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If you have questions about applying methodology described in this article to a current application, please contact our technical service chemists.

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Fast HPLC Analysis of Wine Acids, Using a SUPELCOSIL SAX1 Column

G. Vas, Research Institute for Viticulture & Enology of Agricultural Ministry, Eger, Hungary

The strong anion-exchange SUPELCOSIL SAX1 column is especially suited to determining organic acids, prevalent in grapes and wines, that are important in vine ripening and enology methods.

One of the most important chemical groups analyzed in grapes and wines is organic acids. Grapes contain mainly citric, malic, tartaric, caproic, caprylic, capric, maleic, and fumaric acids. Wine, in addition, contains succinic, lactic, shikimic, and acetic acids. Some of these acids have special importance in vine ripening or enological methods. Tartaric acid affects the stability of the wine; the ratio between the amounts of tartaric and malic acid determines vine ripeness; and acetic, fumaric, and/or lactic acids are surveyed in enology methods.

Wine acids are analyzed on cation or anion exchange columns. Table 1 compares analyses between these two types of columns. A SUPELCOSIL™ SAX1 anion exchange column takes significantly less time than the cation exchange column to equilibrate and to analyze the wine acids.

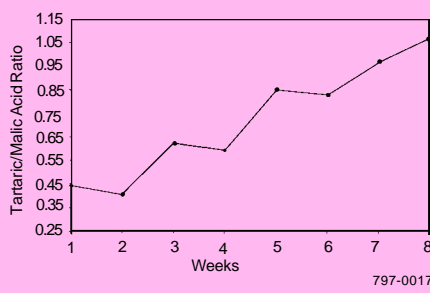
The decomposition of malic acid, a critical process in wine making, is generally spontaneous. However, if conditions are unfavorable for decomposition, enologists can help the process by adding enzymes. It is very important to know the initial concentration of malic acid to determine if enzymes are needed, and to know subsequent concentrations to estimate when the wine has completed the decomposition process. This process easily can be monitored by analyzing samples using the SAX1 column.

Table 1. SUPELCOSIL SAX1 Column Performs Efficiently

	Equilibrium Time (hours)	Analysis Time (minutes)	Minor Components Detected [■]
Cation Exchange Column	4-5	40	yes
SUPELCOSIL SAX1 Anion Exchange Column	0.5	10	no

[■]Under these conditions, the SAX1 column cannot sufficiently separate some acids (e.g., gluconic, shikimic, and citric acids). Fortunately, their analysis is not important for wine technology. However, some grapes, e.g. Cabernet and Chardonnay, contain large amounts of shikimic acid, in which case analysis can help in variety identification.

Figure A. Demonstration of Chardonnay Wine Aging Process

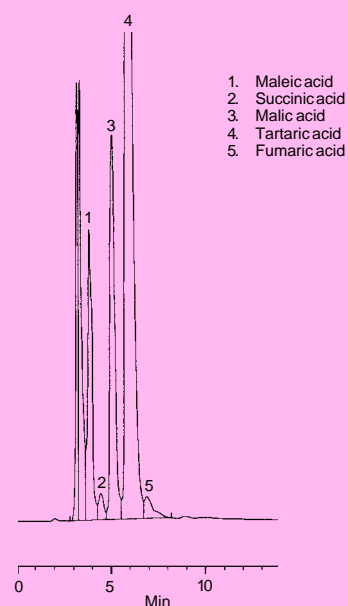


The SUPELCOSIL SAX1 column is especially useful for the analysis of must, or young wine, samples. Two main components, tartaric and malic acids, are well separated on the SAX1 column, and their concentration ratio is widely used to estimate vine ripeness. Using the tartaric/malic acid ratio for Chardonnay samples taken at weekly intervals shows how the ratio increases as the wine ages (Figure A).

Figure B shows how well the SAX1 column separates wine acids from a Cabernet Franc wine. Note that the use of guard columns in the analysis of red wines and musts is strongly recommended.

Figure B. Fast Analysis of Red Wine (Cabernet Franc) on a SUPELCOSIL SAX1 Column

Column: SUPELCOSIL SAX1, 25cm x 4.6mm, 5µm particles
 Cat. No.: 59138
 Mobile Phase: acetonitrile:50mM KH₂PO₄, pH 5.50, 35:65
 Flow Rate: 1mL/min
 Det.: UV, 210nm
 Inj.: 5µL filtered sample



Ordering Information:

Description	Cat. No.
SUPELCOSIL SAX1 Column 25cm x 4.6mm ID, 5µm particles	59138
Supelguard™ cartridges, 2cm with 5µm SAX1 phase	59536-U
Cartridge, holder	59537-U
2 cartridges	59537-U

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