RANDOX
FOOD DIAGNOSTICS

Honey Analysis

Better Science, Safer Food

Providing a Full Testing Profile for the Honey Industry

Commitment to research and development is the driving force behind our innovative technology, allowing Randox Food Diagnostics to become global leaders in the screening for antibiotics and enzymatic testing within honey. With a comprehensive range of testing solutions and validations across multiple matrices, we are changing the face of food safety and quality worldwide.

Over 35 years, Randox Food Diagnostics has developed a specific product portfolio including ELISA and Randox's patented Biochip Array Technology to suit the needs of the honey industry, for the screening of drug residues. Due to the rise in fraudulent honey being sold to consumers worldwide, Randox Food Diagnostics also developed the RX misano, a table top sized spectrophotometer to test honey quality through enzymatic screening solutions.

Putting the food and agricultural industries at the forefront of what we do has allowed Randox Food to become the trusted supplier of the most innovative, multiplexing technology for honey producers. Biochip Array Technology allows users to save time, consolidate costs and gain accurate results.

We offer screening solutions in honey for the following:

- Antibiotics
- Hydroxymethylfurfural (HMF)
- Diastase
- Glucose/fructose
- Honey colour

Biochip Array Technology

Randox's patented Biochip Array Technology (BAT) allows for simultaneous detection of multiple analytes from a single sample. Accurate, repeatable and trusted results on a 9mm x 9mm ceramic chip. Our unique technology is at the forefront of testing and provides a large number of results in less time when compared to other methods.

Randox's comprehensive test menus allow for the screening of multiple sample types, providing quantitative results. These versatile arrays are ideal for the screening of multiple antibiotics within honey, up to 54 samples in just 2 hours 30 minutes. This technology ultimately provides a more informed decision on confirmatory analysis required.

Benefits

The Biochip

Each single 9x9mm Biochip acts as the reaction well for a single sample, replacing multiple ELISA tests.

Consolidation

Each Biochip well provides the user with up to 44 individual results from a single sample.

Excellent Accuracy

Users will be provided with quantitative results (ppb) for each analyte depending on the kit used.

Evidence Investigator Process

Step 1

Add assay reagents and samples to Biochips

Step 2

Place up to 54 Biochips into thermoshaker

Step 3

Wash Biochips and tap to dry prior to imaging

Step 4

Add signal reagent to each Biochip and load into the analyser

Step 5

Biochip loaded into image box and chemiluminescence measured

Step 6

Test results reported

Evidence Investigator Package

Evidence Investigator

Thermoshaker

PC software

Barcode scanner

Honey Biochip Arrays

Antimicrobial Array I Ultra

Catalogue No - EV3843

Samples per kit - 54

Assay	LOD (ppb)	Compound	%CR
Sulphadimethoxine	5.00˅	Sulphadimethoxine*	100
Sulphadiazine	5.00	Sulphadiazine*	100
Sulphadoxine	5.00	Sulphadoxine*	100
Sulphachlorpyridazine	5.00	Sulphachlorpyridazine*	100
Sulphamethoxypyridazine	5.00	Sulphamethoxypyridazine* Sulphaethoxypyridazine	100 56
Sulphamerazine	5.00	Sulphamerazine*	100
Sulphisoxazole	5.00	Sulphisoxazole*	100
Sulphathiazole	5.00	Sulphathiazole* Sulphadiazine	100 6.2
Sulphamethazine	5.00	Sulphamethazine*	100
Sulphaquinoxaline	5.00	Sulphaquinoxaline*	100
Sulphapyridine	8.00	Sulphapyridine* Sulphasalazine	100 12.9
Sulphamethoxazole	1.60	Sulphamethoxazole* Sulphamethizole Sulphachlorpyridazine	100 92 12.1
Sulphamonomethoxine	20.00	Sulphamonomethoxine*	100
Trimethoprim	9.00	Trimethoprim*	100
Dapsone	3.50	Dapsone*	100

*Each LOD (ppb) standardised to this compound

˅A higher LOD of 10ppb is recommended for the screening of unprocessed raw honey samples.

Antimicrobial Array II Plus

Catalogue No - EV4169 A/B

Samples per kit - 54

Assay	LOD (ppb)	Compound	%CR
Quinolones	3.00	Norfloxacin*	100
		Pefloxacin	84
		Enrofloxacin	76
		Ciprofloxacin	59
		Ofloxacin	57
		Enoxacin	54
		Pipemidic Acid	36
		Fleroxacin	32
		Levofloxacin	32
		Nadifloxacin	27
		Orbifloxacin	23
		Danofloxacin	20
		Marbofloxacin	16
		Oxolinic Acid	12
		Difloxacin	8
		Pazufloxacin	7
		Sarafloxacin	6
Ceftiofur	2.00	Ceftiofur*	100
		Desfuroylceftiofur	92
Thiamphenicol	1.00	Florfenicol*	100
		Thiamphenicol	53
Streptomycin	3.00	Streptomycin*	100
		Dihydrostreptomycin	99
Tylosin	1.00	Tylosin*	100
		Tilmicosin	37
Tetracyclines	4.50	Tetracycline*	100
		4-epitetracycline	87
		Rolitetracycline	67
		4-epioxytetracycline	52
		Oxytetracycline	52
		Chlortetracycline	51
		Demeclocycline	41
		Doxycycline	23
		4-epichlortetracycline	20
		Methacycline	11

*Each LOD (ppb) standardised to this compound

Antimicrobial Array III

Catalogue No - EV3695

Samples per kit - 54

Assay	LOD (ppb)	Compound	%CR
AOZ	0.30	4-NP-AOZ*	100
		Furazolidone	8.3
AMOZ	0.08	4-NP-AMOZ*	100
		Furaltadone	40.7
AHD	0.30	4-NP-AHD*	100
		Nitrofurantoin	41.9
SEM	0.50	4-NP-SEM*	100

*Each LOD (ppb) standardised to this compound

Antimicrobial Array III (CAP Only)

Catalogue No - EV3738

Samples per kit - 54

Assay	LOD (ppb)	Compound	%CR
Chloramphenicol	0.14	Chloramphenicol*	100
		Chloramphenicol Glucuronide	75.1

*Each LOD (ppb) standardised to this compound

Antimicrobial Array V

Catalogue No - EV4027

Samples per kit - 54

Assay	LOD (ppb)	Compound	%CR
Nitroimidazoles	0.90	Metronidazole*	100
		Ronidazole	310
		Hydroxy-Metronidazole	145
		Dimetridazole	90
		Ternidazole	85
		Ipronidazole	82
		HMMNI	56
		Hydroxy-Ipronidazole	7
		Carnidazole	3
		Secnidazole	2
Chloramphenicol	0.10	Chloramphenicol*	100
		Chloramphenicol Glucuronide	75

*Each LOD (ppb) standardised to this compound

Antimicrobial Array IV

Catalogue No - EV3878 A/B

Samples per kit - 54

Assay	LOD (ppb)	Compound	%CR
Spiramycin/Josamycin	2.00	Spiramycin*	100
		Kitasamycin	169
		Spiramycin 1	79
		Acetylspiramycin	32
		Josamycin	27
Apramycin	2.00	Apramycin*	100
Bacitracin	1.20	Bacitracin*	100
Neomycin/Paromomycin	1.00	Neomycin*	100
		Paromomycin	182
		Framycetin	25
Tobramycin	4.00	Tobramycin*	100
		Kanamycin B	24
		Dibekacin	20
Tylosin B/Tilmicosin	1.00	Tylosin A	105
		Tylosin B*	100
		Tilmicosin	82
		Tylvalosin	48
Spectinomycin	2.60	Spectinomycin*	100
Amikacin/Kanamycin	6.00	Amikacin*	100
		Kanamycin A	260
		Kanamycin B	9
Lincosamides	8.00	Lincomycin*	100
		Clindamycin	160
		Pirlimycin	38
Erythromycin	2.50	Erythromycin*	100
		Clarithromycin	498
		Roxithromycin	334
		Gamithromycin	51
		Anhydroerythromycin A	20
		Tulathromycin	10
		Oleandomycin	3
Streptomycin/ Dihydrostreptomycin	4.00	Streptomycin*	100
		Dihydrostreptomycin	135
Virginiamycin	2.00	Virginiamycin M1*	100

*Each LOD (ppb) standardised to this compound

Honey ELISA Kits

With extensive experience in food safety that stretches over 35 years, Randox Food Diagnostics has translated this knowledge into premium quality ELISA kits that combine confidence with convenience.

Chloramphenicol FAST

Catalogue No - CN10171

Tests per kit - 96 tests

Assay	LOD (ppb)	Compound	%CR
Chloramphenicol	1.50 (RS)	Chloramphenicol*	100
	0.07 (SE)	Chloramphenicol Glucuronide	100

*Each LOD (ppb) standardised to this compound

RS - Rapid Screen SE - Solvent Extraction

Chloramphenicol Next Gen

Catalogue No - CN10152

Tests per kit - 96 tests

Assay	LOD (ppb)	Compound	%CR
Chloramphenicol	0.05	Chloramphenicol*	100
		Chloramphenicol Glucuronide	123
		Chloramphenicol base	0.002
		Florfenicol	<0.00052
		Florfenicol amine	<0.00052
		Thiamphenicol	<0.00052

*Each LOD (ppb) standardised to this compound

Oxytetracycline Sensitive

Catalogue No - OXS10118A

Tests per kit - 96 tests

Assay	LOD (ppb)	Compound	%CR
Oxytetracycline	3.92	Oxytetracycline*	100
		4-epioxytetracycline	100
		Tetracycline	>100
		4-epitetracycline	>100
		Rolitetracycline	>100
		Chlortetracycline	98
		Demeclocycline	79
		Doxycycline	44
		4-epichlortetracycline	38
		Methacycline	21

*Each LOD (ppb) standardised to this compound

Streptomycin

Catalogue No - STP3468

Tests per kit - 96 tests

Assay	LOD (ppb)	Compound	%CR
Streptomycin	6.40	Streptomycin*	100
		Dihydrostreptomycin	106

*Each LOD (ppb) standardised to this compound

Tetracycline Sensitive

Catalogue No - TCS10117A

Tests per kit - 96 tests

Assay	LOD (ppb)	Compound	%CR
Tetracycline	2.00	Tetracycline*	100
		4-epitetracycline	87
		Rolitetracycline	67
		4-epioxytetracycline	52
		Oxytetracycline	52
		Chlortetracycline	51
		Demeclocycline	41
		Doxycycline	23
		4-epichlortetracycline	20
		Methacycline	11

*Each LOD (ppb) standardised to this compound

Honey Quality Testin

Glucose/Fructose Analysis

The carbohydrate composition of honey is responsible for some of its key functional properties. The ability to hold moisture and extend shelf-life, its microwave reactivity and its ability to promote colour and flavour development are all related to its carbohydrate composition.
The composition of glucose/fructose ratios are parameters which are also used to help predict the tendency of honey to crystallise.

Individual analysis of sugars can show valuable information about source and floral origin. Randox offer a simple and fast method for the determination of glucose/fructose content in honey.

HMF (Hydroxymethylfurfural)

Hydroxymethylfurfural (5-hydroxymethyl-2-furaldehyde, HMF) is an organic compound that is produced by acid-catalyzed dehydration of sugars, primarily fructose and its measurement is crucial to evaluate the conformity of honey for daily use according to government legislation. Elevated concentrations of HMF in honey provide an indication of overheating, poor storage conditions, possible adulteration with other sugars or syrups and/or higher age of the honey.

The use of the HMF value alone is enough to provide all of the information required to estimate the total heat exposure of all honey, making it one of the most common honey quality tests.

Phadebas® Honey Diastase

Diastase in honey converts starch to short-chain sugars and the enzyme activity hints at heating and / or poor storage conditions. Heating the honey degrades the enzyme, which is why restrictions are enforced by the EU. One official method of determining the Diastase Number (DN) in honey is the Phadebas® assay, *as recommended by the International Honey Comission.*

Phadebas® Honey Diastase Test is a method for the quantitative analysis of α-amylase in all honey types.

Honey Colour Test*

Colour grading has been used by the honey industry for many years. In natural condition honey can adopt a continuous range of colours related to mineral content and floral source. In addition, there is a connection with flavour as lighter coloured honey has a mild taste whereas darker types have a stronger taste.

*Included with the analyser and no kits required

RX misano

Honey naturally contains a small amount of enzymes which can vary widely by floral source and region. These enzymes play an important role by contributing to functional properties of honey, making it a unique ingredient that is far more complex than other sweeteners.

According to the EU Honey Directive 2001/110/EC, certain composition criteria must be determined for honeys intended for human consumption. In order to achieve this, the most modern enzymatic analyser in the industry, the RX misano, is now available for the analysis of diastase, total sugars (glucose/fructose), HMF and colouration.

Designed with the user in mind, the RX misano incorporates a responsive touch screen display, test menu personalisation and the ability to upload new parameters via USB. With an increase in automatic features, the RX misano also guarantees the precision and accuracy of results, improving the overall efficiency and versatility of enzymatic honey analysis.

Benefits at a Glance

User Friendly

7" responsive touch screen display, favourites menu, on screen prompts, the ability to export data into excel and import new menus.

Semi-Automated

With the ability to automatically calculate results, the RX misano leaves less chance for human error.

Customisable Test Menus

As the RX misano for honey test menu continues to grow, users can simply upload new parameters to the machine via USB.

Accurate

Results are quantitative and produced within +/- 1% of UKAS accredited reference materials, boasting increased accuracy compared to alternative methods.

Reduced Foot Print

With a smaller footprint than standard spectrophotometers, the RX misano is suitable for laboratories of all sizes.

Excellent Thermal Performance

The RX misano heats to 37°C in less than 30 seconds and cools from 37°C to 25°C in less than 1 minute.

Quality Analysis Kits

Glucose/Fructose Analysis

Catalogue No - GF2635

Samples per kit - 157

The sugar composition of honey is responsible for some of its key functional properties. The determination of glucose/fructose ratios are parameters which are used to help predict the tendency of honey to crystallise.

Individual analysis of sugars can show valuable information about source and floral origin. Randox offers a simple and fast method for the determination of glucose/fructose content in honey.

Sample Preparation/Assay Protocol

Calculation of Result

Fructose content = Total sugars – Glucose content (Work out second value as a percentage of total value)
Results are calculated in g/l (Grams per litre).

Optimum glucose/fructose content is **> 70% of total honey constituents**

Product	Time to result
Glucose	6 minutes
Fructose	22 minutes
Total Sugars	16 minutes

Linearity	Sensitivity	Precision	
		Intra Assay	Inter Assay
7.5g/l	**0.3g/l**	<5%	<7.5%

HMF (Hydroxymethylfurfural)

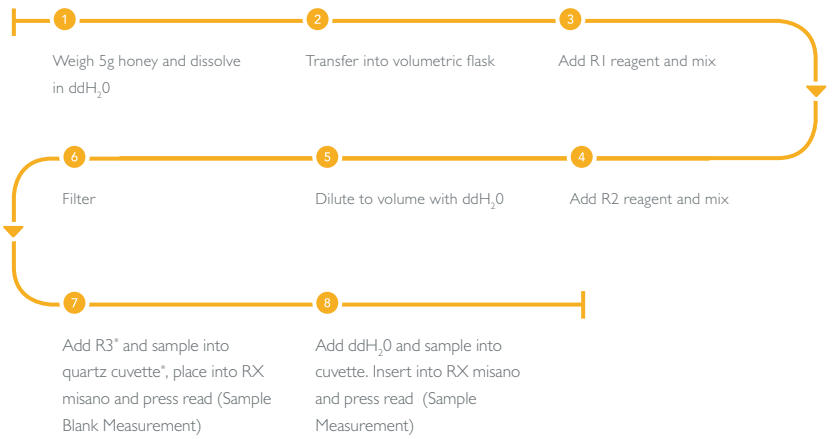
Catalogue No - HMF6000

Samples per kit - 100

Hydroxymethylfurfural (5-hydroxymethyl-2-furaldehyde, HMF) is an organic compound that is produced by acid-catalyzed dehydration of sugars, primarily fructose and its measurement is crucial to evaluate the conformity of honey for daily use according to government legislation. Elevated concentrations of HMF in honey provide an indication of overheating, poor storage conditions, possible adulteration with other sugars or syrups and/or higher age of the honey.

The use of the HMF value alone is enough to provide all of the information required to estimate the total heat exposure of all honey, making it one of the most common honey quality tests.

Sample Preparation/Assay Protocol



Calculation of Result

The test is linear to Hydroxymethylfurfural (HMF) concentration of 100 mg/kg. Dilute samples above this concentration, i.e. 1+ 3 with ddlH$_2$O.

The Codex quotes the following: The HMF content of honey after processing and/or blending must not be higher than 80 mg/kg. The European Union (EU Directive 110/2001) has fixed a HMF limit in honey of 40 mg/kg with the following exceptions: 80 mg/kg for honey coming from Countries or Regions with tropical temperatures, 15 mg/kg for honey with low enzymatic level (8-3 Schade Units).

Product	Time to result	Sensitivity
HMF	<25 minutes	2mg/kg

*Quartz cuvette required for test (not included)
*R3 Additional extra - Sodium Bisulfite Solution - Honeywell Fluka (13438)

Phadebas® Honey Diastase Test

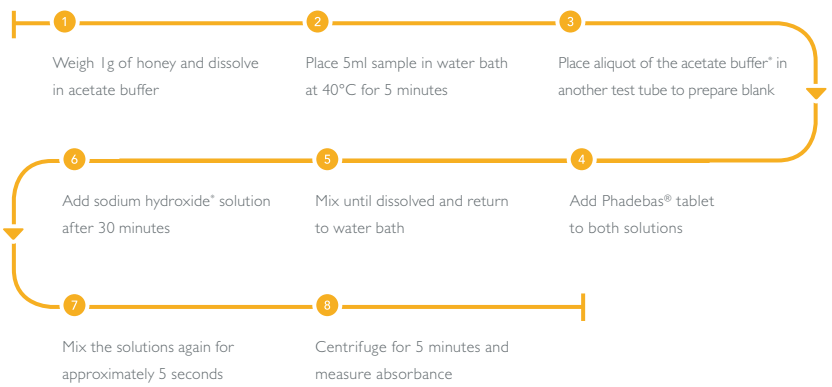
Catalogue No - 1321

Samples per kit - 50

Diastase in honey converts starch to short-chain sugars and the enzyme activity hints at heating and/ or poor storage conditions. Heating the honey degrades the enzyme, which is why restrictions are enforced by the EU. One official method of determining the Diastase Number (DN) in honey is the Phadebas® test, as recommended by the International Honey Commision.

Phadebas® Honey Diastase Test is a method for the quantitative analysis of α-amylase in all honey types.

Sample Preparation/Assay Protocol



Calculation of Result

The absorbance of the blank is subtracted from that of the sample solution (ΔA620). If the absorbance is higher than 1.0, dilute the sample with water and retest.

The Codex quotes the following: The diastase activity of honey, determined after processing and/or blending, in general not less than **8 Schade units** and in the case of honeys with low natural enzyme content not less than **3 Schade units.**

Product	Time to result
Diastase	40 minutes

*Additional extra - Sodium Hydroxide & Acetate Buffer

Honey Colour Test

Colour grading has been used by the honey industry for many years.

In natural conditions honey can adopt a continuous range of colours related to mineral content and floral source. In addition, there is a connection with flavour as lighter coloured honey has a mild taste whereas darker types have a stronger taste.

*Included with the analyser and no kits required

Sample Preparation/Assay Protocol

1. Sample is added to the sample cuvette
2. Select honey colour from RX misano test menu and the sample will be read
3. Record absorbance to classify honey colour

Calculation of Result

A simple measurement of absorbance at 560nm* enables a colour classification for honey to be established, as indicated in the table below.

Colour Names (Honey)	Pfund Scale (mm)	Mid Range Absorbance
Water White	<8	0.0945
Extra White	9-17	0.189
White	18-34	0.378
Extra Light Amber	35-50	0.595
Light Amber	51-85	1.389
Amber	86-114	3.008
Dark Amber	>114	>3.1

*Instrument algorithm in place for 560nm determination

Local Engineers. Global Coverage.

Randox Food Diagnostics provide customers with an unrivalled support service. A team of highly trained specialists are on-hand to deal with any technical and service issues you may have.

>100

>100 Specialists

We have >100 engineers and technical support specialists placed around the world to ensure an efficient response to customer requests

Global Offices

We have 25 international offices acting as direct points of contact for customers

Aftercare

We offer the ultimate after-care support with tailored service packages to suit your available budget

Technical Distributors

We have official Randox Food Diagnostics technical distributors in over 100 countries

350

350 Scientists

We have 350 scientists placed around the world, dedicated to providing a quality product offering

RANDOX HEALTH

GRAND NATIONAL

500+

laboratories using Randox Food Diagnostics technology

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