CDR WineLab®: An easy-to-use device for the real-time monitoring of your fermentations

Simone Bellassai
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CDR, a “workshop” of ideas and continuous innovation

CDR conducts its business in heterogeneous sectors

SECTORS

TELEMATIC SYSTEMS
Automatic Toll collection terminals

MEDICAL DIAGNOSTICS
Hematology and hemostasis systems

FOOD DIAGNOSTICS
Analysis systems for food and beverage

SENSORING SYSTEMS
Sensors and probes for QC

WINELab®

- Milk and Dairy Products
- Egg Products
- Tomato/Vegetable puree
- Bakery products

➢ CDR FoodLab®

- Wine
- Beer and Water
- Cider
- Kombucha

➢ CDR WineLab®

➢ CDR BeerLab®

➢ CDR CiderLab

➢ CDR KombuchaLab

- All kind of oils
- All kind of fats
- Nuts/hard-shelled fruits

➢ CDR FoodLab®

➢ CDR OxiTester

➢ CDR PalmOilTester

WINELab®

Canada
USA
Mexico
Guatemala
Jamaica
Trinidad and Tobago

Colombia
Ecuador
Suriname
Perù
Chile
Argentina
Brazil
Paraguay
Uruguay

Island
Finland
Norway
Sweden
Denmark
Russsia
Austria
Switzerland

Ireland
Belgium
France
United Kingdom
Netherland
Germany
Monaco
Italy
Spain
Portugal
Greece

Morocco
Algeria
Tunisie
Libya
Egypt
Sudan
Uganda
Ivory Coast
Togo
Ghana
Nigeria
Cameroon
Gabon
Congo

Estonia
Latvia
Lithuania
Poland
Cezh Republic
Ukraine
Slovakia

Seychelles
Kenya
Tanzania
Burundi
Ruanda
Botswana
South Africa

Hungary
Romania
Bulgaria
Serbia
Slovenia
Croatia
Albania

Turkey
Azerbaijan
Cyprus
Syria
Iraq
Kuwait
Iran
Jordan
Lebanon
Israel
Palestine
Saudi Arabia
Emirates
Baharain

China
Mongolia
Japan
South Korea
Philippines
Mauritius
Myanmar
Vietnam
Thailand
Taiwan
Bangladesh
India
Pakistan
Indonesia
Malaysia
Singapore
Sri Lanka

Australia
New Zeland
New Caledony
Papua New Guinea

More than 100 countries

CDR WineLab® is the sytem composed of an analyzer based on photometric technology and pre-filled ready to use reagents

Also available CDR WineLab® Junior version.
Both are thermostated analyzers
at 37°C that use LED emitters as light
sources, to specific wavelengths

Reagents are supplied in bag of 10 pre-filled vials, ready to use and “calibrated”

Pipette for the sample collection

WINELab®

ANALYZER FEATURES

- ✓ No maintenance
- ✓ No calibration of the analyzer is required
- ✓ LEDs wavelengths with an Absorbance range 0.000 – 6.000
- ✓ 16 analyses in the same working session
- ✓ MULTITASKING mode (different tests at the same time)
- ✓ 3 years warranty
- ✓ Touch screen on which methods are explained step by step

The two parts dedicated to incubation and reading are thermostated at 37°C

WINELab®

REAGENTS FEATURES

- ✓ Pre-filled reagents
- ✓ NO CALIBRATION REQUIRED
- ✓ Ready to use reagents
- ✓ Long shelf-life (from 6 to 18 months)

CDR WineLab® system

CDR WineLab®

You can do all the analyses of the panel

- Printer on board
- You can carry out 16 analyses at the same time of the same parameter
- You can carry out different analyses at the same time (multitasking mode)

CDR WineLab® Jr.

It can be tailored with 3 analyses of your choice with the possibility to add the others later

- No printer
- You can carry out 3 analyses at the same time of the same parameter

WINELab®

Analysis on GRAPES

Analysis on GRAPE JUICE

Analysis on WINE

We can analyze the whole winemaking process, from grape to finished wine

WINELab®

Total anthocyanins

Total Polyphenols Index (TPI)

Total acidity

pH

Yeast Assimilable Nitrogen (YAN)

Free sulfur dioxide

L-Lactic acid

Glucose and Fructose

Total sulfur dioxide

L-Malic acid

Gluconic acid

Calcium

Copper

Galacturonic acid

Acetic acid

Alcohol by volume

Tonality and intensity

Glycerol

Catechins

Acetaldehyde

Tannins

HCl index

Polymerised anthocyanins

Winemaking –red wine

Ripeness of grapes

Before starting the pressing phase you can determine ***Technological ripeness*** and ***Phenolic maturity***

Technological ripeness

$$\frac{Sugars\ (\frac{g}{L})}{Total\ Acidity\ (\frac{g}{L})}$$

Phenolic maturity

With CDR WineLab® it is possible to follow the phenolic maturity of grape measuring the anthocyanins

Winemaking - red wine

Analysis on grape juice

Grape juice is a liquid with a high sugar content (about 200g/L) and a high turbidity, formed during the phases of destemming and crushing of grapes

Yeasts will be added to the must for starting ALCOHOLIC FERMENTATION

For accurate analyses, it is required to centrifuge the must.

If must is fermenting, it is required to degas it with an ultrasonic bath, and then to centrifuge it.

Centrifuge

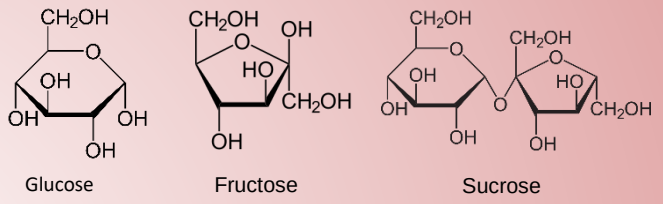
to clarify the grape juice (3 minutes)

Ultrasonic bath

to degasing the grape juice (2-3 minutes)

Winemaking - red wine

Analysis on grape juice with CDR WineLab®



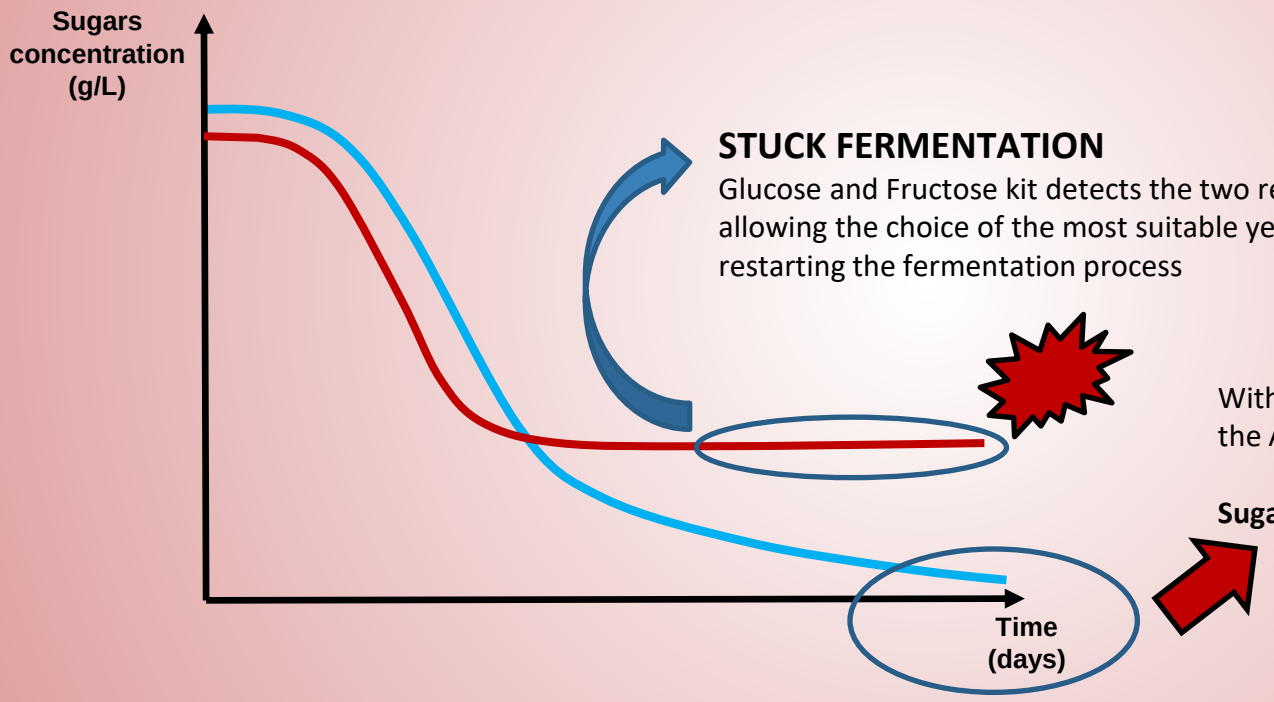
Fermentable sugars (reference method)

CDR WineLab® detects only the two fermentable sugars - glucose and fructose - with three different kits

Fermentable sugars	230 g/L	Easy dilution kit is used
Glucose and fructose	120 g/L 110 g/L	
Fermentable sugars (sucrose included)	250 g/L with addition of 20 g/L of sucrose	In this case, the dilution/inversion kit is included

Winemaking – red wine

The end of alcoholic fermentation



STUCK FERMENTATION

Glucose and Fructose kit detects the two residual sugars separately, allowing the choice of the most suitable yeast to be used for restarting the fermentation process

With CDR WineLab® you can detect the end of the AF, with a sugar detection limit of 0.1 g/L

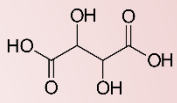
Sugar range at the end of AF 0.1 – 18.0 g/L

Optimal fermentation

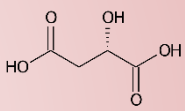
Stuck fermentation

Winemaking - red wine

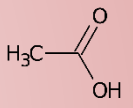
Analysis on grape juice with CDR WineLab®



Tartaric acid



L-Malic acid



Acetic acid

Total acidity (method correlated to the reference one)

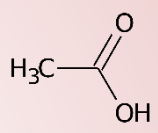
It detects the content of organic acids in must/wine. It is a very important parameter for the wine taste and it can be adjusted by the addiction of tartaric acid to the must.

CDR WineLab® detects the total acidity in the range 0.5 – 10.0 g/L; the result is expressed as tartaric acid

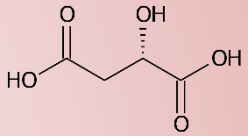
CDR WineLab® configuration for France foresees the result as sulfuric acid.

Winemaking - red wine

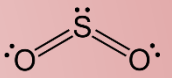
Analysis on grape juice with CDR WineLab®



Acetic acid



L-Malic acid



Sulphur dioxide

Acetic acid (reference method)

Parameter referred to the presence of bacterial contamination. Its increasing represents a not recoverable organoleptic alteration.
Its detection is very important in order to monitor the whole winemaking process.
CDR WineLab® determines acetic acid in the range 0.05 – 1.20 g/L.

L-Malic acid (reference method)

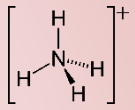
Fundamental parameter for the malolactic fermentation process. This analysis can be done on the pre-fermented must also, in order to plan the proper fermentation protocol.
CDR WineLab® determines L-malic acid in the range of 0.05 – 5.00 g/L.

Total sulfur dioxide

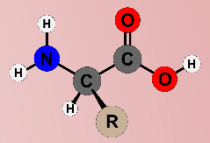
It is added before fermentation in order to reduce acetic acid bacteria and the development of indigenous and wild yeasts as much as possible, and to protect the grape juice from oxidation.

Winemaking - red wine

Analysis on grape juice with CDR WineLab®



Ammonium



Amminoacid

Yeast assimilable nitrogen (reference method)

Parameter that represents the concentration of assimilable nitrogen from yeasts during the fermentation process.
It is composed of inorganic nitrogen (ammoniacal nitrogen) and organic nitrogen (α-amino nitrogen).

CDR WineLab® allows to detect both nitrogen components separately, in order to optimize the addiction of nutrients to the must

Proline and hydroxy-proline acids, widely present in must but not fermentable by yeasts, are not detected.
On the contrary, the old method (titration with formaldehyde) is affected by this intereference.

Gluconic acid (reference method) and Glucoronic acids

Parameter referred to the action of *Botrytis Cynerea* on grapes. The increasing of its concentration in the determines a more difficult protection of the wine as finished product, because gluconic acid is related to an increase of subtances that combine with SO_2

Fundamental parameter for the production of Champagne/Spumante, widely used by our customers located in the region of Champagne: Moet Chandon, Veuve Cliquot and Laboratoire du Champagne

Winemaking – red wine

Maceration

The maceration occurs during the alcoholic fermentation and can be analyzed by:

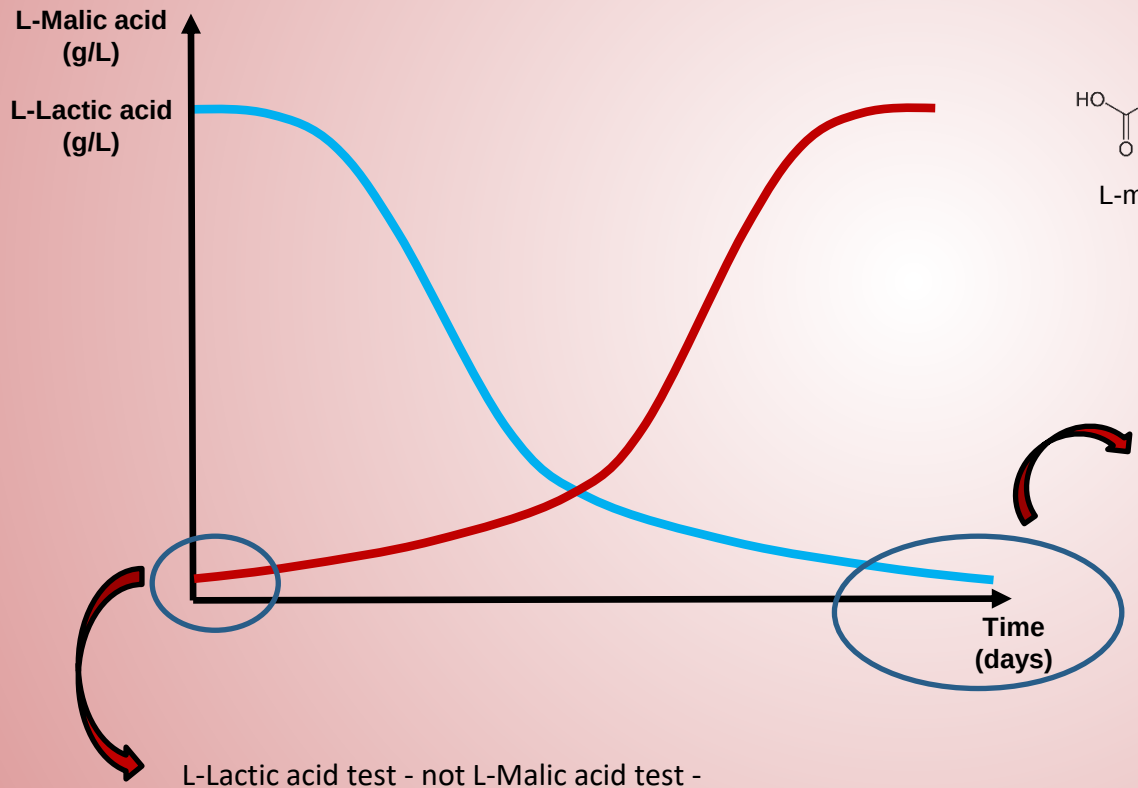
- **Color analysis (ABS 420, 520, 620nm)**
- **Total Anthocyanins**
- **Total Polyphenols Index**

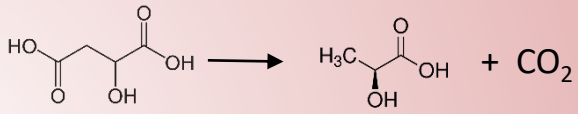
Centrifuge

Ultrasonic bath

Winemaking – red wine

Malolactic fermentation





L-malic acid

L-lactic acid

L-Malic acid test is used for detecting the end of the malolactic fermentation
CDR WineLab® detection limit is 0.05 g/L

L-malic acid

L-lactic acid

L-Lactic acid test - not L-Malic acid test -
has to be used for detecting the beginning of the malolactic fermentation!!!

Winemaking – red wine

Color stabilization and aging

Barrique and Tonneau
(aging in wood)

Concrete vessels
(aging in concrete)

Steel vessels
(MICRO-OXIGENATION)

Steel vessels
(aging in steel)

Polyphenols monitoring

- **Total anthocyanins**
- **Total Polyphenols Index (TPI)**
- **Total Polyphenols Folin Ciocalteu**
- **Color**

CDR WineLab® - PARSEC

- **Total anthocyanins**
- **Polymerised anthocyanins**
- **Total Polyphenols Index (TPI)**
- **Tannins**
- **HCl index**
- **Color**
- **pH**

Winemaking - white wine

Ripeness of grapes

Before starting the real mashing phase, standard analyses for checking the technological ripeness of grapes are performed

Technological ripeness → $\frac{Sugars\ (\frac{g}{L})}{Total\ Acidity\ (\frac{g}{L})}$

Most of the white wines are sensible to grey mould, due to the development of *Botrytis Cinerea*.
The preventive analysis of **gluconic acid** and **galacturonic acid**, allows the oenologist to better evaluate the health condition of grapes

The quantification of gluconic acid and galacturonic acid are very important parameters in order to evaluate the quality of white grape juice that will become *champagne* or *spumante*

Winemaking - white wine

grape juice extraction

All the operative steps before fermentation (on grapes and must) are of huge importance for the evaluation of the product quality. It is necessary to:

- gently press the grapes
- reduce the mechanical pressure that can affect the skins
- increase the pressure in a slow progressive way
- do not apply a temperature over 20°C for extracting the juice
- reduce the turning over of pomace as much as possible
- keep away from air (from oxygen in particular) the extracted must

Checking during extraction phase with CDR WineLab®

The must browning can be evaluated by ***ABS*** reading to ***420nm***

The extraction of phenolic components can be evaluated by the ***Total Polyphenols Index*** test

Winemaking - white wine

Fermentation

The evolution of alcoholic fermentation is usually slower in white wines that in red wines, because in this case the temperature is kept lower, in order to better preserve the aromas.

As far as the sugars detection with CDR WineLab® is concerned, this is performed as already explained for red wines.

The malolactic fermentation usually is not done in this case, because L-Malic acid gives acidity and freshness to a white wine.

Malolactic kit – allows the determination of both L-Malic and L-Lactic acids
It is used by those winery that produce white wines in which the malolactic fermentation is partially performed

Example of result:
1,21 g/L of L-Malic acid
0,45 g/L ofL-Lactic acid

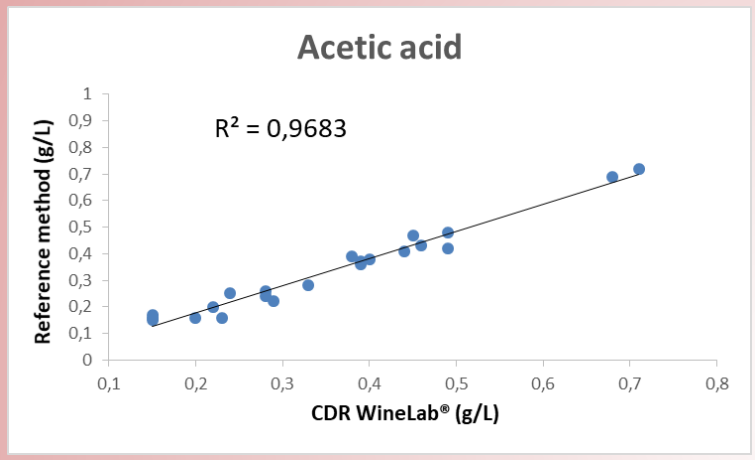
Wine bottling

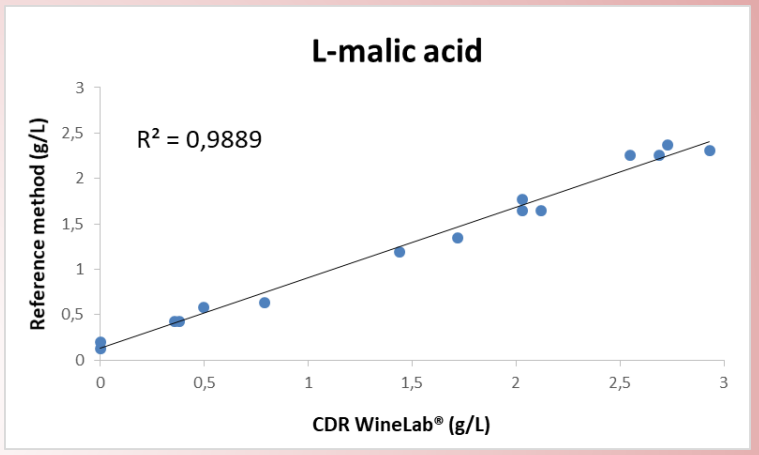
At the end of the winemaking process for the bottling SO_2 free and total are two very important parameters

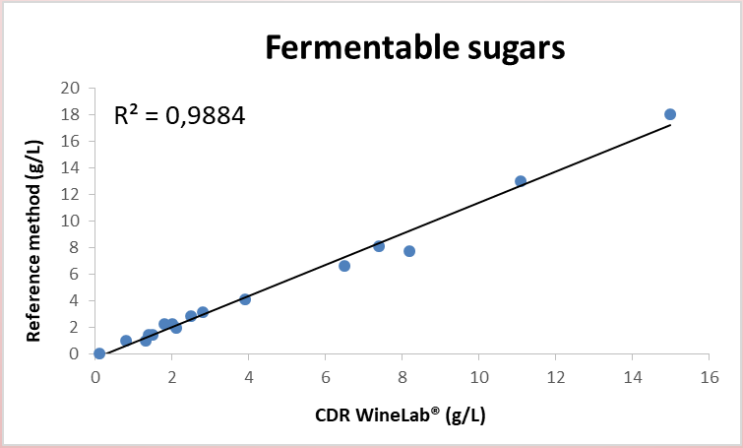
- **Free SO_2**
  It represents the real protection, from both microbiological and chemical points of view, for wine
- **Total SO_2**
  Related to the legal limit

CDR WineLab® for Total and Free SO_2 uses a reagent not affected neither by wine color nor ascorbic acid

CDR WineLab® correlation with the reference method







In conclusion

- CDR WineLab® system is an easy and fast tool for your wine-making QC
- You can take decisions quickly in a few minutes about the wine making process
- You can realize a complete in-house quality control of the process
- The analyzer can be used by everyone. You don’t need any chemical expertise
- You don’t need any glassware. With only a small desk you can check the whole production process

Let’s see right now how CDR WineLab® works!!!

Simone Bellassai
CDR FOODLAB® division manager