BioSystems

COD 12516 5 x 40 mL + 5 x 10 mL
Only for in vitro use in the clinical laboratory

INTENDED USE

Reagent for the measurement of urea concentration in human serum, plasma or urine. The obtained values are useful as an aid in the diagnosis and monitoring of chronic renal failure, and to evaluate the function of renal glomerulus.

This reagent is for use in the BioSystems A25 and A15 analyzers.

CLINICAL SIGNIFICANCE

Urea is synthesized in the liver as a by-product of the deamination of amino acids. Its elimination in the urine represents the major route for nitrogen excretion.

Elevated urea concentration in plasma is found as a result of a high-protein diet, increased protein catabolism, after a gastrointestinal hemorrhage, mild dehydration, shock and heart failure or treatment with glucocorticoids (pre-renal uremia)[1,2].

Post-renal uremia is caused by conditions that obstruct urine outflow: nephrolithiasis, tumor or prostatic hypertrophy. The usefulness of urea as an indicator of renal function is limited by the variability of its plasma concentration as a result of nonrenal factors[1,2].

Clinical diagnosis should not be made on the findings of a single test result, but should integrate both clinical and laboratory data.

PRINCIPLE OF THE METHOD

Urea in the sample consumes, by means of the coupled reactions described below, NADH that can be measured by spectrophotometry[3,4].

$$\text{Urea} + H_2O \xrightarrow{\text{urease}} 2NH_4^+ + CO_2$$

$$NH_4^+ + \text{NADH} + H^+ + \text{2 – oxoglutarate} \xrightarrow{\text{glutamate dehydrogenase}} \text{Glutamate} + NAD^+$$

COMPOSITION

A. Reagent: 5 x 40 mL Tris 100 mmol/L, 2-oxoglutarate 5.6 mmol/L, urease > 140 U/mL, glutamate dehydrogenase > 140 U/mL, ethyleneglicol 220 g/L, sodium azide 0.95, pH 8.0.

B. Reagent: 5 x 10 mL. NADH 1.5 mmol/L, sodium azide 9.5 g/L.

WARNING: H302: Harmful if swallowed. EUH031: Contact with acids liberates toxic gas. P301+P312: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. P330: Rinse mouth.

STORAGE AND STABILITY

Store at 2-8 ºC.

Components are stable once opened until the expiry date marked in the label if they are stored well closed and care is taken to prevent contamination during their use.

On board stability: Reagents open and kept in the refrigerated compartment of the analyzer are stable 30 days.

Indications of deterioration: Absorbance of the blank below the limit indicated in "Test Parameters".

WARNING AND PRECAUTIONS

Exercise the normal precautions required for handling all laboratory reagents. Safety data sheet available for professional user on request. Disposal of all waste material should be in accordance with local guidelines. Any serious incident that might occur in relation to the device shall be reported to BioSystems S.A.

ADDITIONAL MATERIALS REQUIRED (NOT PROVIDED)

Biochemistry Calibrator (BioSystems cod. 18011) or Biochemistry Calibrator Human (BioSystems cod. 18044).

REAGENT PREPARATION

Working Reagent: Pour the contents of the Reagent B into the Reagent A bottle. Mix gently. Other volumes can be prepared in the proportion: 4 mL Reagent A + 1 mL Reagent B. Stable for 2 months at 2-8ºC.

SAMPLES

Serum, plasma or urine collected by standard procedures.

Urea in serum or plasma is stable for 7 days at 2-8ºC. Heparin is recommended as anticoagulant[5].

Urea in urine is stable for 2 days at room temperature if microbial growth is prevented[5].

CALIBRATION

It is recommended to do a reagent blank every day and a calibration at least every 2 weeks, after reagent lot change or as required by quality control procedures.

QUALITY CONTROL

It is recommended to use the Biochemistry Control Serum level I (cod. 18005, cod. 18009 and cod. 18042) and II (cod. 18007, cod. 18010 and 18043) and the Biochemistry Control Urine (cod. 18054 and cod. 18066) to verify the accuracy of the measurement procedure.

Each laboratory should establish its own internal Quality Control scheme and procedures for corrective action if control results are not within the acceptable limits.

REFERENCE VALUES

Serum and plasma[1]: 12.8 - 42.8 mg/dL urea = 6 - 20 mg/dL BUN = 2.14 - 7.14 mmol/L urea. Concentrations in the neonatal period are lower, and in adults over 60 years of age are higher than in adults. Concentrations also tend to be slightly higher in males than in females.

Urine[1]: 26 - 43 g/24-h urea = 12 - 20 g/24 h BUN = 428 - 714 mmol/24-h urea.

These ranges are given for orientation only; each laboratory should establish its own reference ranges.

METROLOGICAL CHARACTERISTICS

The following data were obtained using an A25 analyser. Results are similar with A15.

- Detection limit: 4.0 mg/dL urea = 1.9 mg/dL BUN = 0.7 mmol/L urea.
- Linearity limit: 250 mg/dL urea = 117 mg/dL BUN = 42 mmol/L urea. For samples with higher values, dilute manually or refer to the Test Parameterization for Automatic dilution (note that all these samples will be diluted with the same dilution ratio).
- Precision:

Mean concentration urea	Repeatability (CV)	Within-laboratory (CV)
27 mg/dL = 4.5 mmol/L	4.0 %	4.7 %
142 mg/dL = 23.6 mmol/L	1.2 %	1.5 %

- Trueness: Results obtained with this reagent did not show systematic differences when compared with reference reagents. Details of the comparison experiments are available on request.

LIMITATIONS OF THE PROCEDURE

- Interferences: bilirubin (up to 30 mg/dL), hemolysis (hemoglobin up to 500 mg/dL) and lipemia (triglycerides up to 1625 mg/dL) do not interfere. Other drugs and substances may interfere[6].

BIBLIOGRAPHY

1. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th ed. Burtis CA, Ashwood ER, Bruns DE. WB Saunders Co, 2012.
2. Friedman and Young. Effects of disease on clinical laboratory tests, 4th ed. AACC Press, 2001.
3. Talke H and Schubert GE. Enzymatische harnstoffbestimmung in blut und serm im optischen test nach Warburb. *Klinische Wochenschrift* 1965; 43: 174-175.
4. Gutmann I, Bergmeyer HU. Methods of enzymatic Analysis, ed Bergmeyer HU, Academic Press, NY, 1974; 4:1794-1798.
5. Word Health Organization (WHO). Use of anticoagulants in diagnostic laboratory investigations. Document WHO/DIL/LAB/99.1, Rev.2; 2002.
6. Young DS. Effects of drugs on clinical laboratory tests, 5th ed. AACC Press, 2000.

TEST PARAMETERS

R1: use Reagent A.

R2: use Reagent B.

	A25	A15
GENERAL		
Name	**UREA-UV**	**UREA-UV**
Sample type	SER / URI	SER / URI
Analysis mode	fixed-time mon.	fixed-time mon.
Units	mg/dL	mg/dL
Turbidimetry test	no	No
Decimals	0	0
Type of reaction	decreasing	decreasing
PROCEDURE		
Reading mode	monoch.	monoch.
Main filter	340	340
Reference filter	-	-
Sample	3	3
Vol. R1	300	300
Vol. R2	-	-
Washing	1.2	1.2
Reading 1 (cycle)	4	3
Reading 2 (cycle)	7	5
Reagent 2 (cycle)	-	-
Predilution factor	- / 50	- / 50
Predilution reduced factor	2	2
CALIBRATION AND BLANK		
Calibration type	multiple	multiple
Number of calibrators	-	-
Calibration curve	-	-
OPTIONS		
Blank absorbance limit	1.100	1.100
Kinetic blank limit	-	-
Linearity limit	250 / 12500	250 / 12500

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