

## DETERMINATION OF SULFUR COMPOUNDS IN FERMENTED RASPBERRY BEVERAGES BY GC-PFPD

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Volatile sulfur compounds are known to have very powerful and characteristic odours, and can contribute to pleasant or unpleasant aromas of a wine, according to their nature and concentration. Their concentration has a great influence on sensory properties, often being strongly dependent on threshold values, normally low. The determination of sulfur compounds, eluted in a chromatographic column, has been performed using mainly flame photometric detection (FPD), sulfur chemiluminescence detection (SCD), atomic emission detection (AED) and more recently, pulsed flame photometric detection (PFPD). The objective of this study was to determine the sulfur compounds in a fermented raspberry beverage using GC-PFPD. The analyses were made on a Varian CP-3800 gas chromatography equipped with a PFPD detector operating in sulfur mode. Aromatic extracts, obtained by liquid-liquid extraction with dichloromethane, were injected into a 1079 split/splitless injector (splitless for 30 s). The separation was performed with a CP-Wax 52 CB column (50 m x 0.25 mm i.d., 0.2 µm film thickness; Chrompack). The oven temperature was programmed from 60 °C (5 min) to 200 °C, at 20 °C/min (final hold for 5 min). The carrier gas was helium with a constant flow rate of 1.2 mL/min. The temperature of the injector and detector was set to 250 °C. The detector voltage was 570 V, the gate delay for sulfur compounds was 6 ms and the gate width was 20 ms. All sulfur compounds were identified by comparing their retention times with those of the pure standards. Raspberry pulp was diluted with water (1:1), sucrose was added to adjust the initial sugar concentration to 160 g/L (sucrose + glucose + fructose) and the pH was corrected to 4 with CaCO<sub>3</sub>. Batch fermentations (3 L of raspberry must) were carried out at 22 °C in a

bioreactor, after inoculation with 1 g/L of *Saccharomyces cerevisiae* CAT-1 previously grown in YPD medium.

In fermented raspberry beverage were identified and quantified 7 sulfur volatile compounds: furfuryl mercaptan (16.9 µg/L), 2-mercaptoethanol (4.7 µg/L), 2-(methylthio)ethanol (158.1 µg/L), 3-mercapto-3-methylbut-1-ol (4.0 µg/L), 3-methylthio-1-propanol (128.9 µg/L), 4-mercapto-1-hexanol (1.5 µg/L) and benzothialoze (5.7 µg/L). The highest concentrations were found for 2-(methylthio)ethanol and methionol (3-methylthio-1-propanol). Methionol, with cauliflower and cabbage descriptors, can be related to the metabolism of yeasts, when methionine is metabolized.

It was concluded that liquid-liquid microextraction with dichloromethane followed by GC-PFPD analysis is effective to quantify volatile sulfur compounds produced in fermented raspberry beverages. As expected, the PFPD detector exhibited a quadratic behavior for these compounds.

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