**1H NMR based sulfonation reaction kinetics of wine relevant thiols in comparison with known carbonyls**

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**Supplementary Information**

**Figure S1:** 1H NMR spectra of cysteine (a) and cysteine sulfonate (b) in model wine solution (12% v/v ethanol, 5g/L tartaric acid, pH=3.5, RT) and D2O-TSP.



**Figure S2:** Homonuclear correlation 1H-1H gCOSY2D NMR spectrum of cysteine sulfonate



**Figure S3:** 1H-13C gHSQC 2D NMR spectrum of cysteine sulfonate



**Figure S4:** 1H-13C gHMBC 2D NMR spectrum of cysteine sulfonate



**Figure S5:** 1H NMR spectra of glutathione (10) and glutathione sulfonate (11) in model wine solution (12% v/v ethanol, 5g/L tartaric acid, pH=3.5, RT) and D2O-TSP. In the current spectra, the peaks of pyroglutamic acid and cysteinylglycine sulfonate are indicated as H´.



**Figure S6:** Homonuclear correlation 1H-1H gCOSY 2D NMR spectrum of glutathione sulfonate



**Figure S7:** 1H-13C gHSQC 2D NMR spectrum of glutathione sulfonate



**Figure S8:** 1H-13C gHMBC 2D NMR spectrum of glutathione sulfonate

