

## Urea/BUN – Liquizyme (UV)

REF: 319 001	(3 x 50 ml)	150 test
REF: 319 002	(3 x 90 ml)	270 test
REF: 319 003	(4 x 100 ml)	400 test
REF: 319 004	(4 x 50 ml)	200 test
REF: 319 005	(8 x 50 ml)	400 test

### Intended Use

Spectrum liquizyme urea reagent is intended for the in-vitro quantitative, diagnostic determination of urea in human serum or urine on both automated and manual applications.

### Background

Urea is the major product of protein nitrogen metabolism. It is synthesized by the urea cycle in the liver and excreted through the kidneys. The circulating levels of urea depend upon protein intake, protein catabolism and kidney function. Elevated urea levels can occur due to renal impairment or in some diseases such as diabetes, infection, congestive heart failure and during different liver diseases. Determination of blood urea nitrogen is the most widely used screening test for renal function together with serum creatinine.

### Method

urease-UV fixed rate (enzymatic method).

### Assay Principle

The series of reactions involved in the assay are as follows :

1. Urea is hydrolyzed in the presence of water and urease to produce ammonia and carbon dioxide.



2. In the presence of glutamate dehydrogenase (GLDH) and reduced nicotinamide adenine dinucleotide (NADH), the ammonia combines with  $\alpha$ -ketoglutarate ( $\alpha$ -KG) to produce L-glutamate.



The rate decrease in the NADH concentration is directly proportional to the urea concentration in the specimen. It is determined by measuring the absorbance at 340 nm.

### Reagents

#### Standard urea (ST)

BUN	50	mg/dL
Urea	107	mg/dL

#### Reagent 1 (R1 Buffer)

Tris Buffer ( pH 8.5)	50	mmol/L
$\alpha$ -Ketoglutarate	10	mmol/L
GLDH	8.0	K U/L
Urease	5.0	K U/L
Sodium azide	8.0	mmol/L

#### Reagent 2 (R2 Starter)

NADH	>0.20	mmol/L
Sodium azide	8	mmol/L

For further information, refer to the Urea/Bun reagent material safety data sheet.

### Reagent Preparation

Prepare working solution as following:

REF: 319 001 : add 5 ml from R2 to one bottle of R1; mix gently  
 REF: 319 002 : add one bottle from R2 to one bottle of R1 ; mix gently  
 REF: 319 003 : add one bottle from R2 to one bottle of R1 ; mix gently  
 REF: 319 004 : add 5 ml from R2 to one bottle of R1; mix gently  
 REF: 319 005 : add 5 ml from R2 to one bottle of R1; mix gently

Or prepare the working solution according to the number of tests required by mixing 9 volumes of reagent 1 (R1) and 1 volume of reagent 2 (R2) eg. 900  $\mu$ l R1 +100  $\mu$ l R2.

### SYMBOLS IN PRODUCT LABELLING

	Authorised Representative		Use by/Expiration Date
	For in-vitro diagnostic use		CAUTION. Consult instructions for use
	Batch Code/Lot number		Manufactured by
	Catalogue Number		(Xi) - Irritant
	Consult instructions for use		
	Temperature Limitation		

### Precautions and Warnings

Do not ingest or inhale. In case of contact with eyes or skin; rinse immediately with plenty of soap and water. In case of severe injuries; seek medical advice immediately.

Both reagents (R1) and (R2) contain sodium azide which may react with copper or lead plumbing.

### Reagent Storage and Stability

All reagents are stable until expiration date stated on label when stored refrigerated at 2 – 8 °C.

Working solution is stable for 1 month at 2 – 8 °C or 8 days at 15 – 25 °C.

Once opened, the reagent vial and standard are stable for 3 months at the specified temperature if contamination is avoided.

### Deterioration

Do not use liquizyme BUN reagent if it is turbid or if the absorbance of the working reagent is less than 1.0 at 340 nm. Failure to recover control values within the assigned range may be an indication of reagent deterioration.

### Specimen Collection and Preservation

No special preparation of the patient is required. Use nonhemolyzed serum or plasma only. The only acceptable anticoagulants are heparin, EDTA and fluoride. Do not use ammonium heparin plasma.

**Stability:** 7 days at 15 –25 °C ; 7 days at 2 – 8 °C;  
 1 year at -20 °C

Urine samples are prediluted 1 : 50 with ammonium free water prior to assay.

**Stability:** 2 days at 15 – 25 °C ; 7 days at 2 – 8 °C;  
 1 month at -20 °C

### System Parameters

Wavelength	340 nm
Optical path	1 cm
Assay type	Fixed Rate
Direction	Decrease
Sample : Reagent Ratio	1 : 100
e.g.: Reagent volume	1 ml
Sample volume	10 $\mu$ l
First read time	30 seconds
Delay time	60 seconds
Last read time	90 seconds
Temperature	37 °C
Zero adjustment	Against Air
Reagent Blank Limits	Low 1.00 AU High 2.0 AU
Sensitivity	0.9 mg/dL (0.15 mmol/L)
Linearity	200 mg/dL (33.2 mmol/L)

### Procedure

	Standard	Specimen
Working solution	1 ml	1 ml
Standard	10 $\mu$ l	-----
Specimen	-----	10 $\mu$ l

Mix, and after 30 seconds read the absorbance A1 of the standard or specimen. Exactly 1 minute later, read the absorbance A2 of standard or specimen.

## Calculation

$\Delta A \text{ specimen} = A1 \text{ specimen} - A2 \text{ specimen}$   
 $\Delta A \text{ standard} = A1 \text{ standard} - A2 \text{ standard}$

$$\text{Serum urea concentration (mg/dl)} = \frac{\Delta A_{\text{specimen}}}{\Delta A_{\text{standard}}} \times n$$

where  $n = 107 \text{ mg/dL}$

Urine urea concentration is determined by multiplying the result by the dilution factor (50).

## Quality Control

Normal and abnormal commercial control serum of known concentrations should be analyzed with each run.

## Performance Characteristics

### Precision

Within run (Repeatability)

	Level 1	Level 2
n	20	20
Mean (mg/dL)	45	150
SD	0.7	2.7
CV%	1.56	1.8

Run to run (Reproducibility)

	Level 1	Level 2
n	20	20
Mean (mg/dL)	47	153
SD	0.82	2.81
CV%	1.74	1.84

## Methods Comparison

A comparison between Spectrum Urea (UV) reagent and a commercial reagent of the same methodology was performed on 200 human sera. A correlation of 0.992 was obtained.

## Sensitivity

When run as recommended, the minimum detection limit of the assay is 0.9 mg/dL.

## Linearity

The reaction is linear up to a urea concentration of 200 mg/dL. Specimens showing higher concentration should be diluted 1+2 with physiological saline and repeat the assay (result  $\times 3$ ).

## Interfering Substances

### Haemolysis

Erythrocyte contamination doesn't elevate results. Haemolytic specimens may cause high absorbance flagging.

### Icterus

No significant interference.

### Lipemia

Lipemic specimens may cause high absorbance flagging. Diluted sample treatment may be recommended.

### Anticoagulants

Ammonium heparin should not be used.

### Others

Ammonium ions should be avoided since it may cause erroneously elevated results.

## Expected Values

### Urea (Serum)

Adults <65 years : 15-50 mg/dL (2.5-8.33 mmol/L)  
Adults >65 years : < 70 mg/dL (<11.66 mmol/L)

### BUN (Serum)

Adults <65 years : 7-23.5 mg/dL  
Adults >65 years : 7-32.9 mg/dL  
Children : 5-18 mg/dL

### Urine (24) hours

Urea : 20-35 g/24hrs (330-580 mmol/24hrs)  
BUN : 9.3-16.4 g/24hrs

**Spectrum Diagnostics does not interpret the results of a clinical laboratory procedure; interpretation of the results is considered the responsibility of qualified medical personnel. All indications of clinical significance are supported by literature references.**

## Analytical Range

0.9 – 200 mg/dL (0.15 - 33.2 mmol/L).

## Waste Disposal

This product is made to be used in professional laboratories. Please consult local regulations for a correct waste disposal.

**S56:** dispose of this material and its container at hazardous or special waste collection point.

**S57:** use appropriate container to avoid environmental contamination.

**S61:** avoid release in environment. refer to special instructions/safety data sheets.

## References

1. Batton, C. J & Crouch, S.R: Anal. Chem. , 1977, 49:464-469 .
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3. Tiffany TO, jansen JM, Burtis CA, Overtion JB, SCOTT CD. Enzymatic kinetic rate and end point analyses of substrate, by use of a gemsac fast analyzer. Clin Chem. 1972;18:829-840.
4. Tietz NW, Ed. Clinical guide to laboratory tests. 2ND. Philadelphia: WB Saunders;1990:566.



**Egyptian Co for Biotechnology - Spectrum Diagnostics (S.A.E)**

Obour city industrial area. block 20008 piece 19 A. Cairo. Egypt.

Tel: +202 4489 2248 - Fax: +202 4489 2247

www.spectrum-diagnostics.com

E-mail: info@spectrum-diagnostics.com



**MDSS GmbH**  
Schiffgraben 41  
30175 Hannover, Germany

