Malt, Wort & Beer Analysis

NEOGEN | Megazyme

Contents

This brochure features highlights from our malt and beverage analysis range. For the full catalogue, visit our website: **www.megazyme.com**

Megazyme creates products that allow breeders, maltsters, brewers and distillers to measure important analytes and parameters using basic laboratory equipment. Our analytical solutions include our bestselling **assay kits**, which bring together the components needed to measure specific analytes in an accurate, sensitive, and cost-effective way.

The assay kits include our exclusive **enzymes**, **substrates** and **reagents**, many of which are also sold separately. Our most popular substrates are also available in an innovative and highly convenient **tablet** form.

Cell Wall Components & Hydrolases

Starch Components

Starch Hydrolases

Other Analytes

Cell Wall Components

The cell walls within the barley endosperm are composed of two major polysaccharides: β-glucan and arabinoxylan. Cellulose is also present, but in far smaller quantities.

These cell walls must be broken down to allow starch hydrolases to access the starch found inside the endosperm.

The cell wall fragments also need to be broken down as completely as possible. This process is driven by specialised enzymes, which are released from grains themselves during malting.

Why do cell walls matter?

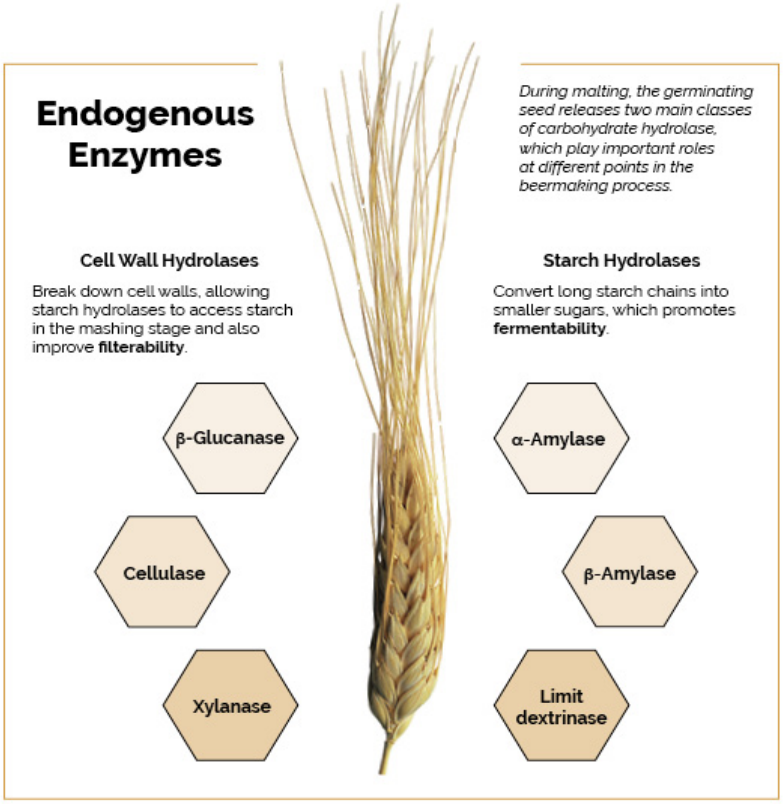
The relative presence or absence of the relevant cell wall hydrolases in malt will determine the degree of starch mobilisation.

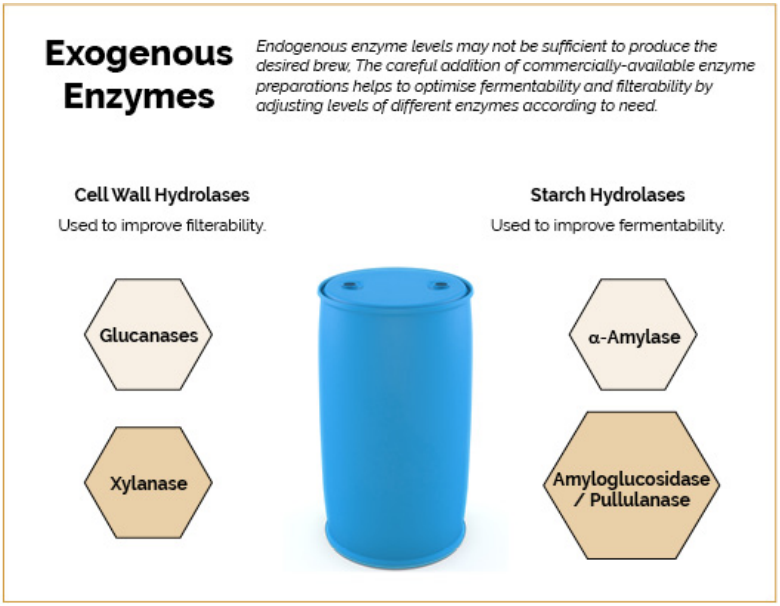
The predicted degree of cell wall hydrolysis will have a strong influence on a brewer or distiller's process decisions, as it has a direct impact on:

- mashing programme required
- wort viscosity
- lautering performance
- filtration
- likelihood of haze

There is also a likely knock-on effect on wort fermentability since the formation of fermentable sugars depends on the extent of starch mobilisation.

In summary, understanding cell wall hydrolase activity allows brewers and distillers to correct potential problems before they occur, for example through adjusted mashing procedures or addition of appropriate exogenous enzymes.





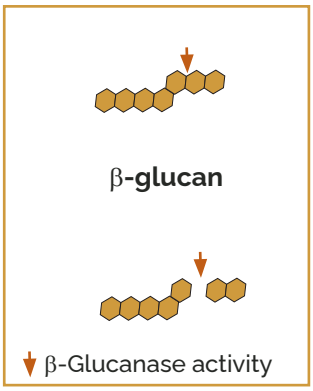
β-Glucan & β-Glucanase

β-Glucan is the major polysaccharide of the endosperm cell walls in barley and oat grains and is also present in wheat.

Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-BGLU	β-Glucan Assay Kit (Mixed Linkage) • Only enzymatic kit available • Rapid reaction, stable reagents (> 2 years) and standard included Recognition: *AOAC Method 995.16; AACC Method 32-23.01; ICC Standard Method 166*	100 assays
Carbohydrate Substrates		
P-BGCFA ©℗	β-Glucan CFA Standard - 4 vials For use with CFA/Calcofluor β-glucan assay procedure. Recognition: *EBC 4.16.2*	100 mL

β-Glucan is hydrolysed by β-glucanase. An *endo*-acting enzyme, β-glucanase cuts internal linkages in the polysaccharide chain. β-Glucanase is also able to hydrolyse β-glucans bound to proteins, which cause precipitates and haze formation if left unaddressed.

β-Glucanase is primarily active during the malting stage: some is denatured at kilning, while the rest becomes inactive at temperatures close to starch gelatinisation. For this reason, exogenous β-glucanase is a common additive to mashes.



Measurement of β-Glucanase Activity

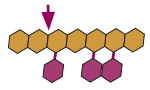
β-Glucanase activity in malt, wort or commercial enzyme preparations can be measured using the following products:

Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-MBG4 ©℗ Recommended	Malt β-Glucanase/Lichenase Assay Kit • Convenient, rapid reaction • Stable reagents (> 2 years) with standards included for malt flour and lichenase • Well suited to automation	100 assays 400 assays
K-MBGL ©℗	β-Glucanase Assay Kit (Malt & Microbial) • Rapid reaction • Stable reagents (> 2 years) and standard included	100 assays
Colourimetric Substrate Tablet Tests		
T-BGZ-200T T-BGZ-1000T ©℗	β-Glucazyme Contains highly specific insoluble substrate (AZCL-Barley β-glucan) in a convenient ready-to-use tablet formulation.	200 tablets 1000 tablets
Colourimetric Substrates		
I-AZBGL ©℗	AZCL-Barley β-Glucan High purity insoluble substrate for assay of malt β-glucanase, lichenase and cellulases.	3 g
Carbohydrate Substrates		
P-BGBM ©℗	β-Glucan (Barley: Medium Viscosity) For use with traditional reducing sugar or viscosity-based assays.	5 g

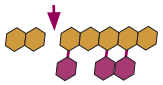
Arabinoxylan & Xylanase

Arabinoxylan is sometimes called pentosan and is the second most abundant polysaccharide in barley endosperm cell walls. It is also the primary component in wheat cell walls. Its structure contains two main sugars: arabinose and xylose. Where soluble arabinoxylans persist into the wort, they can cause high viscosity, poor filterability and formation of beer hazes.

Product Code	Product Name	Pack Size
K-ARGA	L-Arabinose/D-Galactose Assay Kit • Only enzymatic kit available • Rapid reaction, stable reagents (> 2 years) and standard included	115 assays 1150 assays 1150 assays
K-XYLOSE	D-Xylose Assay Kit • Only enzymatic kit available • Rapid reaction (~ 6 min), stable reagents (> 2 years) and standard included • *Mega-Calc*™ software tool available	100 assays 1000 assays 1300 assays



arabinoxylan



Xylanase activity

Main Hydrolase for Arabinoxylan: Xylanase

Arabinoxylan is hydrolysed by xylanase, which acts on the xylose part of the molecule. Although xylanase is able to liberate oligosaccharides from the longer chain, it is not able to cut branch points in the arabinoxylan molecule.

Xylanase is found at very low concentrations in barley malts, and becomes even scarcer by the time malts reach the mashing tun: like β-glucanase, xylanase exhibits poor thermostability, with a portion becoming deactivated during kilning.

Measurement of Xylanase Activity

Due to the potential consequences of residual arabinoxylans in the finished beverage, xylanase activity is an important parameter for brewers and distillers to measure - whether relying on endogenous xylanase or supplementing with exogenous enzymes. Xylanase activity can be measured in malts and commercial enzyme preparations using the following products:

Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-XylX6-2V ©Ⓟ Recommended	Xylanase Assay Kit (XylX6 method) • Completely specific for *endo*-xylanase • Stable reagents (> 4 years) and standard included • Well suited to automation	200 assays 400 assays
K-XYLS ©Ⓟ	Xylanase (Xylazyme AX) Assay Kit • Stable reagents (> 2 years) and standard included • Contains AZCL-arabinoxylan (wheat) in tablet form	200 assays
Colourimetric Substrate Tablet Tests		

KEY TO ICONS

Assay Format manual spectrophotometer · microplate · auto-analyser

Recommended by Megazyme

Enzyme Activity: Extract Purity © suitable for crude extract · Ⓟ suitable for purified extract

Xylanase & Cellulase

Product Code	Product Name	Pack Size
T-XAX-200T T-XAX-1000T ©℗	Xylazyme AX (60 mg)	200 tablets 1000 tablets
Colourimetric Substrates		
S-AWAXP ©℗	Azo-Wheat Arabinoxylan (powder) High purity soluble substrate for the assay of *endo*-1,4-β-D-xylanase in powder form.	3 g
S-AWAXL ©℗	Azo-Wheat Arabinoxylan (liquid) - 1% w/v High purity soluble substrate for the assay of *endo*-1,4-β-D-xylanase in liquid form.	100 mL

Cellulase

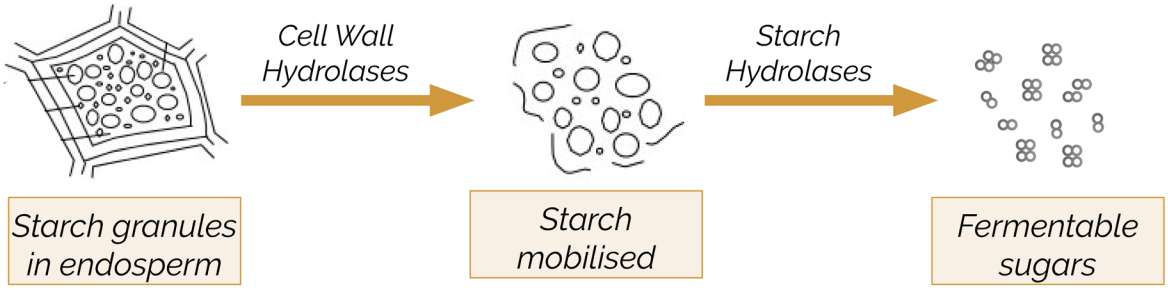
Cellulase is an *endo*-acting enzyme which hydrolyses the β-1,4 bonds found in both cellulose and β-glucan.

Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-CellG5-4V ©℗ Recommended	*endo*-Cellulase Assay Kit • Completely specific for cellulase (*endo*-1,4-β-glucanase) • Highly sensitive • Stable reagents (> 4 years) and standard included • Well suited to automation	120 assays 240 assays 480 assays
Colourimetric Substrate Tablet Tests		
T-CCZ-200T T-CCZ-1000T ©℗	Cellazyme C Highly specific insoluble substrate AZCL-HE-Cellulose) in a convenient ready-to-use 60 mg tablet formulation.	200 tablets 1000 tablets
T-CAF ©℗	Cellazyme AF Highly specific insoluble substrate (AZCL-HE-Cellulose) in a convenient ready-to-use 40 mg tablet formulation.	1000 tablets
T-CTZ-200T T-CTZ-1000T ©℗	Cellazyme T Highly specific insoluble substrate (AZCL-Xyloglucan) in a convenient ready-to-use tablet formulation.	200 tablets 1000 tablets
Colourimetric Substrates		
I-AZCEL ©℗	AZCL-HE-Cellulose Dyed and crosslinked cellulose for the assay of cellulase.	3 g

Starch Components

Like most cereals, barley contains starch as its primary storage polysaccharide. Starch must be released from within the barley endosperm, then broken down into smaller fragments in order to become useful for fermentation.

Once the cell wall has been broken down by enzymes like β-glucanase and xylanase, the starch hydrolases (another group of enzymes released by the grain during malting) are able to reach the starch molecules.



Each of the main starch hydrolases acts on different types of linkage within the starch chains, cutting the molecules into smaller fragments known as maltodextrins. The very smallest fragments are the fermentable sugars such as maltose and glucose.

Why does starch matter?

The abundance and activity of starch hydrolases has a direct impact on the fermentability of the later wort. Brewers and distillers who understand the enzyme content of their malts and mashes can exercise tighter control of their mashing and fermentation processes to ensure predictable production and consistent sensory characteristics with every batch.

KEY TO ICONS

Assay Format	manual spectrophotometer	microplate	auto-analyser
Recommended by Megazyme			
Enzyme Activity: Extract Purity	© suitable for crude extract	Ⓟ suitable for purified extract	

Starch Components

Total Starch

Using enzymatic methods, it is possible to determine the total starch (**K-TSHK**, **K-TSTA**) content in any sample. This is useful for brewers and distillers wishing to understand the potential fermentability of their malts and worts.

Product Code	Product Name	Assays per Kit
K-TSTA-100A	Total Starch (GOPOD Method) Assay Kit • Stable reagents (> 12 months) and standard included • *Mega-Calc*™ software tool available Recognition: *AOAC Method 996.11; AACC Method 76-13.01; ICC Standard No 168*	100
K-TSHK	Total Starch (Hexokinase Method) Assay Kit • Hexokinase utilisation allows for more user-friendly assay • Stable reagents (> 2 years) and standard included • *Mega-Calc*™ software tool available Recognition: *AOAC Method 996.11; AACC Method 76-13.01; ICC Standard No 168*	100

Starch Damage

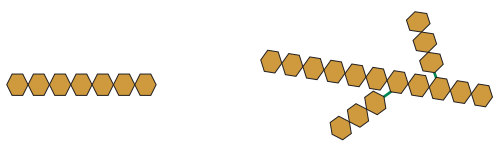
Measurement of starch damage from grain milling and processing allows brewers and distillers to assess the accessibility of starch to starch hydrolases.

Product Code	Product Name	Assays per Kit
K-SDAM	Starch Damage Assay Kit • Only enzymatic kit available • Highly specific • Stable reagents (> 2 years) and standard included • *Mega-Calc*™ software tool available Recognition: *AACC Method 76-31.01; ICC Standard No 164*	200

Amylose/Amylopectin

Cereal starches are composed of two types of polysaccharide chains: amylose and amylopectin.

Many of the starch properties relevant to maltsters are determined by the proportions of amylose and amylopectin present, for example gelatinisation, solubility, and mouthfeel of finished beverages.



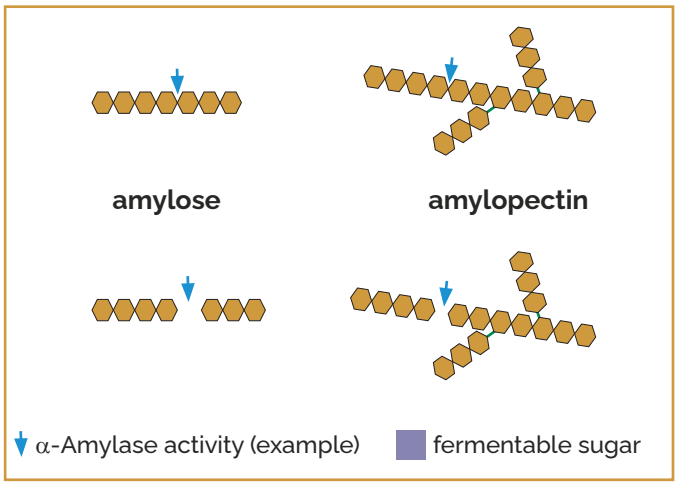
Product Code	Product Name	Assays per Kit
K-AMY	Amylose/Amylopectin Assay Kit Based on a Con A precipitation procedure. • Accurate and reliable ratio determination • Only enzymatic kit available • Stable reagents (> 12 months) and standard included	100

α-Amylase

α-Amylase is one of the three most important enzymes involved in starch hydrolysis, releasing fermentable sugars and maltodextrins from starch polysaccharide molecules. α-Amylase is an *endo*-acting enzyme which hydrolyses the α-1,4 bonds found in both amylose and amylopectin.

As the most thermostable of the starch hydrolases, α-amylase has a temperature optimum up to 70°C, which allows it to tolerate the temperatures involved in starch gelatinisation.

Around 90% of α-amylase persists through the mashing phase. The amount of α-amylase that survives after mashing is generally not the limiting factor in obtaining the maximal hydrolysis of starch for fermentation.



α-Amylase

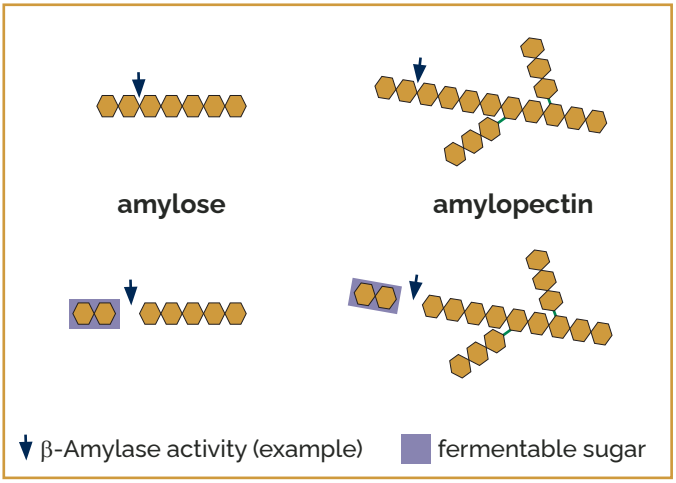
Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-AMYLSD ⓒⓟ	α-Amylase SD Assay Kit • Extremely high sensitivity (~ 2.4-fold increase over K-CERA) • Stable reagents (> 2 years) and standard included • Suitable for automation • *Mega-Calc*™ software tool available	160 assays 640 assays
K-CERA ⓒⓟ Recommended	α-Amylase Assay Kit (Ceralpha Method) • Highly specific • Stable reagents (> 2 years) and standard included • *Mega-Calc*™ software tool available Recognition: *AOAC 2002.01, AACC Method 22-02.01, ICC Standard No. 303*	100 assays
R-CAAR4 ⓒⓟ	α-Amylase Reagent (Ceralpha) Ceralpha reagent for the measurement of α-amylase.	200 assays
R-AMHR4 ⓒⓟ	α-Amylase HR Reagent (Ceralpha) Ceralpha reagent which incorporates thermostable α-glucosidase, allowing assays to be performed at temperatures up to 60°C and over the pH range 5.2-7.5.	200 assays
Colourimetric Substrate Tablet Tests		
T-AMZBG ⓒⓟ	Amylazyme BG for Cereal α-Amylase Contains highly specific insoluble substrate (AZCL-Amylose plus bacterial β-glucanase) in a convenient ready-to-use tablet formulation.	200 tablets
Colourimetric Substrates		
S-RSTAR ⓒⓟ	Red Starch Soluble, dyed starch substrate.	5 g
Carbohydrate Substrates		
P-BLDX-50G P-BLDX-10G ⓒⓟ	β-Limit Dextrin β-Limit-dextrin as a substrate for α-amylase for use with EBC Method 4.13	50 g 10 g
P-AMYL ⓒⓟ	Amylose (potato) For use with traditional reducing sugar or viscosity-based assays.	5 g

β-Amylase

Like α-amylase, β-amylase cuts α-1,4 linkages in starch chains. However, β-amylase is an exo-acting enzyme, which means that instead of randomly cutting internal linkages in starch, it cuts from the end of the chain only.

β-Amylase liberates fermentable maltose molecules, which account for ~ 65% of the fermentable sugar in wort. α-Amylase and β-amylase work synergistically during mashing as β-amylase generally acts on the starch fragments liberated by the initial hydrolytic action of α-amylase.

See the Megazyme website for full details on our range of ultra-pure β-amylases.



Product Code	Product Name	Pack Size
E-BARBP-2G	β-Amylase (Barley) Powder Recommended for use with EBC Method 4.13.	2 g
E-BARBL-50KU	β-Amylase (Barley) Liquid - 10,000 units/mL	50,000 U

Measurement of β-Amylase Activity

β-Amylase is the most abundant starch hydrolase present during malting, however it is significantly less thermostable than α-amylase. Just 40% of the initial β-amylase persists to continue liberating maltose at the end of mashing. Brewers therefore need to quantify the true activity of β-amylase: the presence of too little β-amylase has the potential to limit the fermentability of the resulting wort. This is a particular concern when brewing with adjuncts.

Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-BETA3 Ⓒ Ⓟ Recommended	β-Amylase Assay Kit (Betamyl-3 Method) • Only enzymatic kit available • Rapid reaction • Stable reagents (> 2 years) and standard included • *Mega-Calc*™ software tool available	100 assays
R-BAMR3 Ⓒ Ⓟ	β-Amylase Assay Reagent (Betamyl-3)	200 assays

KEY TO ICONS

Assay Format manual spectrophotometer · microplate · auto-analyser
Recommended by Megazyme
Enzyme Activity: Extract Purity Ⓒ suitable for crude extract · Ⓟ suitable for purified extract

Malt Amylase

Megazyme's malt amylase preparations contain ultra-pure enzymes at standard concentrations.

Product Code	Product Name	Pack Size
E-MAST	Malt Amylase Standard (α-amylase 950 U/mL, β-amylase 5,700 U/mL)	100 mL

Measurement of Malt Amylase Activity

Malt amylase activity can be measured in a single kit, incorporating our novel 'Ceralpha' and 'Betamyl-3' methods.

Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-MALTA Ⓒ Ⓟ	Malt Amylase Assay Kit This kit contains reagents for 50 assays each of α-amylase (Ceralpha method) and β-amylase (Betamyl-3 method).	100 assays

KEY TO ICONS

Assay Format — manual spectrophotometer; microplate; auto-analyser

Recommended by Megazyme

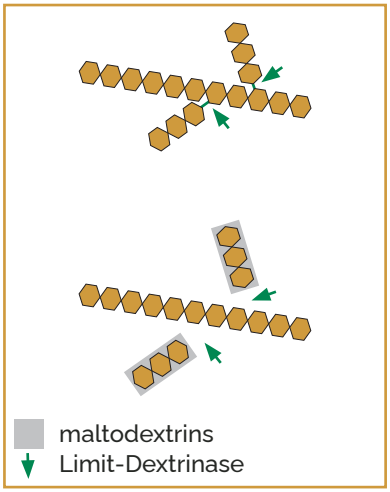
Enzyme Activity: Extract Purity — Ⓒ suitable for crude extract; Ⓟ suitable for purified extract

Limit-Dextrinase/Pullulanase

The most 'specialised' of the main starch hydrolases, limit-dextrinase is the only starch-degrading enzyme capable of cutting the branch points in amylopectin molecules. Branched maltodextrins cannot be fully hydrolysed by the other starch-degrading enzymes.

The activity of limit-dextrinase converts amylopectin chains into shorter, unbranched maltodextrins that can be further degraded by α-amylase and β-amylase, i.e. into fermentable sugars.

A further starch hydrolase called pullulanase has a similar pattern of activity to limit-dextrinase. This is an exogenous enzyme used to promote fermentability. Pullulanase is of particular interest to brewers producing 'light' beers with a lower calorific content.



Product Code	Product Name	Pack Size
E-PULKP	Pullulanase M1 (*Klebsiella planticola)*	700 U
E-PULBL	Pullulanase M2 (*Bacillus licheniformis)*	2,000 U

Measurement of Limit-Dextrinase/Pullulanase Activity

Limit-dextrinase is mainly produced during malting, albeit in much smaller quantities than α-amylase or β-amylase. Like β-amylase, limit-dextrinase is relatively heat-sensitive: ~ 40% of limit-dextrinases remains in mash after 60 minutes. Measurement of limit-dextrinase is of importance to brewers and distillers because careful control of limit-dextrinase (in particular among the starch hydrolases) is needed to ensure satisfactory wort fermentability. This is especially true for brewers using certain cereal adjuncts, e.g. rice in Asian beers.

Product Code	Product Name	Pack Size
Assay Kits and Reagents		
K-PullG6 ©℗ Recommended	Pullulanase/Limit-Dextrinase Assay Kit (PullG6 Method) • High sensitivity • No transglycosylation interference • Stable reagents (> 12 months) and standard included	100 assays
Colourimetric Substrate Tablet Tests		
T-LDZ-200T ©℗	Limit-Dextrizyme Tablets Contains highly specific insoluble substrate (AZCL-Pullulan) in a convenient ready-to-use tablet formulation.	200 tablets

Amyloglucosidase

Amyloglucosidase is commonly added as an exogenous enzyme by brewers manufacturing low-calorie beers. See the Megazyme website for full details on our range of ultra-pure and analytical grade amyloglucosidases.

Product Code	Product Name	Pack Size
E-AMGPU	Amyloglucosidase (*Rhizopus* sp.)	5,000 U
E-AMGDF-40ML E-AMGDF-100ML	Amyloglucosidase (*Aspergillus niger*)	130,400 U 326,000 U
E-AMGDF-A-100ML	Amyloglucosidase for use with ANKOM™ Dietary Fiber Analyzer	326,000 U
E-AMGDFPD	Amyloglucosidase (*Aspergillus niger*) Powder - 4g	144,000 U
E-AMGDFNG-20ML	Amyloglucosidase (*Aspergillus niger*) Glycerol Free	130,400 U

Measurement of Amyloglucosidase Activity

Product Code	Product Name	Pack Size
R-AMGR3	Amyloglucosidase Assay Reagent	200 assays

KEY TO ICONS

Assay Format manual spectrophotometer microplate auto-analyser

Recommended by Megazyme

Enzyme Activity: Extract Purity © suitable for crude extract (P) suitable for purified extract

Fermentable Sugars

The quantity of fermentable sugar released during malting and mashing relates directly to the amount of alcohol that can be produced from the wort during yeast fermentation. The main fermentable sugars are glucose, fructose, sucrose and maltose.

Why fermentable sugar matters

Too little fermentable sugar will result in low alcohol levels and altered mouthfeel, while too much sugar in the wort may not be entirely fermented, influencing the flavour of the final beverage.

Product Code	Product Name	Assays per Kit
K-GLUC	D-Glucose Assay Kit (GOPOD Format) • Stable reagents (> 12 months) • Standard included	660
K-GLUHK-110A K-GLUHK-220A	D-Glucose HK Assay Kit • Rapid reaction • Stable reagents (> 2 years) and extended cofactor stability • Standard included • *Mega-Calc*™ software tool available	110 1100 1000 220 2200 2000
K-FRUGL	D-Fructose/D-Glucose Assay Kit • Rapid reaction at either 25°C or 37°C • Stable reagents (> 2 years) and extended cofactors stability • Standard included • *Mega-Calc*™ software tool available	110 1100 1100
K-FRGLQR	D-Fructose/D-Glucose Assay Kit (Liquid Ready) • Optimised for auto-analyser/microplate: 'ready to use' liquid stable formulation • Rapid reaction (~ 13 min) • Stable reagents (> 2 years) ad standard included	1100 1100
K-SUFRG	Sucrose/D-Fructose/D-Glucose Assay Kit • Rapid reaction • Stable reagents (> 2 years) and standard included • *Mega-Calc*™ software tool available	300 (100 of each)
K-MASUG	Maltose/Sucrose/D-Glucose Assay Kit • Rapid reaction • Stable reagents (> 2 years) and extended cofactors stability • Stabilised D-glucose/D-fructose standard solution included • *Mega-Calc*™ software tool available	100 (34 of each)

Yeast Assimilable Nitrogen

Yeast Assimilable Nitrogen plays an important role in feeding yeast during fermentation. Proteins in the malting grain are broken down by protease enzymes to release amino acids, ammonium ions, and smaller peptides. There are two main components in yeast assimilable nitrogen:

1. Free Amino Nitrogen (FAN), also known as **'Primary Amino Nitrogen'**, and
2. Ammonia

Both components must be measured in order to understand the YAN content.

Why YAN matters

Too little YAN will result in poor yeast growth and sluggish fermentation. This is a particular risk for brewers using adjuncts, which tend to be nitrogen-deficient compared to barley.

Conversely, too much YAN will result in beer hazes, formation of by-products which affect flavour (e.g. diacetyl and higher alcohols), and promote the growth of spoilage organisms.

Product Code	Product Name	Assays per Kit
K-PANOPA	Primary Amino Nitrogen (PANOPA) Assay Kit • Stable reagents (> 2 years) • Standard included • *Mega-Calc*™ software tool available	100 1000 1100
K-AMIAR	Ammonia Assay Kit • Rapid reactions due to use of uninhibited glutamate dehydrogenase • Stable reagents (> 2 years) and extended cofactor stability • Standard included • *Mega-Calc*™ software tool available Recognition: MEBAK	96 960 960

KEY TO ICONS

Assay Format manual spectrophotometer | microplate | auto-analyser

Recommended by Megazyme

Enzyme Activity: Extract Purity Ⓒ suitable for crude extract | Ⓟ suitable for purified extract

Acetic Acid

Acetic acid is produced by yeasts as part of the normal fermentation process, but can be generated in larger quantities by acetobacteria during maturation, spoiling the flavour with a 'vinegar' note.

Product Code	Product Name	Assays per Kit
K-ACETRM	Acetic Acid Assay Kit (Acetate Kinase Manual Format) • Improved assay format (only two absorbance readings required) • Stable reagents (> 2 years) • *Mega-Calc*™ software tool available	72 720
K-ACETAK	Acetic Acid Assay Kit (Acetate Kinase Analyser Format) As K-ACETRM, with reagents optimised for auto-analyser use.	550
K-ACETGK	Acetic Acid GK Assay Kit (Analyser Format) • Rapid reaction (~ 5 min at 37°C) • Positive reaction (increase in absorbance) which offers a more robust assay • Excellent reagent stability (> 2 years)	500
K-ACET	Acetic Acid Assay Kit (ACS Manual Format) • No wasted ACS solution • Stable reagents (> 2 years) • *Mega-Calc*™ software tool available	53
K-ACETAF	Acetic Acid Assay Kit (ACS Analyser Format) As K-ACET, with reagents optimised for auto-analyser use.	456

At Megazyme, we understand that different laboratories have different priorities when selecting an assay format. The features of our five acetic acid options are summarised in the following table.

	K-ACETRM	K-ACETAK	K-ACETGK	K-ACET	K-ACETAF
Suitable for manual	✓	×	×	✓	×
Suitable for microplate	✓	×	×	×	×
Suitable for auto-analyser	×	✓	✓	×	✓
Biochemistry of assay	Acetate kinase			Acetyl-CoA synthetase	
Reaction time	~ 4 min	~ 10 min	~ 8 min at 25°C ~ 5 min at 37°C	~ 14 min	~ 15 min
Limit of detection	0.254 mg/L	~ 10 mg/L	~ 10 mg/L	0.14 mg/L	~ 10 mg/L
Method recognition				EN, ICUMSA, IFU, ISO, MEBAK	EN, ICUMSA, IFU, ISO, MEBAK
Shelf life	> 2 years	> 2 years	> 2 years	> 2 years	> 2 years
Assays per kit	72 / 720	550	500	53	456

Ethanol & Acetaldehyde

Ethanol

Ethanol is the primary product of yeast fermentation and a labelling requirement in many commercial markets.

Product Code	Product Name	Assays per Kit
K-ETOH	Ethanol Assay Kit • Aldehyde dehydrogenase supplied as stable suspension • Rapid reaction • Stable reagents (> 2 years) and extended cofactors stability • Standard included • *Mega-Calc*™ software tool available	60 600 600
K-ETOHLQR	Ethanol (Liquid Ready) Assay Kit • "Ready to use" liquid stable formulation • All reagents stable for > 12 months after preparation • Rapid reaction (~ 7 min) • Standard included • *Mega-Calc*™ software tool available	60 600 600

Acetaldehyde

Acetaldehyde can be produced during by yeast during fermentation or by acetobacteria during spirit maturation. Its negative effect on flavour and on chemical stability can be corrected by addition of sulphur dioxide.

Product Code	Product Name	Assays per Kit
K-ACHYD	Acetaldehyde Assay Kit • No wasted aldehyde dehydrogenase solution (stable suspension supplied) • Stable reagents (> 2 years) and extended cofactors stability • Standard included • *Mega-Calc*™ software tool available	50 500 500

KEY TO ICONS

Assay Format manual spectrophotometer · microplate · auto-analyser

Recommended by Megazyme

Enzyme Activity: Extract Purity © suitable for crude extract · (P) suitable for purified extract

Sulfites

Sulfites are added to neutralise oxidants in the finished beverage, maintaining the chemical stability of the beer or spirit until it reaches the consumer. At higher concentrations, sulfites contribute a 'burnt' flavour. Some consumers report sulfite sensitivity, and consequently manufacturers may need to state sulfite content on the product label.

Product Code	Product Name	Assays per Kit
K-SULPH	Total and Free Sulfite Assay Kit (Liquid Ready) • "Ready to use" liquid stable formulation • Rapid reaction • Stable reagents (> 18 months) and standard included • *Mega-Calc*™ software tool available	40 400 400 (40/400 of each)
K-TSULPH	Total Sulfite Assay Kit (Liquid Ready) • "Ready to use" liquid stable formulation • Rapid reaction • Stable reagents (> 18 months) and standard included • *Mega-Calc*™ software tool available	80 800 800
K-ETSULPH	Total Sulfite Assay Kit (Enzymatic) • Stable reagents (> 2 years) and standard included • Extended cofactors stability	50 500 588

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