



# Enzymatic analysis for food and feed

**Enzymatic tests are widely used as analytical tools for the analysis of food products such as fruit juices, wine or beer, dairy products, eggs and meat. Enzymatic test kits determine sugars, acids, alcohols and a few other food components.**

They are based on high quality enzymes, enabling precise and specific measurements of each compound, even in complex matrices. Results are measured with a spectrophotometer, automation is possible. Numerous enzymatic methods have been approved or validated by international organisations.

The “Yellow line” kits are produced by Roche (previously Boehringer Mannheim), with more than 40 years of experience in the production of the enzymes, which are the key element of each test. The Roche test kits have been used and validated worldwide for several decades, with many corresponding publications. They have been selected as reference method by many international organizations and they are still the reference quality today.

As an alternative, R-Biopharm also offers the Enzytec™ *Generic* line, which includes enzymatic or colorimetric assays.

Enzytec™ *Liquid* kits are produced by R-Biopharm or by Thermo Scientific. These reagents are all liquid, ready-to-use and stable, so they can be placed directly on any biochemistry analyser and stay on board for true random-access.

The new product line RIDA®CUBE enables single testing. The test cartridges are ready-to-use and allow a rapid analysis. The RIDA®CUBE kits can only be used in combination with the RIDA®CUBE SCAN instrument.



### Roche "Yellow Line"

- Reference quality for more than 40 years
- 31 tests for all requirements in the food industry
- Produced by Roche Diagnostics



### Enzytec™ Liquid

- Liquid, ready-to-use reagents
- Stable until end of shelf-life, even after opening
- Easy and safe use on biochemistry analysers



### RIDA®CUBE SCAN

- Small but precise like a big biochemistry analyser
- Ready-to-use test cartridges for single testing
- Only one pipeting step and a result after 15 minutes



## Enzymatic food analysis

### "Yellow Line" Roche Diagnostics

Product	Description	No. of tests/amount	Art. No.
<b>Acids</b>			
<b>Enzymatic test</b>			
Acetic acid	Enzymatic test (340 nm)	3 x 11 determinations	10148261035
L-Ascorbic acid	Enzymatic test (578 nm)	21 determinations	10409677035
Citric acid	Enzymatic test (340 nm)	3 x 12 determinations	10139076035
Formic acid	Enzymatic test (340 nm)	21 determinations	10979732035
D-Gluconic acid	Enzymatic test (340 nm)	27 determinations	10428191035
L-Glutamic acid	Enzymatic test (492 nm)	3 x 13 determinations	10139092035
D-3-Hydroxybutyric acid	Enzymatic test (492 nm)	3 x 12 determinations	10907979035
D-Isocitric acid	Enzymatic test (340 nm)	33 determinations	10414433035
D-/L-Lactic acid	Enzymatic test (340 nm)	30 determinations of each	11112821035
L-Lactic acid	Enzymatic test (340 nm)	30 determinations	10139084035
D-Malic acid	Enzymatic test (340 nm)	3 x 11 determinations	11215558035
L-Malic acid	Enzymatic test (340 nm)	30 determinations	10139068035
Succinic acid	Enzymatic test (340 nm)	11 determinations	10176281035
<b>Sugars</b>			
<b>Enzymatic test</b>			
D-Glucose	Enzymatic test (340 nm)	3 x 45 determinations	10716251035
D-Glucose/D-Fructose	Enzymatic test (340 nm)	27 determinations of each	10139106035
Lactose/D-Galactose	Enzymatic test (340 nm)	32 determinations	10176303035
Lactose/D-Glucose	Enzymatic test (340 nm)	32 determinations of each	10986119035
Maltose/Sucrose/D-Glucose	Enzymatic test (340 nm)	15 determinations of each	11113950035
Raffinose	Enzymatic test (340 nm)	32 determinations	10428167035
Sucrose/D-Glucose	Enzymatic test (340 nm)	22 determinations of each	10139041035
Sucrose/D-Glucose/D-Fructose	Enzymatic test (340 nm)	22 determinations of each	10716260035
Starch	Enzymatic test (340 nm)	27 determinations	10207748035
<b>Others</b>			
<b>Enzymatic test</b>			
Acetaldehyde	Enzymatic test (340 nm)	3 x 11 determinations	10668613035
Ammonia	Enzymatic test (340 nm)	50 determinations	11112732035
Urea/Ammonia	Enzymatic test (340 nm)	25 determinations of each	10542946035
Cholesterol	Enzymatic test (405 nm)	31 determinations	10139050035
Ethanol	Enzymatic test (340 nm)	33 determinations	10176290035
Glycerol	Enzymatic test (340 nm)	3 x 11 determinations	10148270035
Nitrate	Enzymatic test (340 nm)	3 x 13 determinations	10905658035
D-Sorbitol/Xylitol	Enzymatic test (492 nm)	3 x 12 determinations	10670057035
Sulfite (SO <sub>2</sub> )	Enzymatic test (340 nm)	31 determinations	10725854035
<b>Accessories</b>			
Cuvettes Holder		1	10019624035
Plastic Spatulas		500 pcs.	10019623035



## Enzymatic food analysis

### Enzytec™ Generic

Product	Description	No. of tests/amount	Art. No.
<b>Acids</b>			
Acetic acid	Enzymatic test (340 nm)	2 x 16 determinations	E1226
L-Ascorbic acid	Enzymatic test (578 nm)	3 x 8 determinations	E1267
Citric acid	Enzymatic test (340 nm)	24 determinations	E1214
D-Gluconic acid	Enzymatic test (340 nm)	32 determinations	E1223
D/L-Lactic acid	Enzymatic test (340 nm)	32 determinations	E1255
L-Lactic acid	Enzymatic test (340 nm)	32 determinations	E1254
L-Malic acid	Enzymatic test (340 nm)	32 determinations	E1215
Oxalic acid	Enzymatic test (590 nm)	10 determinations	E2100
Sample purifier	Sample preparation for Enzymatic tests	20 samples	E2250
<b>Sugars</b>			
D-Glucose	Enzymatic test (340 nm)	32 determinations	E1210
D-Glucose/D-Fructose	Enzymatic test (340 nm)	32 determinations of each	E1245
Lactose/D-Galactose	Enzymatic test (340 nm)	32 determinations	E1213
Starch	Enzymatic test (340 nm)	32 determinations	E1268
Sucrose/D-Glucose	Enzymatic test (340 nm)	16 determinations of each	E1246
Sucrose/D-Glucose/D-Fructose	Enzymatic test (340 nm)	16 determinations of each	E1247
Glucose remover	For removal of glucose excess in samples	32	E3400
<b>Colorimetric assays</b>			
β-Glucan (GlucaTest® S125)	Colorimetric test (550 nm)	125 ml (40 tests)	E3500
β-Glucan (GlucaTest® L500)	Colorimetric test (550 nm)	4 x 125 ml (160 tests)	E3550
Copper	Colorimetric test (580 nm)	2 x 50 ml	E2400
Iron	Colorimetric test (580 nm)	4 x 100 ml	E2300
Tartaric acid	Colorimetric test (520 nm)	2 x 80 ml	E3100
<b>Standards</b>			
Multi-acid Standard manual	Multi-acid assay control solution	9 ml	E1240
Multi-acid Standard for automation	Multi-acid calibration solution for automation	9 ml	E1241
Alcohol Standard	Alcohol assay control solution	10 x 1 ml	E5420
Sugar Standard manual	Multi-sugar assay control solution	9 ml	E1242
Sugar combination standard	Multi-sugar assay control solution	3 x 3 ml	E5440
Sugar standard for automation	Multi-sugar calibration solution for automation	3 x 3 ml	E5450



## Enzymatic food analysis

### Enzytec™ Liquid

Product	Description	No. of tests/amount	Art. No.
<b>Acids</b>			
Acetic acid	Enzymatic test (340 nm)	For automation only	E5226
D/L-Lactic acid*	Enzymatic test (340 nm)	2 x 25 determinations	E8240
L-Lactic acid	Enzymatic test (340 nm)	2 x 25 determinations	E8260
L-Malic acid	Enzymatic test (340 nm)	2 x 25 determinations	E8280
<b>Sugars</b>			
D-Galactose	Enzymatic test (340 nm)	2 x 25 determinations	E8120
D-Glucose	Enzymatic test (340 nm)	2 x 25 determinations	E8140
D-Glucose/D-Fructose	Enzymatic test (340 nm)	2 x 25 determinations	E8160
Lactose/D-Galactose*	Enzymatic test (340 nm)	2 x 25 determinations	E8110
Lactose/D-Glucose*	Enzymatic test (340 nm)	2 x 25 determinations	E8130
Sucrose/D-Glucose*	Enzymatic test (340 nm)	2 x 25 determinations	E8180
Sucrose/D-Glucose/D-Fructose*	Enzymatic test (340 nm)	2 x 25 determinations	E8190
<b>Others</b>			
Ammonia	Enzymatic test (340 nm)	4 x 10 determinations	E5390
Ethanol AOAC Official Method First Action	Enzymatic test (340 nm)	2 x 25 determinations	E8340
Glycerol	Enzymatic test (340 nm)	4 x 10 determinations	E5360
SO <sub>2</sub> -Total (Total Sulfite)	Colorimetric test (340 nm)	2 x 50 tests	E8600
SO <sub>2</sub> -Free (Free Sulfite)	Colorimetric test (340 nm)	2 x 50 tests	E8610

### RIDA®CUBE (only for RIDA®CUBE SCAN\*\*)

Acids	Ready-to-use cartridges		
Acetic acid	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4226
D/L-Lactic acid*	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4240
L-Lactic acid	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4260
L-Malic acid	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4280
<b>Sugars</b>			
D-Galactose	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4120
Glucose	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4140
D-Glucose/D-Fructose*	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4160
Lactose/D-Galactose*	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4110
Lactose/D-Glucose*	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4130
Sucrose/D-Glucose*	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4180
Sucrose/D-Glucose/D-Fructose*	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4190
<b>Others</b>			
Ethanol	Enzymatic test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4340
SO <sub>2</sub> -Free (Free Sulfite)	Colorimetric test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4610
SO <sub>2</sub> -Total (Total Sulfite)	Colorimetric test only with RIDA®CUBE SCAN (340 nm)	32 determinations	RCS4600

\* Without differentiation.

\*\* See page 84 – • Equipment/software/accessories.



## Enzymatic food analysis

	"Yellow Line" Roche Diagnostics, the reference method	Enzytec™ Liquid Liquid, ready to use and stable reagents	RIDA® CUBE SCAN Single-test cartridges
<b>Acids</b>			
Acetic acid (340 nm)	10148261035	E5226	RCS4226
L-Ascorbic acid (578 nm)	10409677035		
Citric acid (340 nm)	10139076035		
Formic acid (340 nm)	10979732035		
Gluconic acid (340 nm)	10428191035		
Glutamic acid (492 nm)	10139092035		
D-3-Hydroxybutyric acid (492 nm)	10907979035		
D-Isocitric acid (340 nm)	10414433035		
D/L-Lactic acid (340 nm)	11112821035	E8240	RCS4240
L-Lactic acid (340 nm)	10139084035	E8260	RCS4260
D-Malic acid (340 nm)	11215558035		
L-Malic acid (340 nm)	10139068035	E8280	RCS4280
Oxalic acid (580 nm)		E2100	
Succinic acid (340 nm)	10176281035		
Tartaric acid (520/546 nm)		E3100	
<b>Sugars</b>			
β-Glucan (546 nm)		E3500/E3550	
D-Glucose (340 nm)	10716251035	E8140	RCS4140
D-Glucose/D-Fructose (340 nm)	10139106035	E8160	RCS4160
Lactose/D-Galactose (340 nm)	10176303035	E8110/E8120	
Lactose/D-Glucose (340 nm)	10986119035	E8130/E8140	
Maltose/Sucrose/D-Glucose (340 nm)	1113950035		
Raffinose (340 nm)	10428167035		
Starch (340 nm)	10207748035		
Sucrose/D-Glucose (340 nm)	10139041035	E8180/E8140	RCS4180
Sucrose/D-Glucose/D-Fructose (340 nm)	10716260035	E8190	RCS4190
<b>Others</b>			
Acetaldehyde (340 nm)	10668613035		
Ammonia (340 nm)	1112732035	E5390	
Urea/Ammonia (340 nm)	10542946035		
Cholesterol (405 nm)	10139050035		
Copper (580 nm)		E2400	
Ethanol (340 nm)	10176290035	E8340	RCS4340
Glycerol (340 nm)	10148270035	E5360	
Iron (580 nm)		E2300	
Nitrate (340 nm)	10905658035		
D-Sorbitol/Xylitol (492 nm)	10670057035		
Free Sulfite (340 nm)		E8610	RCS4610
Total Sulfite (340 nm)	10725854035	E8600	RCS4600
<b>Standards</b>			
Alcohol standard		E5420	
Multi-acid standards (low and high)		E1240/E1241	
Multi-sugar standards (low and high)		E5440/E5450	



# Vitamin analysis in food, feed and vitamin containing products

**Food products are now being enriched and fortified with vitamins in many forms. But does the amount present in the food at the end of the shelf life match the label on the package?**

Food manufacturers, regulatory agencies and commercial laboratories should therefore have analytical methods on hand that allow them to quickly and reliably determine the natural and added vitamin content of food products.

## **Product testing:**

There are different methods for analyzing water soluble vitamins: ELISA, immunoaffinity columns (IAC), microbiological and enzymatic microtiter plate tests. The RIDASCREEN®FAST Vitamin B12 and Folic Acid tests allow a quantitative determination of both vitamins within 1 h. The total vitamin B12 content is determined without using cyanide. Regarding folic acid the added vitamin content is determined.

When using immunoaffinity columns in conjunction with HPLC or LC-MS/MS, the sample is purified and the vitamin is retained by the antibody in the column. Using the EASI-EXTRACT® VITAMIN B12 and BIOTIN (columns), you can determine the total vitamin content. With the EASI-EXTRACT® FOLIC ACID (column) you can only determine added folic acid. Depending on the sample preparation the added or total vitamin content can be determined with the microbiological VitaFast® test. With the enzymatic VitaFast® Vitamin C test in microtiter plate format a determination of total vitamin C content (L-ascorbic acid and L-dehydroascorbic acid) is possible.



## VitaFast®

### Microbiological test

- Samples with an added or natural vitamin content can be analyzed
- Method in conformity with official guidelines (Section 64 of the German Food & Feed Act, AOAC)
- AOAC-RI certification for some VitaFast® tests
- Ready-to-use reagents and standards for 96 determinations
- Results available within 24 - 48 hours



## EASI-EXTRACT®

### Immunoaffinity columns

- Isolation and concentration of the vitamin
- Pigments and interfering compounds are removed
- High recovery and low CV's



## RIDASCREEN®

### ELISA

- Determination of total vitamin B12 content
- Determination of added vitamin (folic acid)
- One sample preparation procedure and one identical sample buffer for RIDASCREEN®FAST B12 and Folic Acid
- Results within 1 hour
- Ideal for process control





## Vitamins

### VitaFast®



Product	Description	No. of tests/amount	Art. No.
<b>Microbiological microtiter plates</b>			
VitaFast® Folsäure/Folic Acid AOAC-RI 100903	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.018 µg/100 g (ml)	96 determinations	P1001
VitaFast® Vitamin B12 (Cyanocobalamin) AOAC-RI 101002	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.021 µg/100 g (ml)	96 determinations	P1002
VitaFast® Vitamin B7 (Biotin) AOAC-RI 101001	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.013 µg/100 g (ml)	96 determinations	P1003
VitaFast® Vitamin B3 Niacin	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.0048 mg/100 g (ml)	96 determinations	P1004
VitaFast® Pantothensäure/Pantothenic Acid AOAC-RI 100904	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.0035 mg/100 g (ml)	96 determinations	P1005
VitaFast® Vitamin B1 (Thiamin)	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.008 mg/100 g (ml)	96 determinations	P1006
VitaFast® Vitamin B2 (Riboflavin) AOAC-RI 100902	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.0018 mg/100 g (ml)	96 determinations	P1007
VitaFast® Vitamin B6 (Pyridoxin)	Quantitative determination of the total vitamin content (added and natural) or of the added vitamin only Limit of detection: 0.0002 mg/100 g (ml)	96 determinations	P1008
VitaFast® Inositol	Quantitative determination of the total vitamin content (added and natural) Limit of detection: 0.5 mg/100 g (ml)	96 determinations	P1009
<b>Enzymatic microtiter plate</b>			
VitaFast® Vitamin C (L-Ascorbic Acid)	Quantitative determination of vitamin C (L-ascorbic acid and L-dehydroascorbic acid) possible Limit of detection: 7.8 mg/100 g (ml)	50 determinations	P1010
<b>Spiking standards</b>			
VitaFast® Folsäure/Folic Acid Spiking Standard	Folic Acid in solid form	3 vials	P3001
VitaFast® Vitamin B12 (Cyanocobalamin) Spiking Standard	Cyanocobalamin in solid form	3 vials	P3002
VitaFast® Vitamin B7 (Biotin) Spiking Standard	D-Biotin in solid form	3 vials	P3003
VitaFast® Pantothensäure/Pantothenic Acid Spiking Standard	Ca-D-Pantothentat in solid form	3 vials	P3005
<b>Enzyme</b>			
VitaFast® Chicken Pancreatin	Enzyme for sample preparation for determination of natural folic acid	1 vial for 50 sample preparations	P2002



## Vitamins

### EASI-EXTRACT®

Product	Description	No. of tests/amount	Art. No.
<b>Immunoaffinity columns</b>			
EASI-EXTRACT® VITAMIN B12	Immunoaffinity columns for sample clean-up prior to the analysis of vitamin B12 using HPLC or LC-MS/MS	10 columns (3 ml format) 50 columns (3 ml format)	RBRP80 RBRP80B
EASI-EXTRACT® VITAMIN B12 (LGE) AOAC „Final Action“ certified	Immunoaffinity columns for sample clean-up prior to the analysis of vitamin B12 using HPLC or LC-MS/MS	10 columns (3 ml format) 50 columns (3 ml format)	RBRP88 RBRP88B
EASI-EXTRACT® FOLIC ACID	Immunoaffinity columns for sample clean-up prior to the analysis of folic acid using HPLC or LC-MS/MS	10 columns (3 ml format) 50 columns (3 ml format)	RBRP81 RBRP81B
EASI-EXTRACT® BIOTIN AOAC „First Action“ certified	Immunoaffinity columns for sample clean-up prior to the analysis of biotin using HPLC or LC-MS/MS	10 columns (3 ml format) 50 columns (3 ml format)	RBRP82 RBRP82B
EASI-EXTRACT® MULTI-VIT B (LGE)	Immunoaffinity columns for sample clean-up prior to the analysis of biotin, vitamin B12 and folic acid using HPLC	10 columns (10 ml format) 50 columns (10 ml format)	RBRP183 RBRP183B



### RIDASCREEN®

<b>ELISA microtiter plates</b>			
RIDASCREEN®FAST Vitamin B12	Enzyme immunoassay for quantitative analysis of total vitamin B12 in fortified food and vitamin products Limit of detection: 0.5 µg/kg	48 determinations Incubation time: 25 min	R2103
RIDASCREEN® Folsäure (Folic Acid)	Enzyme immunoassay for quantitative analysis of added folic acid in fortified food and vitamin products Limit of detection: 0.5 µg/kg	48 determinations Incubation time: 25 min	R3203



Vitamins	VitaFast®	EASI-EXTRACT®	RIDASCREEN®
	Microbiological/enzymatic tests	Immunoaffinity columns	ELISA
Folsäure/Folic Acid	●	●	●
Vitamin B12 (Cyanocobalamin)	●	●	●
Vitamin B7 (Biotin)	●	●	
Vitamin B3 (Niacin)	●		
Pantothensäure/Pantothenic Acid	●		
Vitamin B1 (Thiamin)	●		
Vitamin B2 (Riboflavin)	●		
Vitamin B6 (Pyridoxin)	●		
Inositol	●		
Vitamin C	●		

Vitamins	VitaFast® tests
Folic Acid Spiking standard	●
Vitamin B12 Spiking standard	●
Biotin Spiking standard	●
Pantothenic Acid Spiking standard	●
Chicken Pancreatin	●