

# Certificate of Analysis

**Client:****Cellgenic**

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## Amino acid sequence

Gly-His-Lys

## Sample Identification





**Sample Name** GHK-Cu 10 mg **Batch Number** 968552 **Date Published** 6-DEC-2027

## Results for 968552 GHK-CU

Analysis of Peptide Identity, Content and Purity	Result	Unit	Uncertainty	Reporting Limit
GHK-Cu Assay Peptide Screening	10.08	mg	[± 0.06]	
GHK-Cu Identification by RT Peptide Screening	0.998		[± 0.010]	
GHK-Cu Identification by spectrum Peptide Screening	998		[± 10]	
GHK-Cu Purity Peptide Screening	> 99.8	%		

Bioburden	Result	Unit	Uncertainty	Reporting Limit	
Total Aerobic Microbial Count USP <61> Plate Count Method	Not detected	CFU/g		>= 1000	⚠
Total Yeast and Mold Count USP <61> Plate Count Method	Not detected	CFU/g		>= 100	⚠

Endotoxin Analysis	Result	Unit	Uncertainty	Reporting Limit	
Bacterial Endotoxin USP<85> Bacterial Endotoxin	< 0.001	EU/mg		> 0.5	⚠

<b>Heavy Metals</b>	<b>Result</b>	<b>Unit</b>	<b>Uncertainty</b>	<b>Reporting Limit</b>	
Arsenic Elemental Impurities Screening	Not detected	<i>ppm</i>		$\geq 1.5$	
Cadmium Elemental Impurities Screening	Not detected	<i>ppm</i>		$\geq 0.5$	
Cobalt Elemental Impurities Screening	Not detected	<i>ppm</i>		$\geq 25$	
Lead Elemental Impurities Screening	Not detected	<i>ppm</i>		$\geq 1.5$	

Heavy Metals	Result	Unit	Uncertainty	Reporting Limit	
Nickel Elemental Impurities Screening	Not detected	ppm		>= 25	⚠
Quicksilver Elemental Impurities Screening	Not detected	ppm		>= 1.5	⚠
Vanadium Elemental Impurities Screening	Not detected	ppm		>= 25	⚠

## Method Specification

### Determination of identity, content and purity of GHK-Cu

#### 1. Content Assessment

##### 1.1. Instrumentation

Module	Name	Serial Number
System Controller	Shimadzu SCL-10ADvp	C21014112659
Degassing Unit	Shimadzu DGU-14A	NA
Pump A	Shimadzu LC-10ADvp	C20964130075
Pump B	Shimadzu LC-10ADvp	C20953770781
Autosampler	Shimadzu SIL-10ADvp	C21054109114
Column Thermostat	Shimadzu CTO-10ACvp	C21033770144
Detector	Shimadzu SPD-10ADvp	C20994233588

##### 1.2. Chromatographic conditions

- Eluent A: 0.1% TFA in Water (HPLC, Gradient Grade)
- Eluent B: 0.1% TFA in Acetonitrile (HPLC, Gradient Grade)
- Flow rate: 0.4 mL/min
- Program: Gradient elution
- Injection volume: 0.5 µL
- Column Temperature: 60°C
- Column: Phenomenex Biozen Peptide Polar C18, 150 × 2.1 mm, 3 µm
- Detection wavelength: 214 nm

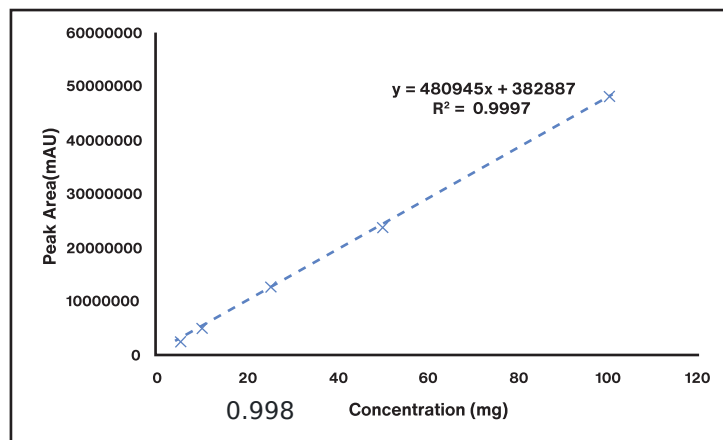
Gradient Program		
Time (min)	A (%)	B (%)
2	100	0
15	75	25
18	75	25
20	100	0
25	end	

### 1.3. Sample preparation

Whole amount of container was dissolved in 2ml of water (HPLC, Gradient Grade). Aliquote part of mL was dispensed into HPLC vial for analysis.

### 1.4. Calibration curve

Calibration curve detail Name	
Quantative method	External Standard
Calibration Type	Linear
Number of calibration points	5
Force through Zero	Disabled
Weighting Method	None



## 2. Purity assessment

### 2.1. Instrumentation

- System Controller: Shimadzu SCL-10ADvp – Serial Number: C21014112659
- Degassing Unit: Shimadzu DGU-14A – Serial Number: NA
- Pump A: Shimadzu LC-10ADvp – Serial Number: C20964130075
- Pump B: Shimadzu LC-10ADvp – Serial Number: C20953770781
- Autosampler: Shimadzu SIL-10ADvp – Serial Number: C21054109114
- Column Thermostat: Shimadzu CTO-10ACvp – Serial Number: C21033770144
- Detector: Shimadzu SPD-10ADvp – Serial Number: C20994233588

## 2.2. Chromatographic conditions

- Eluent A: 0.1% TFA in Water (HPLC, Gradient Grade)
- Eluent B: 0.1% TFA in Acetonitrile (HPLC, Gradient Grade)
- Flow rate: 0.4 mL/min
- Program: Gradient elution
- Injection volume: 0.5  $\mu$ L
- Column Temperature: 60°C
- Column: Phenomenex Biozen Peptide Polar C18, 150  $\times$  2.1 mm, 3  $\mu$ m
- Detection wavelength: 214 nm

### Gradient Program

- 2 min – A: 100% / B: 0%
- 15 min – A: 75% / B: 25%
- 18 min – A: 75% / B: 25%
- 20 min – A: 100% / B: 0%
- 25 min – end

## 1.5. Sample preparation

Whole amount of container was dissolved in 2 mL of water (HPLC, Gradient Grade). Aliquote part of 1 mL was dispensed into HPLC vial for analysis.

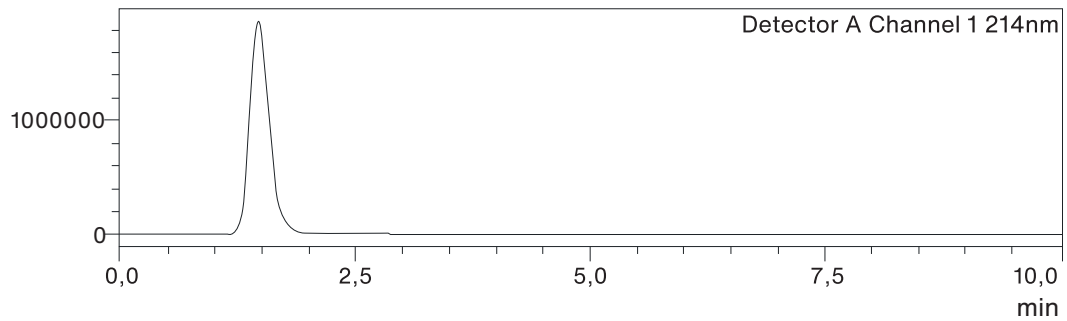
## 1.6. Purity assesment

Purity of compound assessed by area normalization method, comparing area of each peak to sum of area of all peaks detected at wavelength of 214 nm.

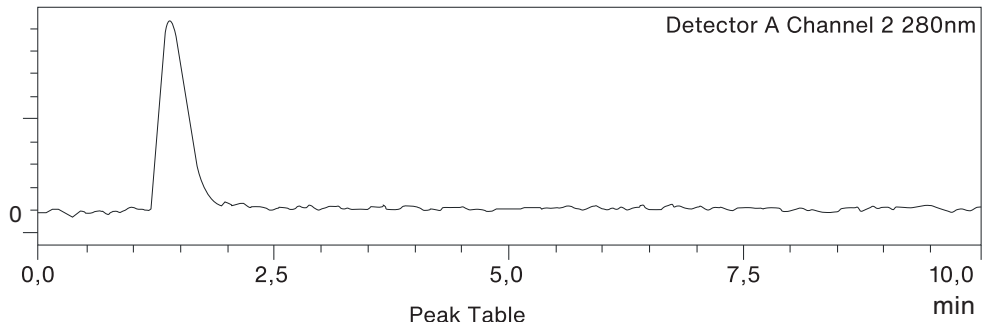
## Sample Information

Injection Volume : 0.5  
 Data File : LYO-0138-P01\_\_007.lcd  
 Method File : Peptide screening\_V10\_Polar.lcm  
 Date Acquired : 07.10.2025 20:10:39

uV



uV



Peak Table

Detector A Channel 1 214nm

Peak#	Name	Ret. Time	Conc.	Unit	Area%
1	GHK-Cu	1,458	50,441	mg/L	100,000
Total					100,000

Detector A Channel 2 280nm Peak Table

Peak#	Name	Ret. Time	Conc.	Unit
Total				

### Determination of bioburden of lyophilized samples

#### 1. Instrumentation and chemicals

##### 1.1. Instruments used

- Sterile Syringe 2 mL Luer
- Sterile needles
- Ready made PCA Plate ROTI Aquatest
- Ready made Sab4 Plate ROTI Aquatest

##### 1.2. Chemicals

Sterile physiological solution (0.9% NaCl)

#### 2. Sample preparation and inoculation

##### 2.1. Sample preparation

1. Fresh sterile needle and syringe was used for measuring exactly 2 mL of sterile physiological solution.
2. Needle was changed and by new needle rubber top of peptide container was penetrated and 2 mL of sterile physiological solution was dispensed.
3. Content of container was completely dissolved and left for 5 minutes to settle potentially created bubbles.
4. This procedure is repeated for two vials.

##### 2.2. Total Aerobic microbial count inoculation and cultivation

1. By sterile needle 1 mL of solution was filled into the sterile syringe.
2. Needle was placed above the flame for few seconds to sterilize.
3. Consequently 1 mL of solution was poured into the ready to use sterile petri dish filled with PCA agar and petri dish was closed.
4. Proces was repeated for two petri dishes.
5. With sterile needle, 1 mL of sterile physiological solution was filled into the sterile needle and was inoculated onto one sterile petri dish filled with PCA agar as negative control sample.
6. Samples and negative control sample were placed in incubator at temperature 37°C for 120 h.

### 2.3. Total Yeast and Mold count inoculation and cultivation

1. By sterile needle 1 mL of solution was filled into the sterile syringe.
2. Needle was placed above the flame for few seconds to sterilize.
3. Consequently 1 mL of solution was poured into the ready to use sterile petri dish filled with Sab4 agar and petri dish was closed.
4. Proces was repeated for two petri dishes.
5. With sterile needle, 1 mL of sterile physiological solution was filled into the sterile needle and was inoculated onto one sterile petri dish filled with Sab4 agar as negative control sample.
6. Samples and negative control sample were placed in incubator at temperature 25°C for 72 h.

### 3. Evaluation of results

After incubation time, colonies are counted as cfu (colonies forming units) and result per 1 g of sample is determined as:

$$CFU_{avg} = \frac{\sum CFU_n}{n}$$

- CFUavg = average CFU counted form n inoculations
- CFUn = CFU counted per inoculation
- n = number of inoculations

$$CFU_{per\ gram} = \frac{CFU_{avg} * DF}{m_s}$$

- CFUavg = Average CFU counted from n inoculations
- $m_s$  = mass of sample (mg)
- DF = Dilution factor

If negative control sample is evaluated as positive, process have to be repeated due to possible contamination in the process of inoculation or incubation.

### Determination of bioburden of lyophilized samples

#### 1. Chromogenic LAL Assay Determination of Bacterial Endotoxin content of sample

##### 1.1. Instrumentation

- Pipette set 1–1000 µL
- Thermostatically controlled water bath
- UV VIS spectrometer (Shimadzu UV-1601)
- GenScript ToxinSensor Chromogenic LAL Endotoxin Assay kit

##### 1.2. Chemicals

- LAL Reagent water (endotoxin free)
- Limulus Amoebocyte Lysate
- LAL Substrate
- Color Stabilizer #1
- Color Stabilizer #2
- Color Stabilizer #3
- 35% HCl (p.a.)
- GenScript ToxinSensor Chromogenic LAL Endotoxin Assay kit

##### 1.3. Sample preparation

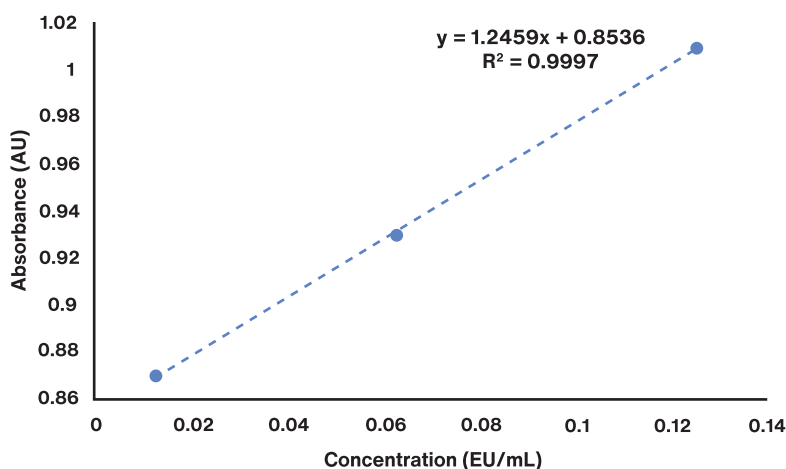
1. Sample container was weighed prior to dissolution and measured weight was marked.
2. Sample was completely dissolved in its container by 2 mL of LAL Reagent water.
3. 100 µL of the sample was aliquoted for analysis.
4. After analysis container was emptied and dried.
5. Dry mass of container was measured and exact weight of dissolved content was determined as:

$$M_{dc} = M_{sample} - M_{container}$$

## 1.4. Measurement procedure

	Standards	Samples	Blank
Standards (mL)	0.1	-	-
Samples (mL)	-	0.1	-
LAL Reagent Water (mL)	-	-	0.1
LAL Solution (mL)	0.1	0.1	0.1
Mix well and incubate at 37°C for 27 min			
Substrate solution (mL)	0.1	0.1	0.1
Mix well and incubate at 37°C for 6 min			
Color Stabilizer #1 solution	0.5	0.5	0.5
Color Stabilizer #2 solution	0.5	0.5	0.5
Color Stabilizer #3 solution	0.5	0.5	0.5
Mix well and read the absorbance at 545 nm			

## 1.5. Calibration curve



## 1.6. Calculation of endotoxin content

Endotoxin content of the sample was calculated from the calibration curve as:

$$Endotox \left[ \frac{EU}{mg} \right] = \left( \frac{ABS_{sample}}{S_{calib}} \right) \times \frac{20}{m_{sample}}$$

$ABS_{sample}$  = Measured absorbance of sample

$S_{calib}$  = Slope of calibration curve

$m_{sample}$  = real measured mass of sample

20 = dilution factor of measured sample

Analysis results relate only to the samples tested.

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