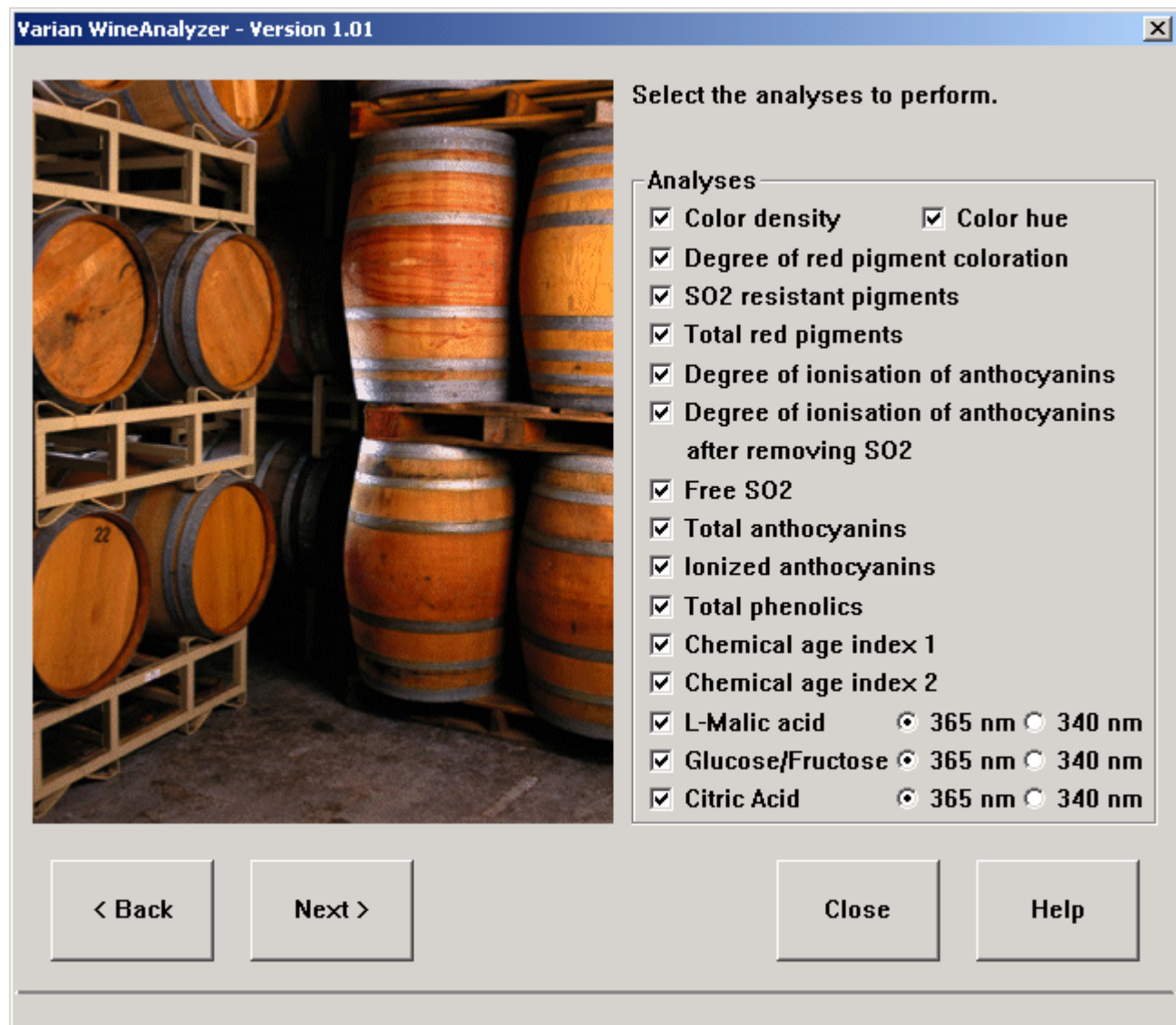


Selecting analyses

On the third screen of the WineAnalyzer, select the analyses you would like to perform.




Select from one to all of the analyses. Many of the analyses require the same reagents to be added and the same absorbance readings to be taken. The software will determine the most logical order in which to run the analyses so that these steps are not duplicated unnecessarily.

For a brief explanation of each analysis, click the links below. For more detailed information on analysis methods, [click here](#).



Note

Tests that involve waiting for reactions to occur have a clock symbol  and the waiting time required.

- | | |
|--|--------------------------------------|
| Color density | Total anthocyanins |
| Color hue | Ionized anthocyanins |
| Degree of red pigment coloration | Total phenolics |
| SO₂ resistant pigments | Chemical age index 1 |
| Total red pigments | Chemical age index 2 |
| Degree of ionization of anthocyanins | L-Malic acid |

- [Degree of ionization of anthocyanins after removing SO₂-](#)
- [Free SO₂](#)
- [Glucose/Fructose](#)
- [Citric acid](#)

Navigation buttons

Click **Back** to go to the '[Entering sample information](#)' screen.
Click **Next** to go to the '[Setting up instrument parameters](#)' screen.
Click **Close** to exit the WineAnalyzer.

Status bar

The status bar at the bottom of the screen shows what is happening at each stage of the analysis.

Color density

This test describes the intensity of color at the actual wine pH and SO₂ level.

The test involves loading undiluted wine and taking a reading at 520 nm then 420 nm.

The formula used is:

$$A_{520} + A_{420}$$

where A_{520} relates to the concentration of red colored pigments and A_{420} relates to the concentration of yellow/brown pigments.

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Color hue

This test describes the hue (tint or shade) of the color (at actual wine pH and SO₂ level).

The test involves loading undiluted wine and taking a reading at 520 nm then 420 nm.

The formula used is:

$$A_{520} / A_{420}$$

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Degree of red pigment coloration



This test involves a 3–4 hour waiting time.

This test expresses the percentage of the total wine pigments that are coloured (at actual wine pH and SO₂ level).

The test involves loading undiluted wine, taking a reading at 520 nm then adding 1M HCl. You are then required to wait for 3–4 hours before taking another reading at 520 nm.

The formula used is:

$$(A_{520} / A_{\text{HCl } 520}) \times 100\%$$

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SO₂ resistant pigments

Select this test (A_{SO₂ 520}) to give an estimate of the concentration of red coloured pigments that are resistant to decolouration on the addition of sulfur dioxide. The test involves adding Na₂S₂O₅ to the sample, waiting 1 minute then taking a reading at 520 nm.

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Total red pigments



This test involves a 3–4 hour waiting time.

Select this test (A_{HCl 520}) to give an estimate of the concentration of all the red pigments (anthocyanins, oligomers and polymers) in the wine. At such a low pH, all the pigments are in their red colored form. The test involves adding 1M HCl to the wine, waiting for 3–4 hours then taking a reading at 520 nm.

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Degree of ionization of anthocyanins



This test involves a 3–4 hour waiting time.

This test describes the amount of anthocyanin ionization. This refers to the percentage of total anthocyanins present in the coloured or flavylium ion form.

The test involves loading undiluted wine and taking a reading at 520 nm. You then add Na₂S₂O₅ to the sample, wait 1 minute then take a reading at 520 nm. You then dilute the wine with 1M HCl, wait 3–4 hours and take a final reading at 520 nm.

The following formula is used:

$$((A_{520} - A_{\text{SO}_2 520}) / (A_{\text{HCl } 520} - 5/3 A_{\text{SO}_2 520})) \times 100\%$$

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Degree of ionization of anthocyanins after removing SO₂



This test involves a 45 minute waiting time followed by a 3–4 hour waiting time.


This test expresses the degree of ionization after abolishing the bleaching effect of SO₂ on wine color. The test involves adding Na₂S₂O₅ to the wine, waiting 1 minute then taking a reading at 520 nm. You then add CH₃CHO to a sample, wait 45 minutes and take a reading at 520 nm. The final step is to add 1M HCl to the wine, wait 3–4 hours then read at 520 nm.

The following formula is used:

$$((A_{\text{CH}_3\text{CHO } 520} - A_{\text{SO}_2 520}) / (A_{\text{HCl } 520} - 5/3 A_{\text{SO}_2 520})) \times 100\%$$

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Free SO₂

 This test involves a 3–4 hour waiting time.

Select this test to determine the amount of free sulfur dioxide in a sample. SO₂ is important in winemaking and is added to wine to aid in the prevention of oxidation and spoilage. The concentration of free and total SO₂ in wine should be checked regularly. Legal limits also exist for the levels of total SO₂ in finished wine, hence this should be closely monitored.


The test involves loading undiluted wine and taking a reading at 520 nm. You then add Na₂S₂O₅ to the sample, wait 1 minute and read at 520 nm. The final step is to add 1M HCl to the wine, wait 3–4 hours then read at 520 nm.

The formula used is:

$$3.84 (A_{\text{CH}_3\text{CHO}}_{520} - A_{520}) / (A_{520} - A_{\text{SO}_2}_{520})$$

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Total anthocyanins

 This test involves a 3–4 hour waiting time.

To determine the total amount of anthocyanins, select this test.

The test involves adding Na₂S₂O₅ to the sample, waiting 1 minute then reading at 520 nm. Then you add 1M HCl to the wine, wait 3–4 hours and read at 520 nm.

The formula used is:

$$20(A_{\text{HCl}}_{520} - 5/3 A_{\text{SO}_2}_{520})$$

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Ionized anthocyanins

This test determines the amount of ionized anthocyanins in a sample.


The test involves loading undiluted wine, taking a reading at 520 nm, then adding Na₂S₂O₅ to the wine. You then wait 1 minute and take another reading at 520 nm.

The formula used is:

$$20(A_{520} - A_{\text{SO}_2}_{520})$$

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Total phenolics

 This test involves a 3–4 hour waiting time.

This test gives a measure of the concentration of all the phenolic material present in the wine.

The test involves adding 1M HCl to the sample, waiting 3–4 hours then reading at 280 nm.

The formula used is:

$$A_{\text{HCl}}_{280} - 4$$

Subtracting the value of 4 allows for absorbance of non-phenolic material.

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Chemical age index 1



This test involves a 45 minute waiting time.

Select this test to determine the Chemical age index 1, a spectral ratio defining the extent to which polymeric pigment forms have displaced the anthocyanins in the course of ageing reactions. As the polymeric pigments are artefacts of the wine making process and of subsequent conservation, the ratio is initially zero or close to zero, but there is progressive increase in the ratio during ageing.

The test involves adding $\text{Na}_2\text{S}_2\text{O}_5$ to the sample, waiting 1 minute and taking a reading at 520 nm. You then add CH_3CHO to the wine, wait 45 minutes and take another reading at 520 nm.

The formula used is:

$$A_{\text{SO}_2}_{520} / A_{\text{CH}_3\text{CHO}}_{520}$$

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Chemical age index 2



This test involves a 3–4 hour waiting time.

Select this test to determine the Chemical age index 2, a spectral ratio defining the extent to which polymeric pigment forms have displaced the anthocyanins in the course of ageing reactions. As the polymeric pigments are artefacts of the wine making process and of subsequent conservation, the ratio is initially zero or close to zero, but there is progressive increase in the ratio during ageing.

The test involves adding $\text{Na}_2\text{S}_2\text{O}_5$ to the sample, waiting 1 minute and taking a reading at 520 nm. You then add 1M HCl to the wine, wait 3–4 hours and take another reading at 520 nm.

The formula used is:

$$A_{\text{SO}_2}_{520} / A_{\text{HCl}}_{520}$$

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L-Malic acid



This test involves a 3 minute waiting time, followed by a 5–10 minute waiting time.

This enzymatic test determines the amount of L-Malic acid present. It is based on the Boehringer Mannheim test for L-Malic acid.

In this test, addition of wine to appropriate enzyme and substrate mixtures results in a reaction where the amount of the compound NADH formed is stoichiometric with the amount of L-Malic acid. The amount of L-Malic acid is calculated from the change in absorbance before and after an enzyme reaction. The calculation is based on relating this change in absorbance to the extinction coefficient of NADH, thus removing the

necessity to set up a standard curve.

You can select to perform this analysis at 365 nm or 340 nm.

The specific equation used is:

$$((29.77 / (\text{extinction coeff})) \times ((A2 - A1)\text{Sample} - (A2 - A1)\text{Blank}))$$

Where:

The extinction coefficient at 340 nm = 6.3 (l x mmol⁻¹ x cm⁻¹)

The extinction coefficient at 365 nm = 3.4 (l x mmol⁻¹ x cm⁻¹)



Note

The WineAnalyzer uses a method whereby the sample is diluted by a factor of 10. If the sample has not been diluted, the equation would be:

$$((2.977 / (\text{extinction coeff})) \times ((A2 - A1)\text{Sample} - (A2 - A1)\text{Blank}))$$

The test involves the following steps:

1. Load and read a [blank](#).
2. Load samples that have been prepared for the first stage of L-Malic acid analysis and wait 3 minutes.
3. Read samples at the selected wavelength.
4. Add MDH to samples (including blank) and wait 5–10 minutes.
5. Load and read the blank and samples at the desired wavelength.

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Glucose/Fructose



This test involves a 3 minute waiting time followed by a 15 minute waiting time.

This enzymatic test determines the total amount of glucose and fructose. It is based on the Boehringer Mannheim test for Glucose/Fructose.

In this test, addition of wine to appropriate enzyme and substrate mixtures results in a reaction where the amount of the compound NADPH formed is stoichiometric with the amount of total glucose/fructose. The amount of glucose/fructose is calculated from the change in absorbance before and after an enzyme reaction. The calculation is based on relating this change in absorbance to the extinction coefficient of NADPH, thus removing the necessity to set up a standard curve.

You can select to perform this analysis at 365 nm or 340 nm.

The specific equation used is:

$$((54.77 / (\text{extinction coeff})) \times (A2 - A1)\text{Sample} - (A2 - A1)\text{Blank})$$

Where:

The extinction coefficient at 340 nm = 6.3 (l x mmol⁻¹ x cm⁻¹)

The extinction coefficient at 365 nm = 3.5 (l x mmol⁻¹ x cm⁻¹)



Note

The WineAnalyzer uses a method whereby the sample is diluted by a factor of 10. If the sample has not been diluted, the equation would be:

$$((5.477 / (\text{extinction coeff})) \times (A2 - A1)\text{Sample} - (A2 - A1)\text{Blank})$$

The test involves the following steps:

1. Load and read a [blank](#).
2. Load samples that have been prepared for the first stage of D-Glucose/D-Sucrose acid analysis and wait 3 minutes.
3. Read samples at the selected wavelength.
4. Add HK/G6P-DH to samples (including blank) and wait 15 minutes.
5. Load and read the blank and samples at the desired wavelength.

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Citric acid



This test involves a 5 minute waiting time.

This test determines the amount of citric acid in a wine sample. It is based on the Boehringer Mannheim test for citric acid.

Citric acid is converted to oxaloacetate and acetate in the reaction catalyzed by the enzyme citrate lyase. In the presence of the enzymes L-malate dehydrogenase and L-lactate dehydrogenase, oxaloacetate and its decarboxylation product pyruvate are reduced to L-malate and L-lactate, respectively, by reduced nicotinamide-adenine dinucleotide. The amount of NADH oxidized is stoichiometric to the amount of citrate.

You can select to perform this analysis at 365 nm or 340 nm.

The equation used is:

$$c = \frac{2.900}{\epsilon} \times \Delta A$$

[g citric acid/L sample solution]

Where:

c = concentration of citric acid calculated as the anhydrous acid

ϵ = extinction coefficient of NADH

ΔA = change in absorbance ($A_1 - A_2$) sample - ($A_1 - A_2$) blank



Note

The extinction coefficient at 340 nm = 6.3 (l x mmol⁻¹ x cm⁻¹)

The extinction coefficient at 365 nm = 3.5 (l x mmol⁻¹ x cm⁻¹)

If the sample has been diluted during preparation, the result must be multiplied by the dilution factor F.

This test involves the following steps:

1. Load and read a [blank](#).
2. Load samples that have been prepared for the first stage of Citric acid analysis and wait 3 minutes.
3. Read samples at the selected wavelength.
4. Add LCL to samples (including blank) and wait 5 minutes.
5. Load and read the blank and samples at the desired wavelength.

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