Industrial Glutamine Analysis

A simple and rapid enzymatic analysis for L-glutamine and ammonia in a variety of biological fluids, e.g. for the monitoring and control of culture media and fermentation processes in biotechnology.

Bulletin Reference	TB – Glutamine – Industrial – GMRD-151 – V.01
Order Code(s)	GMRD-151
Reagent Kit Size(s)	100 ml (140 analyser cycles)
Instruments	All GM8 series analysers
Samples	Aqueous solutions (pH 5 - 7), culture fluid, etc.
Sample Volume	25 µl
Analysis Time	20 seconds (from injection)
Working Range	0.5 - 20 mmol/L
Reagent Stability	Shelf-life unopened: 9 months stored at 0 - 5°C. Shelf-life reconstituted: GLDH/NADH/α-ketoglutarate, 7 - 10 days stored at 0 - 5°C; POD reagent 5-6 weeks at 0 - 5°C.
Note	2 vials of enzyme reagent are provided to maximise kit life. Sample opacity or turbidity presents no problem since the detection method is electrochemical rather than spectrophotometric.

Principle

i) L-glutamine is converted to ammonia and L-Glutamate by the enzyme glutaminase (GLU) in a brief pre-reaction,

$$\text{L-Glutamine} + H_2O \xrightarrow{\textit{Glutaminase (GLU)}} \text{Ammonia} + \text{L-Glutamate}$$

ii) Ammonia, either endogenous or liberated in the above reaction, forms L-glutamate with α-ketoglutarate in the presence of glutamate dehydrogenase (GLDH) and excess NADH,

$$\text{Ammonia} + \alpha\text{-ketoglutarate} \xrightleftharpoons{\textit{Glutamate Dehydrogenase (GLDH)/NADH}} \text{L-Glutamate} + NAD^+$$

$$NADH + H^+ + \tfrac{1}{2}O_2 \xrightarrow{\textit{Peroxidase (POD)}} NAD^+ + H_2O$$

iii) Under the conditions of the assay, the rate of oxidation of excess NADH by peroxidase (POD) is inversely proportional to the total ammonia present.