

# $\alpha$ -Amylase CC\* FS\*\*

Diagnostic reagent for quantitative in vitro determination of  $\alpha$ -Amylase in serum, plasma or urine on photometric systems

## Order Information

Cat. No.	Kit size						
1 0501 99 10 021	R1	5 x	20 mL	+	R2	1 x	25 mL
1 0501 99 10 026	R1	5 x	80 mL	+	R2	1 x	100 mL
1 0501 99 10 023	R1	1 x	800 mL	+	R2	1 x	200 mL
1 0501 99 10 704	R1	8 x	50 mL	+	R2	8 x	12.5 mL
1 0501 99 10 917	R1	8 x	60 mL	+	R2	8 x	15 mL
1 0501 99 10 930	R1	4 x	20 mL	+	R2	2 x	10 mL
1 0501 99 90 314	R1	10 x	20 mL	+	R2	2 x	30 mL

## Summary [1,2]

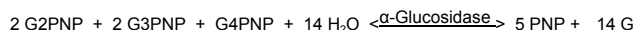
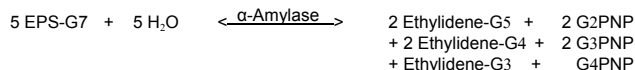
$\alpha$ -Amylases are hydrolytic enzymes which break down starch into maltose. In the human body  $\alpha$ -amylases originate from various organs: the pancreatic amylase is produced by the pancreas and released into the intestinal tract; the salivary amylase is synthesized in the salivary glands and secreted into saliva. The amylase present in the blood is eliminated through the kidney and excreted into the urine. Therefore, elevation of serum activity is reflected in a rise of urinary amylase activity.

Measurement of  $\alpha$ -amylase in serum and urine is mainly used for the diagnosis of pancreatic disorders as well as for detecting the development of complications. In acute pancreatitis the blood amylase activity increases within few hours after onset of abdominal pain, peaks after approx. 12 hours and returns to values within the reference range at the latest after 5 days. The specificity of  $\alpha$ -amylase for pancreatic disorders is not very high as elevated levels are measured also in various non-pancreatic diseases, e.g. parotitis and renal insufficiency. Therefore, for confirmation of an acute pancreatitis measurement of lipase should be additionally performed.

## Method

Enzymatic photometric test, in which the substrate 4,6-ethylidene-(G7)-p-nitrophenyl-(G1)- $\alpha$ -D-maltoheptaoside (EPS-G7) is cleaved by  $\alpha$ -amylases into various fragments. These are further hydrolyzed in a second step by  $\alpha$ -glucosidase producing glucose and p-nitrophenol. The increase in absorbance represents the total (pancreatic and salivary) amylase activity in the sample [3,4].

## Principle



(PNP = p-Nitrophenol, G =Glucose)

## Reagents

### Components and Concentrations

<b>R1:</b>	Good's buffer	pH 7.15	0.1 mol/L
	NaCl		62.5 mmol/L
	MgCl <sub>2</sub>		12.5 mmol/L
	$\alpha$ -Glucosidase		$\geq 2$ kU/L
<b>R2:</b>	Good's buffer	pH 7.15	0.1 mol/L
	EPS-G7		8.5 mmol/L

### Storage Instructions and Reagent Stability

The reagents are stable up to the end of the indicated month of expiry, if stored at 2 – 8°C, protected from light and contamination is avoided. Do not freeze the reagents!

## Warnings and Precautions

1. Saliva and skin contain  $\alpha$ -amylase therefore never pipette reagents by mouth and avoid skin contact with the reagents.
2. The reagents contain sodium azide (0.95 g/L) as preservative. Do not swallow! Avoid contact with skin and mucous membranes.
3. Reagent 1 contains biological material. Handle the product as potentially infectious according to universal precautions and good clinical laboratory practices.
4. In very rare cases, samples of patients with gammopathy might give falsified results [8].
5. Please refer to the safety data sheets and take the necessary precautions for the use of laboratory reagents. For diagnostic purposes, the results should always be assessed with the patients' medical history, clinical examinations and other findings.
6. For professional use only!

## Waste Management

Please refer to local legal requirements.

## Reagent Preparation

### Substrate Start

The reagents are ready to use.

### Sample Start

Mix 4 parts of R1 + 1 part of R2

(e.g. 20 mL R1 + 5 mL R2) = monoreagent

Stability: 6 months at 2 – 8°C  
4 weeks at 15 – 25°C

The monoreagent must be protected from light!

## Materials required but not provided

NaCl solution 9 g/L

General laboratory equipment

## Specimen

Serum, heparin plasma or EDTA plasma, urine

Stability in serum or plasma [5]:

7 days at 20 – 25°C

7 days at 4 – 8°C

1 year at –20°C

Stability in urine [5]:

2 days at 20 – 25°C

10 days at 4 – 8°C

3 weeks at –20°C

Only freeze once! Discard contaminated specimens!

## Assay Procedure

Application sheets for automated systems are available on request.

Wavelength	Hg 405 nm
Optical path	1 cm
Temperature	37°C
Measurement	Against reagent blank

### Substrate Start

	Serum/ Plasma		Urine	
	Blank	Sample	Blank	Sample
<b>Sample/Calibrator</b>	-	20 $\mu$ L	-	10 $\mu$ L
<b>Dist. water</b>	20 $\mu$ L	-	10 $\mu$ L	-
<b>Reagent 1</b>	1000 $\mu$ L	1000 $\mu$ L	1000 $\mu$ L	1000 $\mu$ L
Mix, incubate for approx. 1 min., then add:				
<b>Reagent 2</b>	250 $\mu$ L	250 $\mu$ L	250 $\mu$ L	250 $\mu$ L
Mix, read absorbance (A1) after 2 min. and start stopwatch. Read absorbance (A2) again after 1, 2 and 3 min.				

**Sample Start**

	Serum/Plasma		Urine	
	Blank	Sample	Blank	Sample
Sample/Calibrator	-	20 µL	-	10 µL
Dist. water	20 µL	-	10 µL	-
Monoreagent	1000 µL	1000 µL	1000 µL	1000 µL

Mix, read absorbance (A1) after 2 min. and start stopwatch. Read absorbance (A2) again after 1, 2 and 3 min.

**Calculation****With factor**

From absorbance readings calculate  $\Delta A/\text{min}$  and multiply by the corresponding factor from table below:

$$\Delta A/\text{min} \times \text{factor} = \text{Amylase activity [U/L]}$$

Serum/Plasma	Substrate Start	Sample Start
Urine	5670	4554
	11250	9018

**With calibrator**

$$\alpha\text{-Amylase [U/L]} = \frac{\Delta A/\text{min Sample}}{\Delta A/\text{min Calibrator}} \times \text{Conc. Calibrator [U/L]}$$

**Calculation factor**

$$\alpha\text{-Amylase [U/L]} \times 0.0167 = \alpha\text{-Amylase [\mu\text{kat/L}]}$$

**Calibrators and Controls**

For the calibration of automated photometric systems the DiaSys TruCal U calibrator is recommended. This method has been standardized against the original IFCC [International Federation of Clinical Chemistry and Laboratory Medicine] formulation from 1998. For internal quality control DiaSys TruLab N and P or TruLab Urine controls should be assayed. Each laboratory should establish corrective action in case of deviations in control recovery.

	Cat.-No.	Kit size
TruCal U	5 9100 99 10 063	20 x 3 mL
	5 9100 99 10 064	6 x 3 mL
TruLab N	5 9000 99 10 062	20 x 5 mL
	5 9000 99 10 061	6 x 5 mL
TruLab P	5 9050 99 10 062	20 x 5 mL
	5 9050 99 10 061	6 x 5 mL
TruLab Urine Level 1	5 9170 99 10 062	20 x 5 mL
	5 9170 99 10 061	6 x 5 mL
TruLab Urine Level 2	5 9180 99 10 062	20 x 5 mL
	5 9180 99 10 061	6 x 5 mL

**Performance Characteristics****Measuring range**

On automated systems the test is suitable for the determination of  $\alpha$ -Amylase activities up to 2000 U/L.

In case of a manual procedure, the test is suitable for  $\alpha$ -Amylase activities which correspond to a maximum of  $\Delta A/\text{min}$  of 0.35.

If such values are exceeded the samples should be diluted 1 + 9 with NaCl solution (9 g/L) and results multiplied by 10.

**Specificity/Interferences**

No interference was observed by ascorbic acid up to 30 mg/dL, bilirubin up to 40 mg/dL, by hemoglobin up to 550 mg/dL and lipemia up to 1000 mg/dL triglycerides. For further information on interfering substances refer to Young DS [7].

**Sensitivity/Limit of Detection**

The lower limit of detection is 3 U/L.

**Precision**

Intra-assay precision n = 20	Mean [U/L]	SD [U/L]	CV [%]
Sample 1	184	2.00	1.08
Sample 2	398	2.67	0.67
Sample 3	841	4.96	0.59

Inter-assay precision n = 20	Mean [U/L]	SD [U/L]	CV [%]
Sample 1	180	1.82	1.01
Sample 2	383	3.74	0.97
Sample 3	817	7.48	0.92

**Method Comparison**

A comparison of DiaSys  $\alpha$ -Amylase CC FS (y) with the recommended routine method [5] (x) using 51 samples gave following results:  
 $y = 0.964 x - 2.455 \text{ U/L}$ ;  $r = 0.998$

A comparison of DiaSys  $\alpha$ -Amylase CC FS (y) with a commercially available test (x) using 51 samples gave following results:  
 $y = 1.031 x - 3.613 \text{ U/L}$ ;  $r = 0.994$

**Reference Range [6]**

	Women	Men
Serum/plasma	< 100 U/L	< 100 U/L
	(< 1.67 $\mu\text{kat/L}$ )	(< 1.67 $\mu\text{kat/L}$ )
Urine	< 447 U/L	< 491 U/L
	(< 7.45 $\mu\text{kat/L}$ )	(< 8.18 $\mu\text{kat/L}$ )

Each laboratory should check if the reference ranges are transferable to its own patient population and determine own reference ranges if necessary.

**Literature**

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**Manufacturer**

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