Analysis and separation of organic acids in white wine

Science, Chemistry

Calibration Curve Equation: y = 984 371. 3561x + 216 064. 755

R2 = 0. 9912

Calibration Curve Equation: y = 688 260. 8175x + 475 029. 6892 R2 = 0. 9766

The peak areas of the acids were then obtained through chromatograms and plotted against the concentrations of the standard solutions of the organic acids to construct a calibration curve. Finally, the calibration curves obtained were used to determine the concentration of the organic acids in samples of white wine. Standard solutions of various organic acids commonly found in white wine (tartaric, malic, lactic, citric) were assigned to be contained in flasks 1, 2, 3, and 4, respectively, and were run through the chromatograph.

The mobile phase used for the analytes was H3PO4 at pH 3, to prevent dissociation of the organic acids. The resulting chromatograms of each standard were then analyzed to obtain the retention times of the organic acids. Table 1 shows the experimental retention times of the different organic acids. Table 1. Experimental Retention Times of Organic Acids Organic Acid Retention Time (min) Tartaric 3. 088 Malic 3. 812 Lactic 3. 620 Citric 3. 68 Since there were no clear peaks from the chromatograms obtained for the tartaric, malic, and lactic acid samples, the retention time at which the peak height is greatest was obtained as the experimental retention time of the organic acids. The experimental retention times were then used to identify the peak

areas corresponding to each organic acid analyzed in the resulting chromatograms.

Calibration Curve Equation: y = 1 300 341. 246x + 414 396. 3089 R2 = 0. 9815

Calibration Curve Equation: y = 9 836 731. 501x + 96 328. 12036 R2 = 0. 9994

The equations of the calibration curves were then used to calculate the concentration of each organic acid in the white wine samples. The peak area corresponding to each organic acid was first obtained, and substituted in the calibration curve equation.

The results indicate that malic acid is the major component of white wine. But in reality, this is not the case. The major component of white wine is found to be tartaric acid. The chromatograms (See Appendix) of flasks 1 to 9, and of the sample are not well resolved.

This discrepancy may be caused by several factors. These factors include poor solution preparation,
contamination of the solvent or the sample, bubbles in the detector,
impurities in the mobile phase, bleeding
of the column, inadequate adjustment of equilibrium in gradient operation, and carry? over from previous injection.
Due to these factors, it is highly advised that the future researchers should cautiously execute each procedure of the experiment to

eliminate the discrepancy and accordingly, they could attain better results.

They could also make use of theoretical retention times of the organic acids to determine each of them and which could further help the future researchers to analyze the wine sample more efficiently.

REFERENCE:

Meyer, Veronika R. Practical High Performance Liquid Chromatography. 2nd ed. 1993. England: John Wiley & Sons Ltd. APPENDIX

Data Sheets

- Concentration of tartaric acid standard: 50. 0 g/L
- Concentration of malic acid standard: 50. 0 g/L
- Concentration of lactic acid standard: 25. 0 g/L
- Concentration of citric acid standard: 5. 0 g/L
- Composition of Flasks
- Volume of standard stock solutions (in mL)
- Retention Time Measurement
- Calibration Curve

Flask #	1	2	3	4	5	6	7
Tartaric Acid	5. 00	0. 00	0. 00	0. 00	0. 25	0. 50	2. 50
Malic Acid	0. 00	7. 50	0. 00	0. 00	0. 10	0. 50	2. 50

Lactic Acid	0. 00	0. 00	5. 00	0. 00	0. 10	1. 00	2. 50
Citric Acid	0. 00	0. 00	0. 00	5. 00	0. 25	0. 50	2. 50

*Chromatograms of flasks 1?

9 and of the white wine sample can be seen in the remaining pages after this

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