

# [Analysis and separation of organic acids in white wine](https://assignbuster.com/analysis-andseparation-oforganic-acidsin-white-wine-analysis-paper-samples/)

[Science](https://assignbuster.com/essay-subjects/science/), [Chemistry](https://assignbuster.com/essay-subjects/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  | 8  |
| Tartaric Acid  | 5. 00  | 0. 00  | 0. 00  | 0. 00  | 0. 25  | 0. 50  | 2. 50  | 4. 00  |
| Malic Acid  | 0. 00  | 7. 50  | 0. 00  | 0. 00  | 0. 10  | 0. 50  | 2. 50  | 5. 00  |
| Lactic Acid  | 0. 00  | 0. 00  | 5. 00  | 0. 00  | 0. 10  | 1. 00  | 2. 50  | 3. 00  |
| Citric Acid  | 0. 00  | 0. 00  | 0. 00  | 5. 00  | 0. 25  | 0. 50  | 2. 50  | 3. 75  |

\*Chromatograms of flasks 1? 9 and of the white wine sample can be seen in the remaining pages after this.