

Abstract

The purpose of the study is to evaluate the accuracy and precision of the CDR WineLab[®] oenological analysis system.

For this purpose, 22 wine samples of different types were selected and analysed using the CDR WineLab[®] system, testing the main parameters that need to be monitored during the various stages of wine production.

The results of the CDR instrument were compared with those obtained with the official methods provided by the OIV (International Organisation of Vine and Wine), obtaining for all the measured parameters results that were statistically correlated with the official methods.

The repeatability and reproducibility of each analysis were also assessed by performing 5 consecutive tests on reference solutions for 5 different days.

In particular, the following analyses were performed on each sample:

- **Acetic acid:** The CDR WineLab[®] system was shown to be correlated with the official method and demonstrated good repeatability and reproducibility in the determination of this parameter.
- **Total acidity:** The analysis carried out with CDR WineLab[®] was found to be repeatable and reproducible. The measurements obtained were correlated with the official method despite the narrow range of acidity values analysed which consequently negatively influenced the correlation.
- **Malic acid:** The values obtained with CDR WineLab[®] are highly correlated with the values obtained with the official method. The CDR method also demonstrated excellent repeatability, reproducibility and a detection limit (LOQ= 0.05 g/L) lower than that of the official method.
- **Lactic acid:** The correlation with the official method was not excellent but the two methods are not perfectly comparable. The official method detects both isomers of lactic acid unlike the enzymatic reaction exploited by the CDR method with which only the L isomer is quantified (which, crucially, is the only parameter indicative of the start of malolactic fermentation). The concentration of both isomers was measured by CDR WineLab[®] with a different test provided by CDR s.r.l. The test was performed on the two samples that showed the worst correlation with the results of the official method and the values obtained showed the presence in solution of a non-negligible quantity of isomer D.
The repeatability and reproducibility of the CDR method were good.
- **Alcohol:** The CDR method was found to be correlated with the official method and was repeatable and reproducible.
- **Total SO₂:** The two methods showed a good correlation ($R^2= 0.96$) considering the repeatability of both measurement methods. The value obtained with CDR WineLab[®] demonstrates a better reproducibility than that obtained with the OIV-MA-AS323-04B reference method.
- **Free SO₂:** The two methods showed a good correlation ($R^2= 0.92$) considering the repeatability of both measurement methods. The result obtained with CDR WineLab[®] has a good reproducibility in the measurement of the concentration of free sulphur dioxide if compared with that of the method used as a reference (OIV-MA-AS323-04B).
- **Sugars:** CDR WineLab[®] has excellent reproducibility and repeatability in the measurement of sugars and has provided data that are highly correlated with the reference method.
- **IPT:** The CDR WineLab[®] instrument has two different calibration curves, one for red wines

and one for white wines. Both calibrations were found to be related to the reference method with good repeatability and reproducibility of the method.

All the material necessary to perform the various analyses with the CDR WineLab® system was supplied in specific kits by the manufacturer, the instrument did not require calibration and no type of sample pre-treatment was needed; the operator simply performed the analysis, aided by detailed instructions visible on the instrument's touch screen.

CDR WineLab® enabled performing of the analyses on the various samples simply and quickly, optimising the official methods and proving to be an accurate and precise system for oenological analyses.