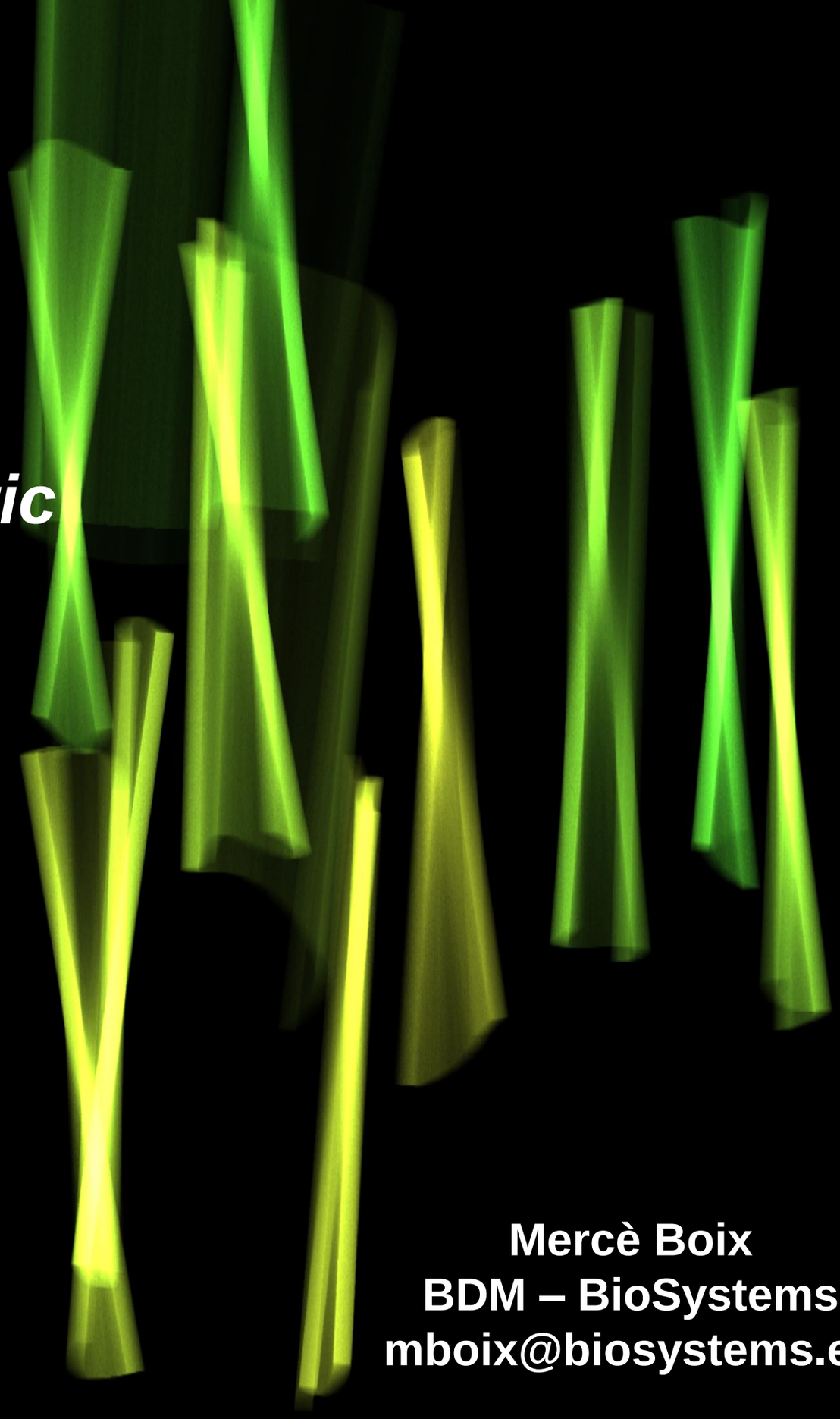
BioSystems

Tailored Solutions for Automatic Analysis in Food & Wine

Allowing you to focus on what matters.

Food & Beverage analysis



Mercè Boix
BDM – BioSystems
mboix@biosystems.es

BioSystems

- Designs, develops & manufactures analy
solutions for:

  - clinical diagnostics
  - veterinary
  - food and beverage
  - biotechnology

- Worldwide group of 16 companies

- Presence in 110 countries

- Customer oriented

- Strong investment in R&D

- ISO 9001, ISO 13485

17 + Locations

100 Markets

650 + Professionals at your service

25K Users

BioSystems Analytical Solutions

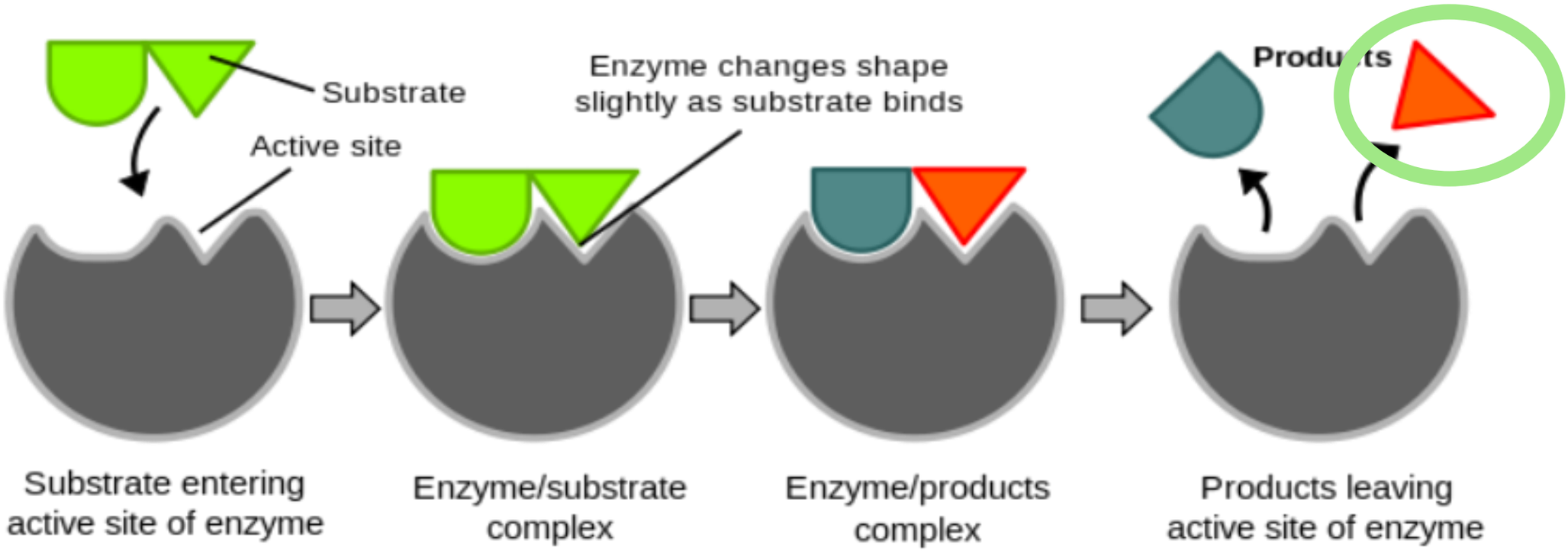
We immediately had a very friendly relationship with BioSystems which,

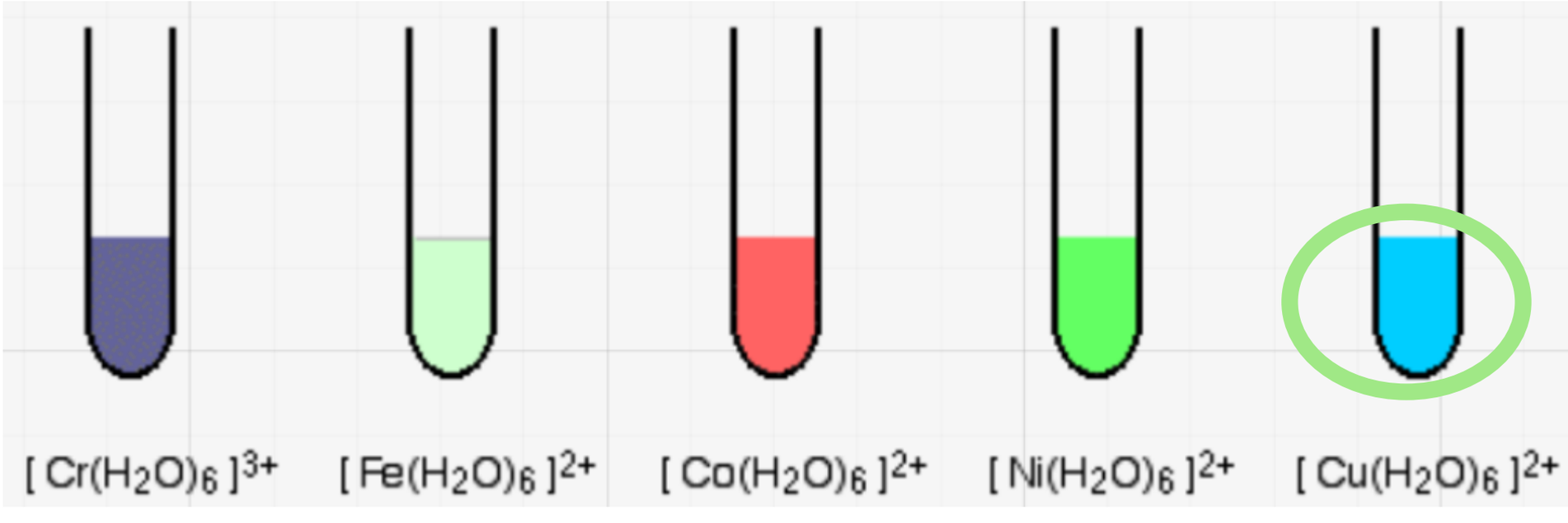
with Y15, made histamine analysis much faster, revolutionizing the productivity of our laboratory.

Danio Perra and Paola Mei,
Chemists at Asdomar
Quality Control Laboratory.

Y15

Photometry: Enzymatic & Chemical Reagents





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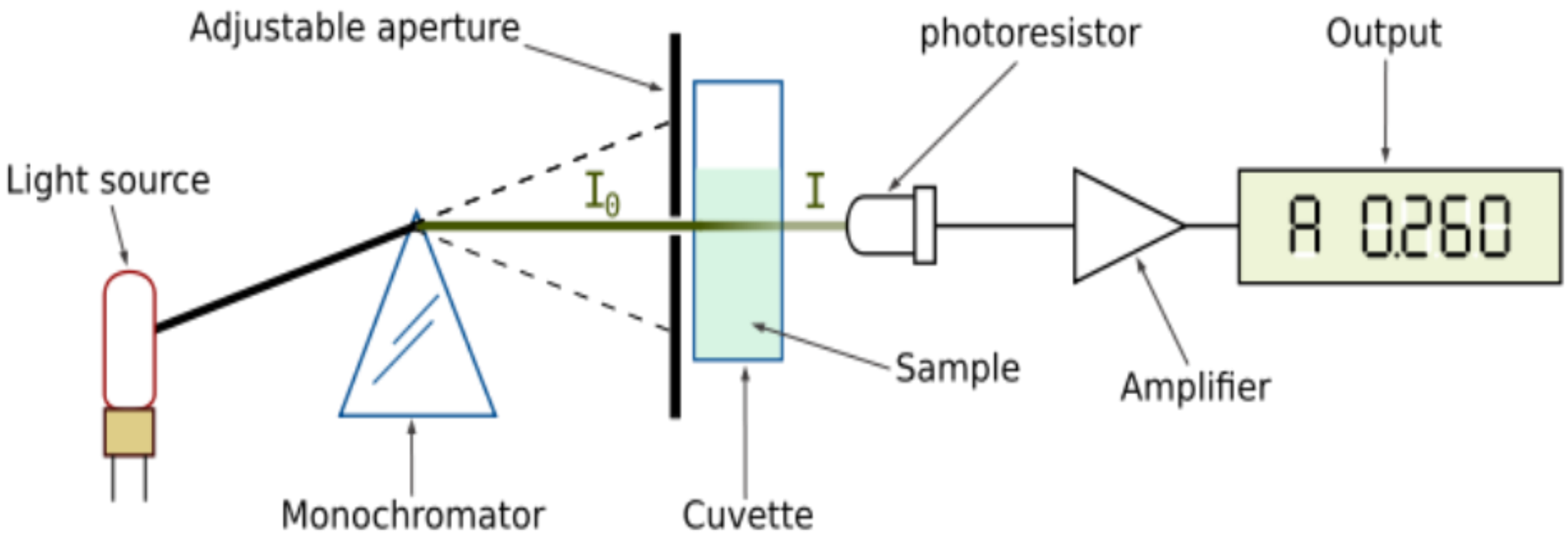
Photometry: Enzymatic & Chemical Reagents



- Reaction develops a change of ‘colour’ (mAbs)
- The signal (mAbs) plotted in a calibration curve gives us information about unknown samples

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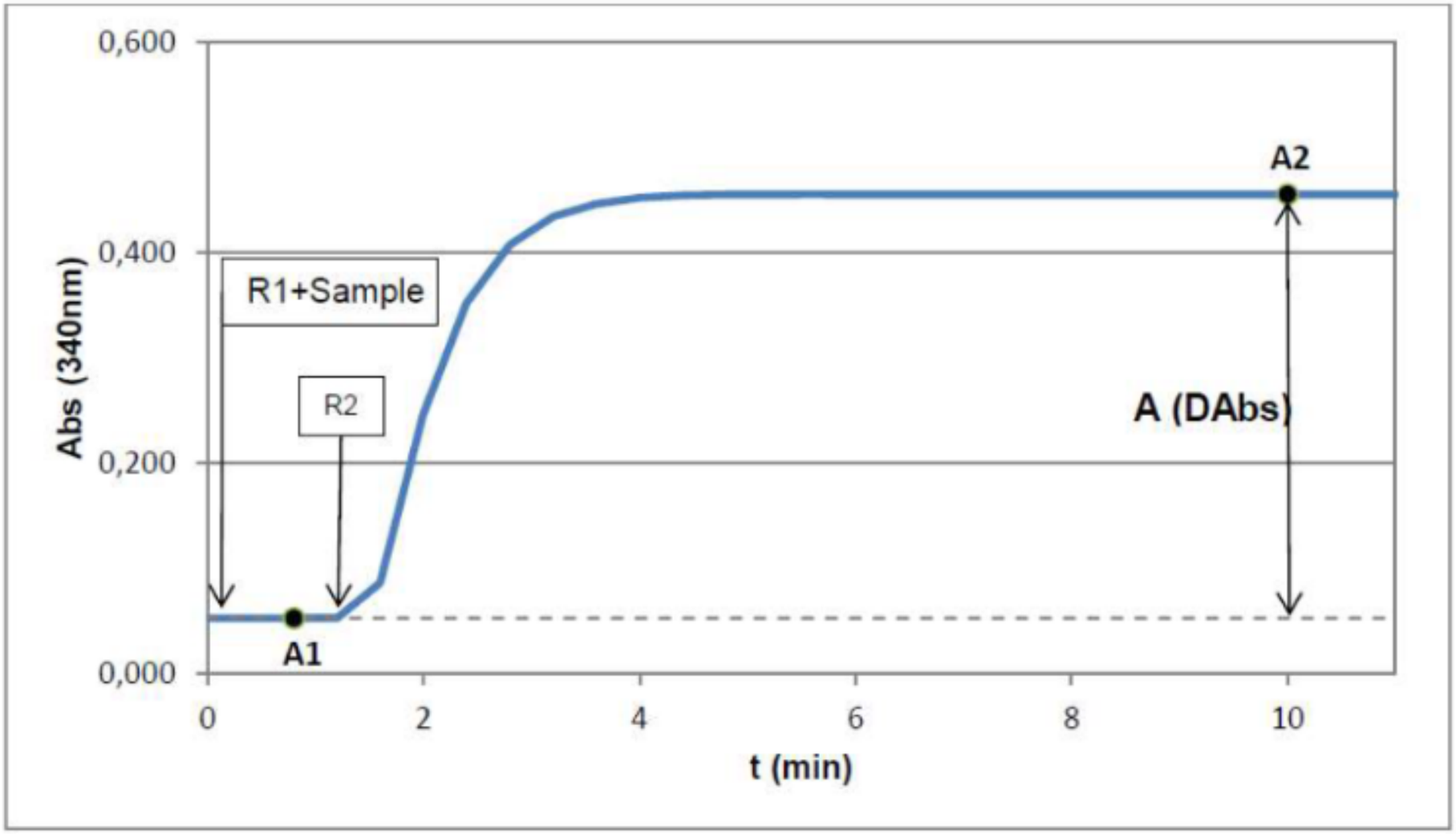
Photometry: Enzymatic & Chemical Reagents



Differential Birreagent: avoids interference of colour

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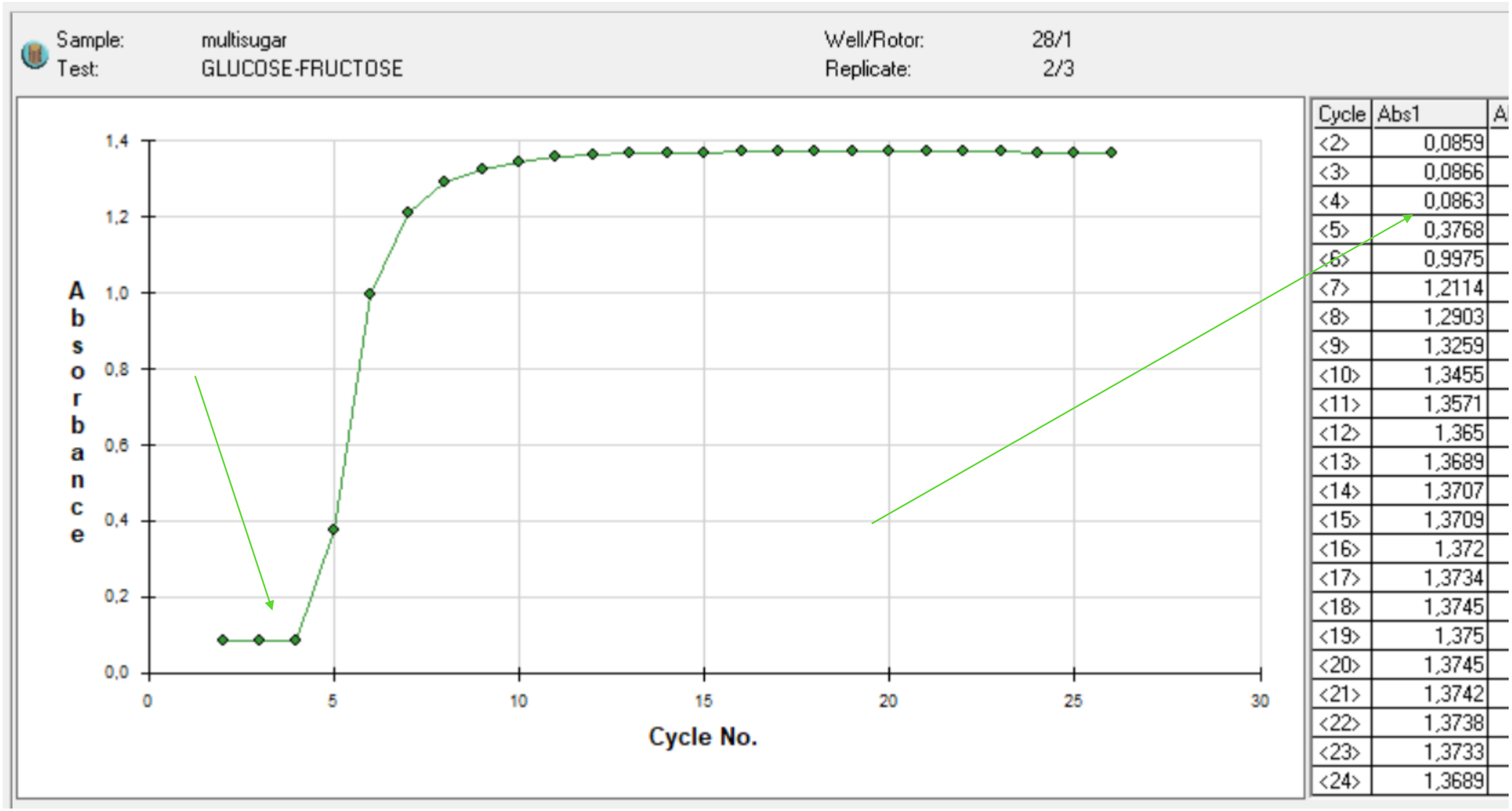
Photometry: Enzymatic & Chemical Reagents



Cycle	Abs1	A
<2>	0,0859	
<3>	0,0866	
<4>	0,0863	
<5>	0,3768	
<6>	0,9975	
<7>	1,2114	
<8>	1,2903	
<9>	1,3259	
<10>	1,3455	
<11>	1,3571	
<12>	1,365	
<13>	1,3689	
<14>	1,3707	
<15>	1,3709	
<16>	1,372	
<17>	1,3734	
<18>	1,3745	
<19>	1,375	
<20>	1,3745	
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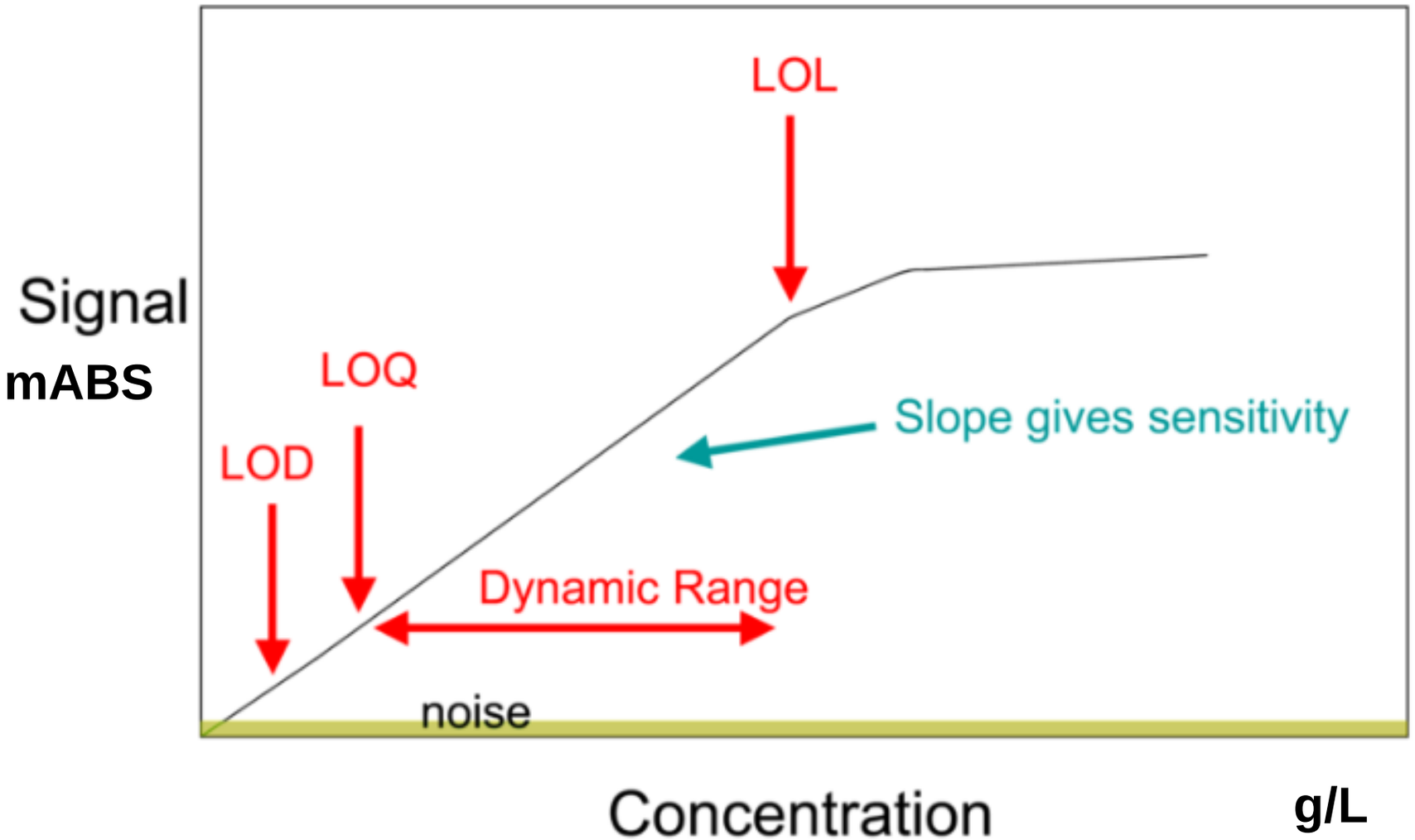
<22>	1,3738	
<23>	1,3733	
<24>	1,3689	

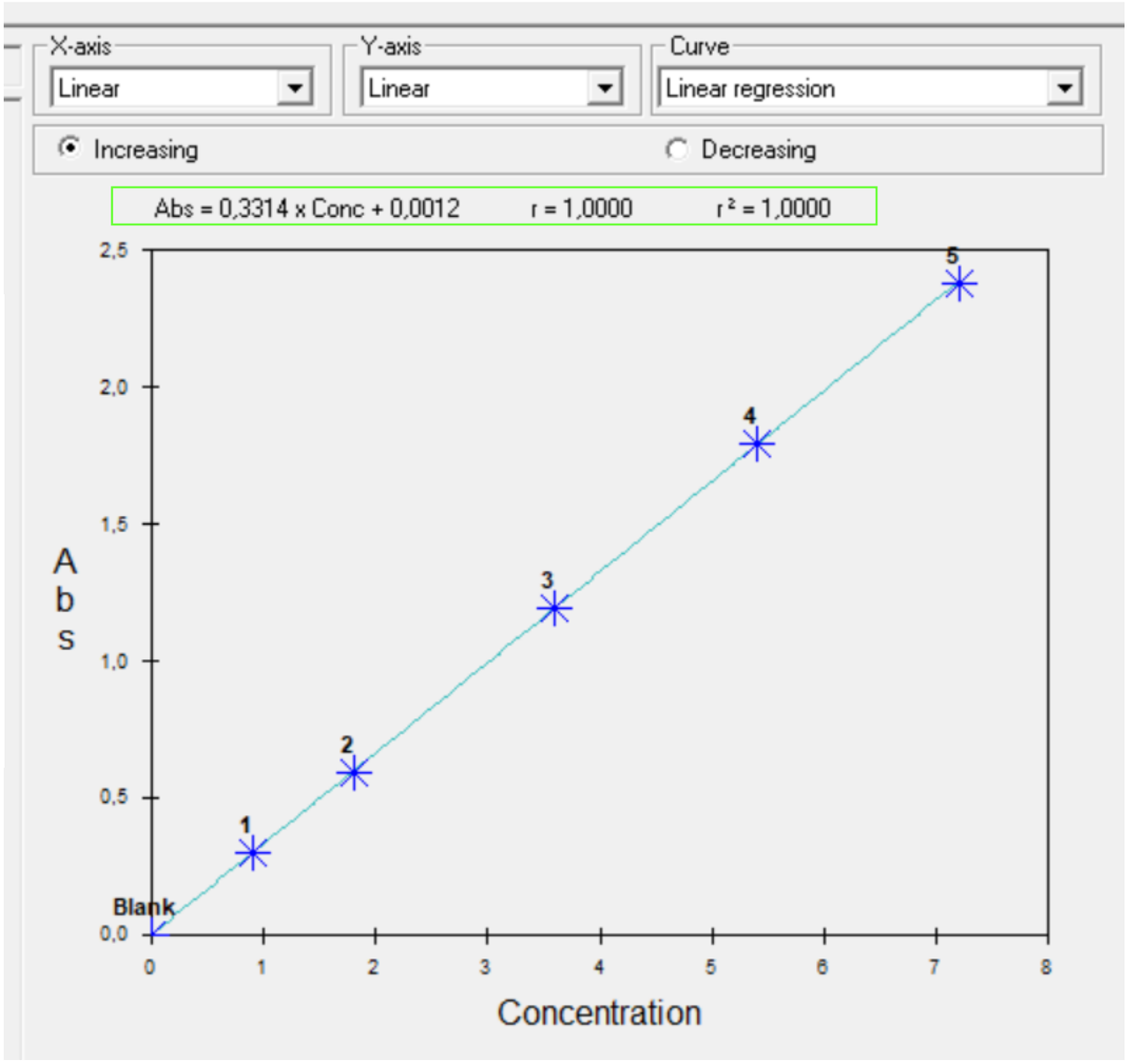
Photometry: Enzymatic & Chemical Reagents



Calibrators: known concentration
LOL: Limit of linearity
LOQ: Limit of Quantification
LOD: Limit of Detection

Photometry: Enzymatic & Chemical Reagents

Calib No.	Abs	Theoretical Conc.	Calculated Conc.	% Error
1	0,2988	0,9000	0,8979	0,2310
2	0,5949	1,8000	1,7913	0,4848
3	1,1970	3,6000	3,6082	0,2284
4	1,7943	5,4000	5,4105	0,1942
5	2,3842	7,2000	7,1905	0,1324
Blank	0,0018	0,0000		



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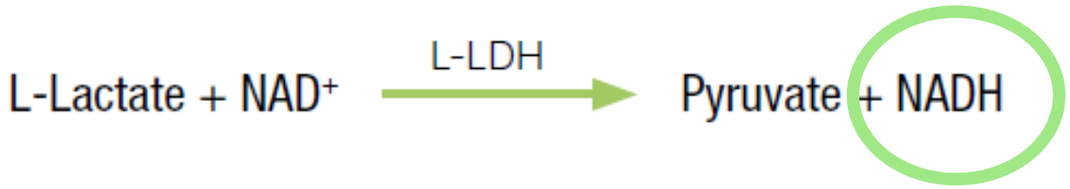
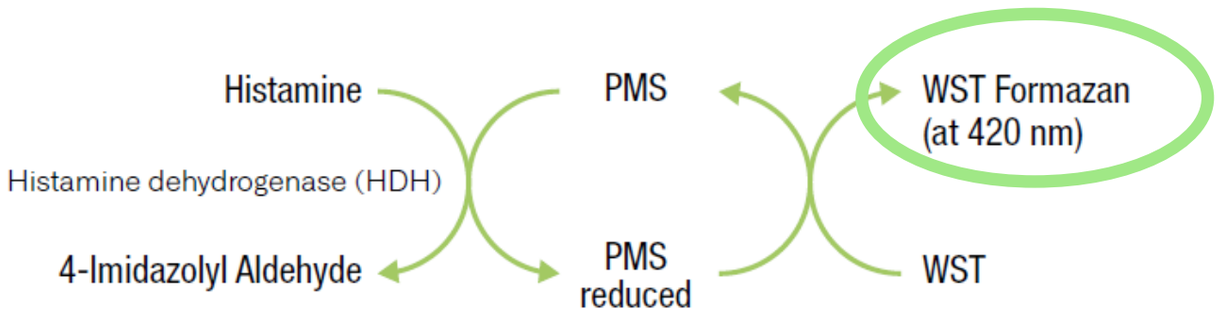
Photometry: Enzymatic & Chemical Reagents

L-lactic acid in the sample yields NADH (by the following reaction), which can be measured by spectrophotometry.



Calcium in the sample reacts with 2,7-[bis(2-arsonophenylazo)]-1,8-dihydroxynaphthalene-3,6-disulfonic acid (Arsenazo III). The color increase is directly proportional to the calcium concentration of the sample.

Histamine in the sample originates, by means of the coupled reactions described below, a coloured complex that can be measured by spectrophotometry.



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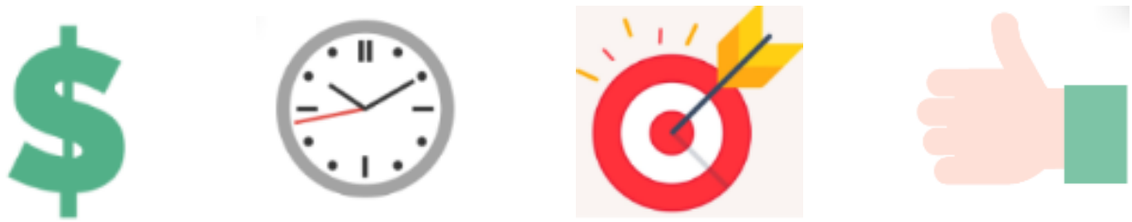
Strenghts

- Liquid reagent + calibrators: **ready to use** (expiry date: up to 30 months)
- **Automation** in BioS Analysers (up to 400 test/hour) ⟶ **High speed**
    - First result: 10’ – next: every 48” (Y15)
- Minimum use of reagent: **Cost-effectiveness**
- **Stable calibration**
- Validated in **different matrices** (easy extraction)
- **Multiparameter**
- **Accurate**



Methods of Analysis Comparison

	Enzymatic (Autoanalyser)	Enzymatic (Manual)	HPLC	InfraRed	Manual Chemistry
Automation					
Multiparameter					
User-Friendliness					
Calibration					
Cost					
Time					
Accuracy at low levels					
Instrument maintenance					

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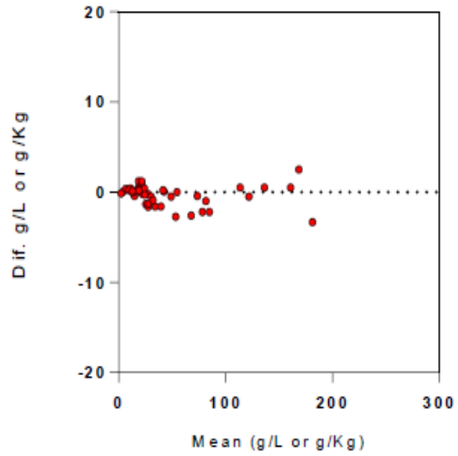
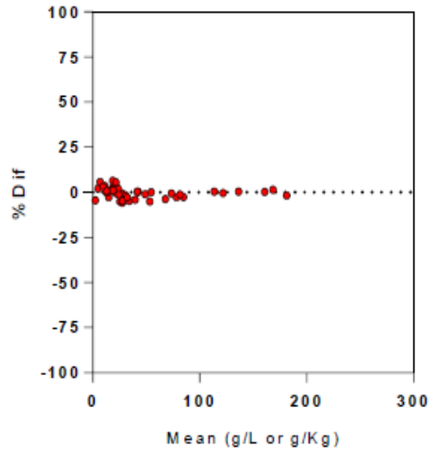
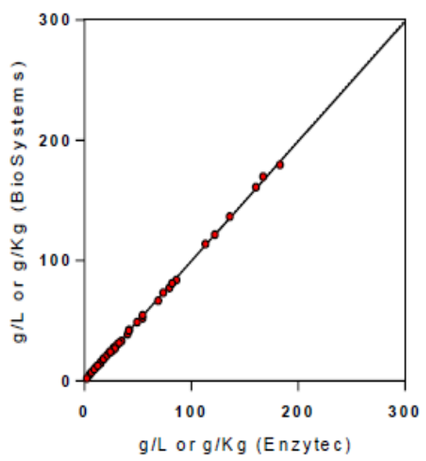
Validation Examples

Absolute diff.	Relative diff. (%)	a	b	r^2
-0,3 (-0,7/0,0)	-0,3 (-1,3/0,6)	-0,2 (-0,7/0,3)	0,996 (0,989/1,004)	0,999

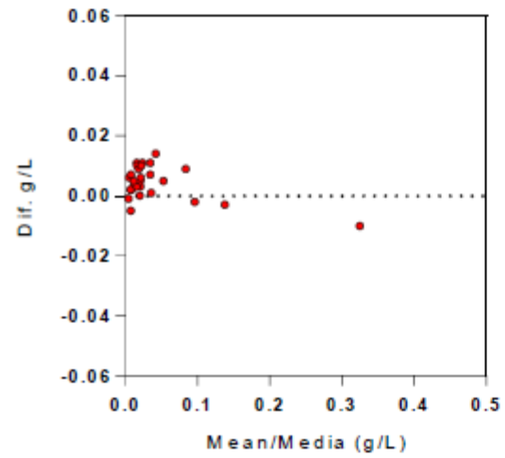


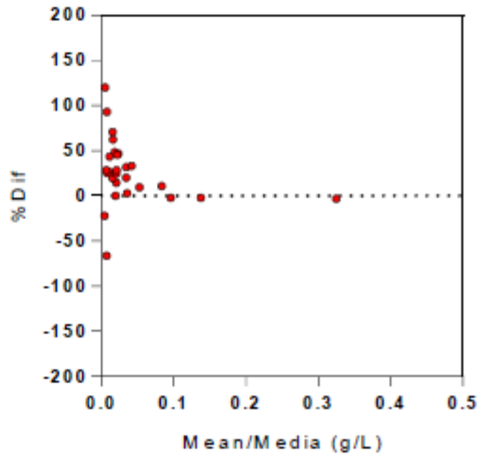


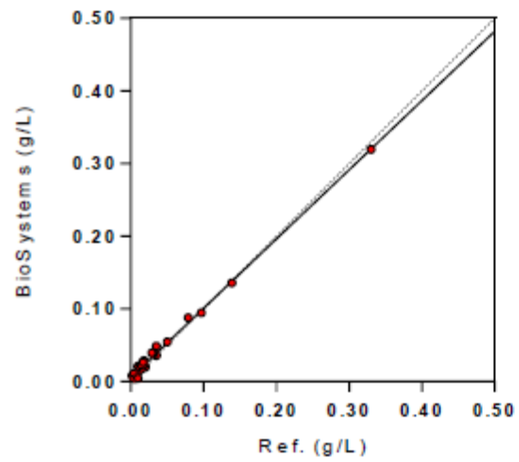


D-glucose comparison (43 samples)

Absolute diff.	Relative diff (%)	a	b	r^2
0,004 (0,002/0,007)	26,3 (12,1/40,6)	0,006 (0,004/0,008)	0,953 (0,924/0,982)	0,995







D-lactic acid comparison (27 samples)

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External Programs

BIPEA
PROFICIENCY TESTING

Nectar multi-fruits avec Stevia - Echantillon 08-3127
Multi-fruits juice with Stevia - Sample 08-3127

CRITERE / CRITERION	SULF27	SO2T27	GLUC27*	FRUC27*	SACC27*	SUC27*
Unité / Unit	mg.l-1	mg.l-1	g.l-1	g.l-1	g.l-1	g.l-1
VALEUR ASSIGNEE / ASSIGNED VALUE						
x_{pt}			14,4	23,2	12,3	50,0
$u(x_{pt})$			0,3	0,4	0,2	0,7
$s(x_{pt})$			0,7	1,2	0,7	2,0
$p(x_{pt})$			13	14	14	13
APTITUDE / PROFICIENCY						
σ_{pt}			2,7	1,2	0,9	2,0
VT			5,4	2,3	1,8	4,0
Max			19,8	25,5	14,1	54,0
Min			9,0	20,9	10,5	46,0
p_D			0	0	0	0

LAB.	x	z	x	z	x	z	x	z	x	z	x	z
B1100					(A) 14,6	0,07	(A) 23,3	0,09	(A) 12,0	-0,33		
B1207												
B1312												
B1377					(CIA) 14,3	-0,04	(CIA) 22,3	-0,78	(CIA) 12,4	0,11	49,0	-0,50
B1396												
B1625												
B1748					(F) 13,7	-0,26	(F) 21,6	-1,39	(F) 12,5	0,22	47,8	-1,10
B1886	< 50		< 10		(A) 14,6	0,07	(A) 22,8	-0,35	(A) 10,8	-1,67	48,2	-0,90

Jus de pomme - Echantillon 15-0
Apple juice - Sample 15-0

CRITERE / CRITERION	DLACT27	LLACT27	DMAL27	LMAL27*	HMF27*	ETH27*
Unité / Unit	g.l-1	g.l-1	mg.l-1	g.l-1	mg.l-1	g.l-1
VALEUR ASSIGNEE / ASSIGNED VALUE						
x_{pt}	0,03			4,7	4,3	0,20
$u(x_{pt})$	0,01			0,2	0,5	0,02
$s(x_{pt})$	0,02			0,4	1,0	0,04
$p(x_{pt})$	4			8	8	7
APTITUDE / PROFICIENCY						
σ_{pt}	0,15			0,4	0,5	0,07
VT	0,30			0,8	1,0	0,13
Max	0,33			5,5	5,3	0,33
Min	0,00			3,9	3,3	0,07
p_D	0			0	2	1

LAB.	x	z	x	z	x	z	x	z	x	z	x	z
B1100	(A) 0,03	0,00	(A) 0,06									
B1207												
B1312							(Z) 4,7	0,00	(B) 4,0	-0,60		
B1377											(D) < 0,50	
B1396												
B1625												

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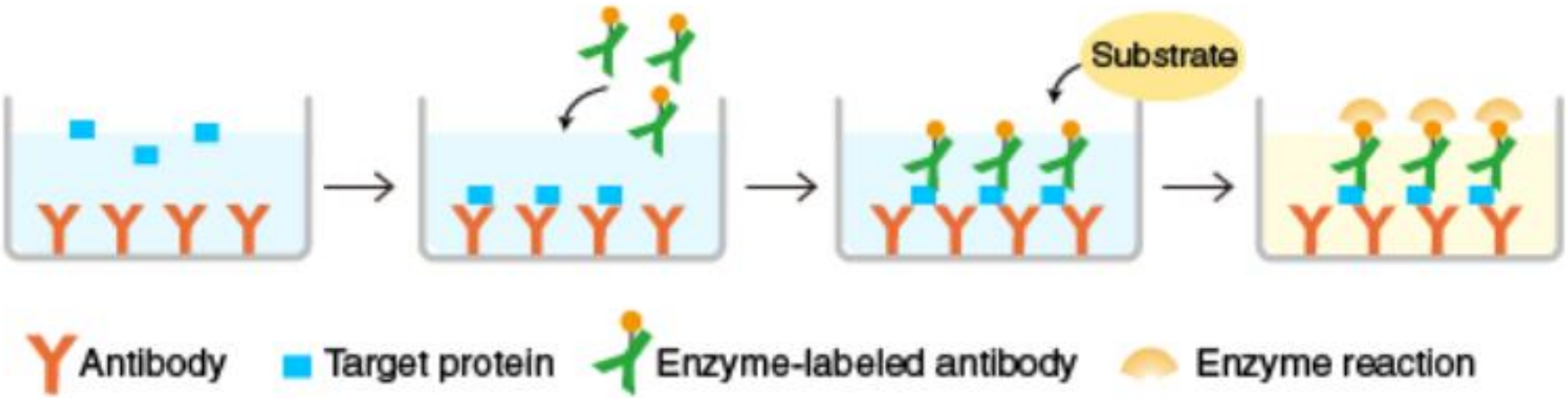
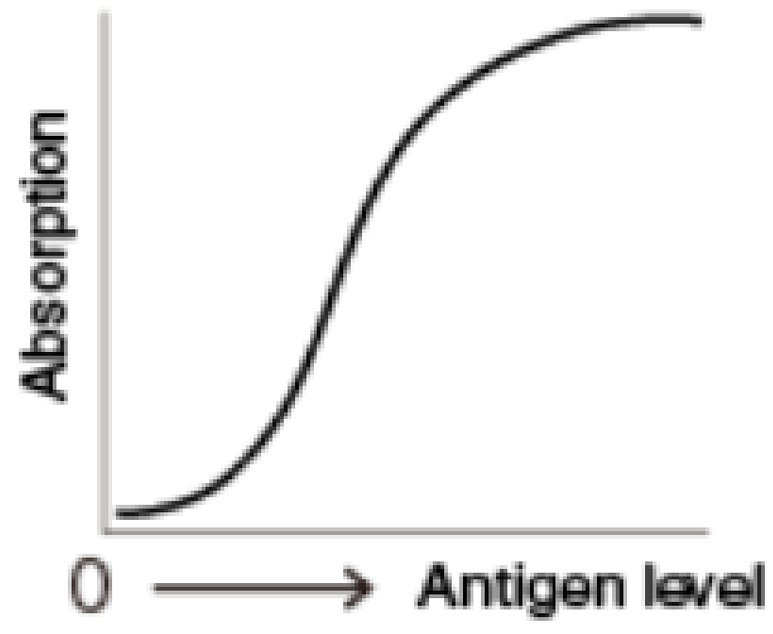
Immunoassay: ELISA



- Use of Antibodies & Conjugates (Enzyme labelled Antibody)
- Use of photometry (450 nm) -> Quantification
- Different type (size of target analyte): Sandwich / Competitive



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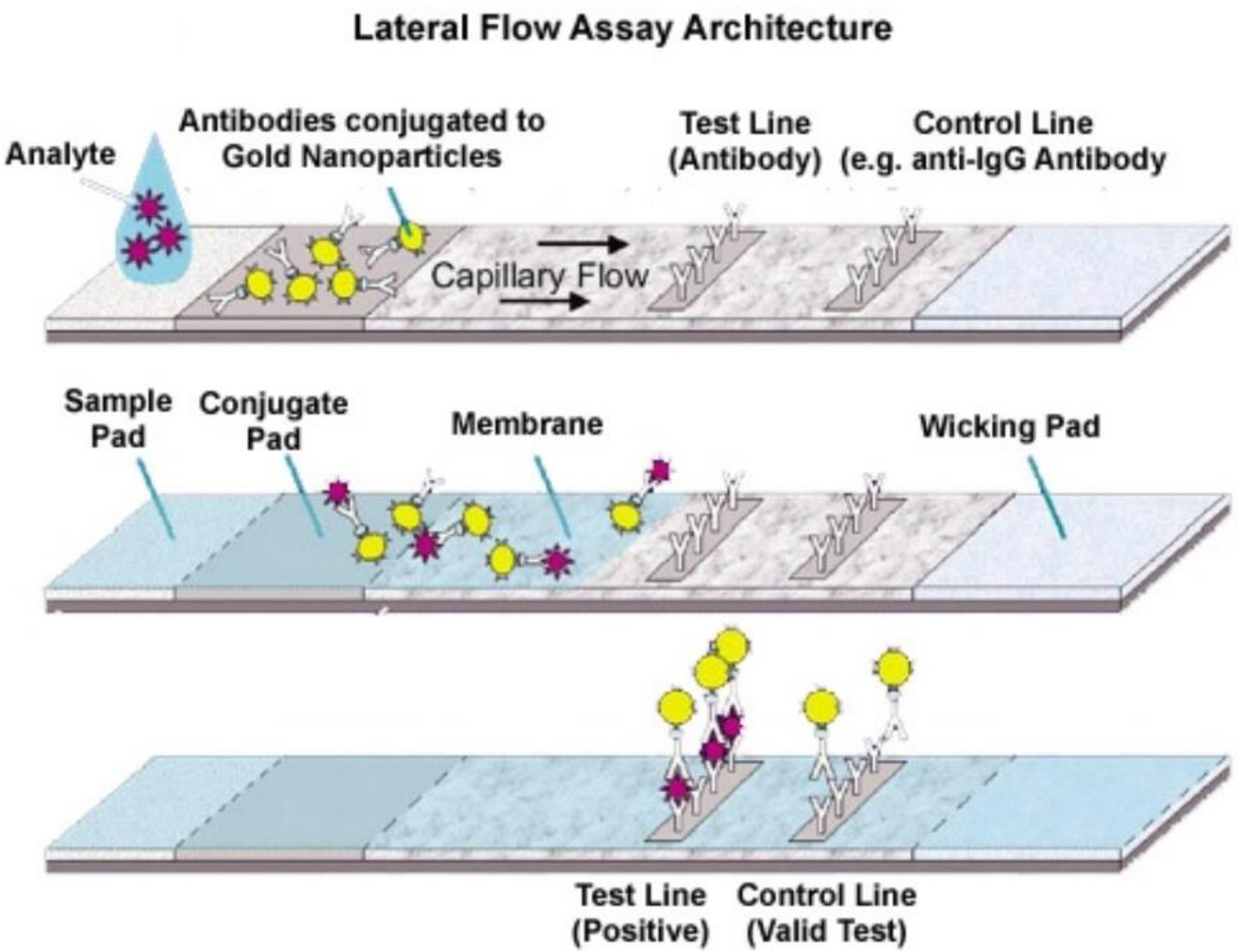
Immunoassay: Rapid Test



Qualitative – No instrument required

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Wine & Alcoholic Beverages

Sugars

D-Glucose/D-Fructose
Sucrose / D-Glucose / D-Fructose

Organic Acids

Acetic Acid
Acetic Acid (liquid)
Ascorbic Acid
Citric Acid
D-Gluconic Acid
D-Lactic Acid
L-Lactic Acid
L-Malic Acid
Pyruvic Acid
Sorbic Acid
Tartaric Acid

Nitrogen and Sulphite Substances

Ammonia
Free Sulfite
Primary Amino Nitrogen (PAN)
Total Sulfite

Ions

Calcium
Copper
Iron
Potassium

Other parameters

Acetaldehyde
Anthocyanins
Carbon dioxide
Catechins
Color
Glycerol
pH
Polyphenols
Total Acidity
TPI (Total Polyphenols Index)

Helping you through the process

BioSystems

KIT	GRAPE JUICE Ripening	GRAPE JUICE Phenolic Potential	GRAPE JUICE Grape Quality & Suppliers Control	GRAPE JUICE Adjustments	WINE Alcoholic Fermentation	WINE Maceration	WINE Malolactic Fermentation	WINE Aging	SPARKLING WINE Adjustment & Aging	WINE Coupage and Fining	WINE Trade and Certification & Export	WINE Tartaric and Protein Stability	WINE Filtering	WINE Adjusting and Bottling
ACETALDEHYDE			•					•						
ACETIC ACID			•		•	•	•	•		•	•			•
AMMONIA	•		•	•	•				•					
ANTHOCYANINS		•		•		•		•						
ASCORBIC ACID				•										
CALCIUM			•									•		•
CATECHINS				•		•		•						
CITRIC ACID				•						•	•	•		•
CO_2									•					
COLOR		•	•	•		•		•						
COPPER			•									•		•
ELISA OCHRATOXINE										•				•
ELISA PROTEINS												•	•	•
FREE SULFITE				•			•	•	•			•	•	•
GLUCONIC ACID			•			•					•			•
GLUCOSE-FRUCTOSE	•		•	•	•					•	•			•
GLUCOSE-FRUCTOSE-SACAROSE									•					•
GLUTEN								•						
GLYCEROL	•		•		•									•
HISTAMINE								•						
IRON		•										•		•
L-LACTIC		•			•		•	•						
L-MALIC	•		•	•	•		•	•	•	•	•			•
PAN	•		•	•	•									
pH			•	•			•			•		•		•
POTASSIUM	•		•									•		•
SORBIC ACID										•		•		•
TARTARIC ACID	•		•	•					•					
TOTAL ACIDITY			•	•			•		•	•	•	•	•	•
TOTAL POLYPHENOLS		•		•		•		•				•		
TOTAL SULFITE			•	•			•	•	•		•	•	•	•

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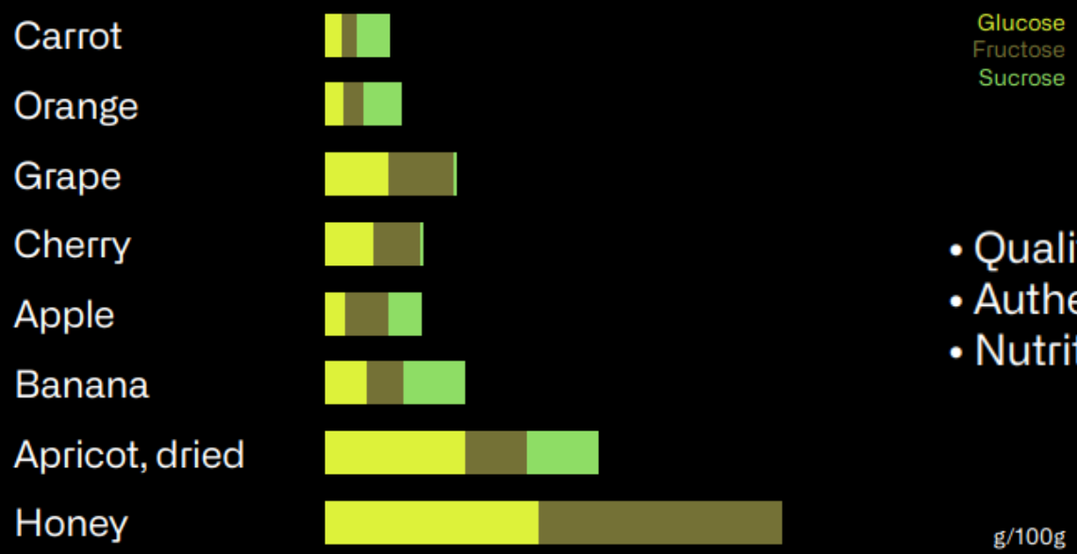
Fruit & Juice

Enzimatic / Chemical Reagents
D-Glucose/D-Fructose
Sucrose/D-Glucose/D-Fructose
Lactose/D-Galactose
D-Lactic Acid
L-Lactic Acid
L-Malic Acid
Acetic Acid (liquid)
Ascorbic Acid
Citric Acid
D-Gluconic Acid
L-Glutamic Acid
Tartaric Acid*
Glycerol*
Ethanol
Total Acidity
Immunoassay (ELISA & Rapid Test)**
Allergens
Gluten
Ochratoxin A

Fruit & Juice: Aims

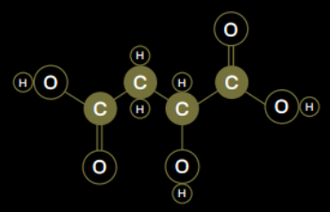
Sugars in fruits, berries and vegetables



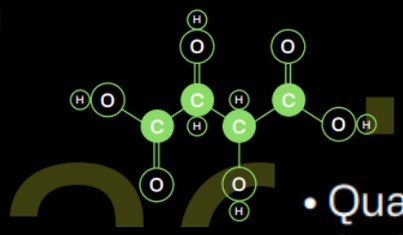
- Quality
- Authenticity
- Nutrition facts

Citric acid

Malic acid

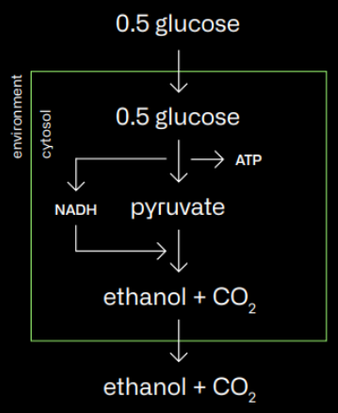


Tartaric acid

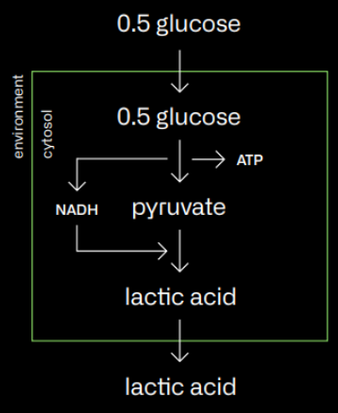


- Quality
- Authenticity
- Nutrition facts

Alcoholic fermentation



Homolactic fermentation



- Indirect microbiology
- Hygiene

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International Fruit & Juice Association

D-Glucose/D-Fructose (IFUMA 55)
Sucrose (IFUMA 56)
Lactic Acid (D&L) (IFUMA 53)
D-Malic Acid (IFUMA 64)
L-Malic Acid (IFUMA 21)
Citric acid (IFUMA 22)
D-Isocitric Acid (IFUMA 54)
Ethanol (IFUMA 52)
Acetic Acid (IFUMA 66)
D-Gluconic Acid (IFUMA 76)
Glycerol (IFUMA 77)
D-Sorbitol (IFUMA 62)
Ascorbic Acid (IFUMA 17c)

International Federation of Fruit Juice Producers

Determination of Lactic Acid enzymatic

IFU Analysis
No. 53 (Rev. 2005)

PRINCIPLE

In the presence of L-lactate dehydrogenase (L-LDH), L-lactic acid (lactate) is oxidized by nicotinamide-adenine dinucleotide (NAD) to pyruvate. The oxidation of D-lactic acid requires the presence of the enzyme D-lactate dehydrogenase (D-LDH) (1), (2).

(1) L-lactate + NAD^+ $\xrightleftharpoons{\text{L-LDH}}$ pyruvate + NADH + H^+

(2) D-lactate + NAD^+ $\xrightleftharpoons{\text{D-LDH}}$ pyruvate + NADH + H^+

BioSystems

Fish & Aquaculture

- **Histamine**

Histamine Spike Solution

AOAC Performance Tested Method

- **Sulfite**

Preservative & Antioxidant

- **Ascorbic Acid, Phosphate….**

Preservative & Quality

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Cereal Based Products

Sugars

- D-Glucose/D-Fructose
- Sucrose/D-Glucose/D-Fructose
- Lactose/D-Galactose
- Maltose/Sucrose/D-Glucose/D-Fructose
- Total Starch

Allergens (ELISA & Rapid Test)

- Milk, Egg, Soya, Nuts, etc.

Mycotoxins (ELISA & Rapid Test)

- Aflatoxin, Ochratoxin, DON, etc

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Usability: Instrument & Software

THANK YOU VERY MUCH

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Any additional question, contact
mboix@biosystems.es