literature and internet sources were collected and compared. By linking and integrating physicochemical principles with experimental data and common observations, I broadly categorize minerality according to their physicochemical sources and the involved chemical reactions.

Tasting of wine samples were performed to evaluate how common minerals are perceived in three different varieties (Chardonnay, Sauvignon Blanc, and Riesling) by directly adding five metal compounds to wines and how the perception and intensity are affected by acidity from additional malic acid. The tastes of the mineral compounds in water were recorded for comparison.

Content



Conclusion

Minerality can be broadly classified into three main groups: **Metal**, **Metal-catalysed**, and **Sulfur**. Metal ions that directly cause the perceived flavours/aromas are in the group of **Metal**. Metal ions that do not directly account for flavours/aromas yet catalyse the chemical reactions to produce volatile compounds are in the group of **Metal-catalysed.** The group of **Sulfur** is mainly sulfur-containing compounds with distinctive aromas. Positive correlations between the intensity of the perceived minerality and concentrations of the associated minerals can be better observed in controlled experiments because perception can be influenced not only internally by chemical components in wine but also externally by environmental factors such as temperature and oxygen exposure. My designed tasting reveals a positive connection between the perceived mineral intensity and concentrations of minerals in wines, which can be modulated by grape varieties, types of minerals, and levels of acidity.