

Glutamine Synthetase

Microplate Assay Kit

Cat #: orb390727 (manual)

Detection and Quantification of Glutamine Synthetase (GS) Activity in Tissue extracts, Cell lysate Samples.

For research use only. Not for diagnostic or therapeutic procedures.

INTRODUCTION

Glutamine Synthetase (GS) is mainly present in plants, is one of the key enzyme in vivo assimilation of ammonia. GS can catalyze ammonium ions and glutamic acid to synthesise glutamine Gln, not only can prevent excessive biological toxic ammonium ions, but also glutamine Gln is the main storage and transport in the form of ammonia.

In the presence of ATP and Mg^{2+} , GS can catalyze ammonium ions and glutamic acid to synthesise glutamine Gln; glutamine Gln further converted to gamma-glutamyl hydroxamic acid, under acidic conditions to form a red iron complexes; the complex has a maximum absorption peak at 540nm.

KIT COMPONENTS

Component	Volume	Storage
96-Well Microplate	1 plate	
Assay Buffer	30 ml x 4	4 °C
Reaction Buffer	8 ml x 1	4 °C
Substrate	Powder x 1	-20 °C
Dye Reagent	5 ml x 1	4 °C
Standard	Powder x 1	4 °C
Plate Adhesive Strips	3 Strips	
Technical Manual	1 Manual	

Note:

Substrate: add 3.5 ml distilled water into the bottle to dissolve it absolutely before use, store at 4 °C.

Standard: add 1 ml distilled water into the tube to dissolve before use, then add 0.25 ml into 0.75 ml distilled water, mix, the concentration will be 5 mmol/L; store at 4 °C.

MATERIALS REQUIRED BUT NOT PROVIDED

1. Microplate reader to read absorbance at 540 nm
2. Distilled water
3. Pipettor, multi-channel pipettor
4. Pipette tips
5. Mortar
6. Ice
7. Centrifuge
8. Timer

SAMPLE PREPARATION

1. For cell and bacteria samples

Collect cell or bacteria into centrifuge tube, discard the supernatant after centrifugation, add 1 ml Assay buffer for 5×10^6 cell or bacteria, sonicate (with power 20%, sonicate 3s, interval 10s, repeat 30 times); centrifuged at 8000g 4 °C for 10 minutes, take the supernatant into a new centrifuge tube and keep it on ice for detection.

2. For tissue samples

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Weigh out 0.1 g tissue, homogenize with 1 ml Assay buffer on ice, centrifuged at 8000g 4 °C for 10 minutes, take the supernatant into a new centrifuge tube and keep it on ice for detection.

3. For liquid samples

Detect directly.

ASSAY PROCEDURE

Add following reagents into the microplate:

Reagent	Sample	Control	Standard	Blank
Reaction Buffer	80 μ l	80 μ l	--	--
Substrate	35 μ l	35 μ l	--	--
Distilled water	--	35 μ l	--	--
Sample	35 μ l	--	--	--
Mix, put it in the oven, 37 °C for 30 minutes.				
Standard	--	--	150 μ l	--
Distilled water	--	--	--	150 μ l
Dye Reagent	50 μ l	50 μ l	50 μ l	50 μ l
Mix, record absorbance measured at 540 nm.				

Note:

- 1) Perform 2-fold serial dilutions of the top standards to make the standard curve.
- 2) For unknown samples, we recommend doing a pilot experiment & testing several doses to ensure the readings are within the standard curve range. If the enzyme activity is lower, please add more sample into the reaction system; or increase the reaction time; if the enzyme activity is higher, please dilute the sample, or decrease the reaction time.

CALCULATION

Unit Definition: one unit is defined as the enzyme products 1 nmol of the gamma-glutamyl hydroxamic acid per minute.

1. According to the protein concentration of sample

$$\begin{aligned} \text{GS (U/mg)} &= (C_{\text{Standard}} \times V_{\text{Standard}}) \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / (V_{\text{Sample}} \times C_{\text{Protein}}) / T \\ &= 714.3 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / C_{\text{Protein}} \end{aligned}$$

2. According to the weight of sample

$$\begin{aligned} \text{GS (U/g)} &= (C_{\text{Standard}} \times V_{\text{Standard}}) \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / (V_{\text{Sample}} \times W / V_{\text{Assay}}) / T \\ &= 714.3 \times (\text{OD}_{\text{Sample}} - \text{OD}_{\text{Control}}) / (\text{OD}_{\text{Standard}} - \text{OD}_{\text{Blank}}) / W \end{aligned}$$

C_{Standard} : the standard concentration, 5 mmol/L = 5000 nmol/ml;

C_{Protein} : the protein concentration, mg/ml;

W: the weight of sample, g;

V_{Standard} : the volume of standard, 0.15 ml;

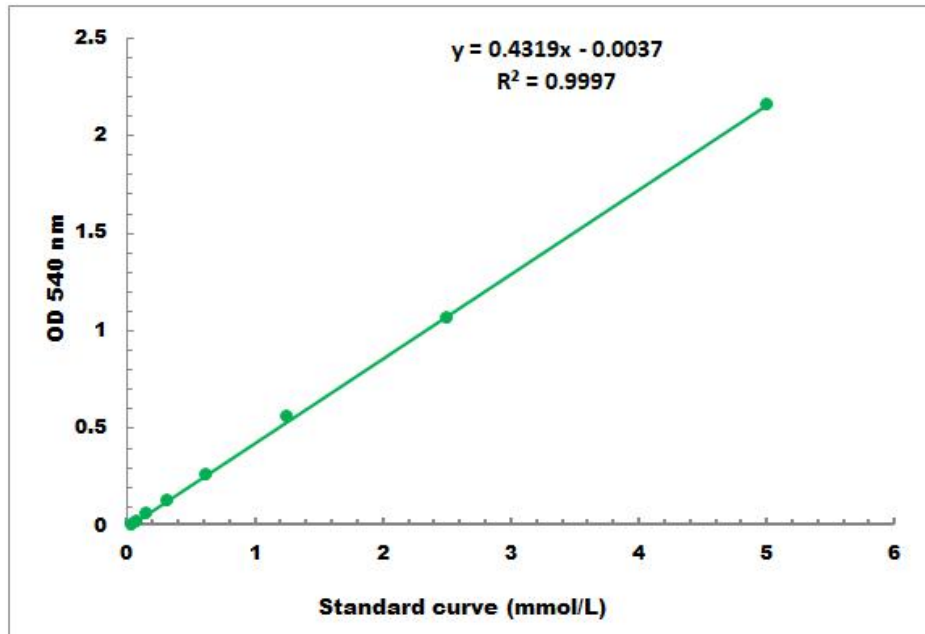
V_{Sample} : the volume of sample, 0.035 ml;

V_{Assay} : the volume of Assay buffer, 1 ml;

T: the reaction time, 30 minutes.

TYPICAL DATA

The standard curve is for demonstration only. A standard curve must be run with each assay.



Detection Range: 0.05 mmol/L - 5 mmol/L