（FOR RESEARCH USE ONLY. DO NOT USE IT IN CLINICAL DIAGNOSIS !）

Catalog No：E-BC-K183-S

Specification：50 Assays(24 samples)/100 Assays(48 samples)

Measuring instrument：Spectrophotometer（580 nm）

Detection range：0.114-30 mmol/L

Elabscience® Urea (BUN) Colorimetric Assay Kit (Urease Method)

This manual must be read attentively and completely before using this product.

If you have any problem, please contact our Technical Service Center for help：

Toll-free: 1-888-852-8623
Tell: 1-832-243-6086
Fax: 1-832-243-6017
Email: techsupport@elabscience.com
Website: www.elabscience.com

Please kindly provide us the lot number (on the outside of the box) of the kit for more efficient service.

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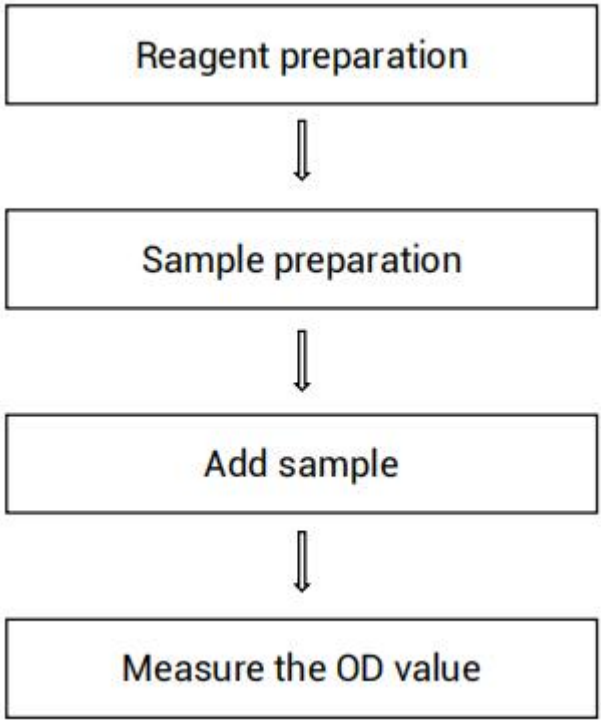
Assay summary



Intended use

This kit can be used to measure urea content in serum, plasma, urine, saliva, milk samples.

Detection principle

Urea can be decomposed into ammonia ion and carbon dioxide by urease. Ammonia ion can react with amphyl and form a green substance in alkaline medium, and the production of the green substance is proportional to the urea content which can be calculated with the colorimetric assay at 580 nm.

Kit components & storage

Item	Component	Size 1 (50 Assays)	Size 2 (100 Assays)	Storage
Reagent 1	100 mmol/L Urea Standard	1 mL × 1 vial	2 mL × 1 vial	2-8°C, 12 months
Reagent 2	Enzyme Stock Solution	0.05 mL × 1 vial	0.1 mL × 1 vial	2-8°C, 12 months, shading light
Reagent 3	Enzyme Diluent	15 mL × 1 vial	30 mL × 1 vial	2-8°C, 12 months
Reagent 4	Chromogenic Agent	60 mL × 1 vial	60 mL × 2 vials	2-8°C, 12 months, shading light
Reagent 5	Alkaline NaClO	60 mL × 1 vial	60 mL × 2 vials	2-8°C, 12 months, shading light

Note: The reagents must be stored strictly according to the preservation conditions in the above table. The reagents in different kits cannot be mixed with each other. For a small volume of reagents, please centrifuge before use, so as not to obtain sufficient amount of reagents.

Materials prepared by users

Instruments:

Spectrophotometer (580 nm), Micropipettor, Vortex mixer, Incubator

Reagents:

Double distilled water, Normal saline (0.9% NaCl), PBS (0.01 M, pH 7.4)

Reagent preparation

① Equilibrate all the reagents to room temperature before use.

② The preparation of enzyme working solution:
Before testing, please prepare sufficient enzyme working solution according to the test wells. For example, prepare 1505 μL of enzyme working solution (mix well 5 μL of enzyme stock solution and 1500 μL of enzyme diluent). The enzyme working solution should be prepared on spot.

③ The preparation of 10 mmol/L urea standard working solution：
For each well, prepare 20 μL of 10 mmol/L urea standard working solution (mix well 2 μL of 100 mmol/L urea standard and 18 μL of double distilled water). Store at 2-8°C for 3 days.

Sample preparation

① Sample preparation:

Serum (plasma) samples: detect directly. If not detected on the same day, the serum or plasma can be stored at -80°C for a month.

Urine: Collect fresh urine and centrifuge at 10000×g for 10 min at 4°C. Take the supernatant to preserve it on ice for detection. If not detected on the same day, the urine can be stored at -80°C for a month.

Saliva: Gargle with clear water, collect the saliva 30 min later, centrifuge at 10000×g for 10 min at 4°C. Take the supernatant and preserve it on ice for detection. If not detected on the same day, the saliva can be stored at -80°C for a month.

Milk: Collect fresh milk, centrifuge at 10000×g for 10 min at 4°C, remove the upper layer of milky white, take the middle layer supernatant and preserve it on ice for detection. If not detected on the same day, the milk can be stored at -80°C for a month.

② Dilution of sample

The recommended dilution factor for different samples is as follows (for reference only):

Sample type	Dilution factor
Rabbit plasma	1
Rat serum	1
Rat plasma	1
Human serum	1
Human saliva	1
Human milk	1
Human urine	30-60
Mouse urine	30-60

Note: The diluent is normal saline (0.9% NaCl) or PBS (0.01 M, pH 7.4). For the dilution of other sample types, please do pretest to confirm the dilution factor.

The key points of the assay

① Properly dilute the sample if the color is too dark, and multiply by dilution factor when calculating the result.

② It is recommended to use disposable plastic tubes to avoid contamination.

③ Prepare fresh enzyme working solution for needed amount before use. The enzyme working solution cannot be store for a long time.

④ The adhesion of enzyme stock solution is strong. It should be slowly absorbed when absorbing with pipette.

⑤ The incubation time must be 10 min accurately after adding enzyme working solution. Therefore, it is better to make batch operation if there are many samples to be detected. The number of operation in a batch should be less than 20.

Operating steps

① Blank tube: Add 0.02 mL of double distilled water to the 5 mL EP tube.
Standard tube: Add 0.02 mL of 10 mmol/L urea standard working solution to the 5 mL EP tube.
Sample tube: Add 0.02 mL of sample to the 5 mL EP tube.
Control tube: Add 0.02 mL of sample to the 5 mL EP tube.

② Add 0.25 mL of enzyme working solution to blank tube, standard tube and sample tube of step 1, add 0.25 mL of enzyme diluent to control tube, mix fully with vortex mixer, incubate at 37°C for 10 min.

③ Add 1 mL of chromogenic agent and 1 mL of alkaline NaClO, mix fully, incubate at 37°C for 10 min.

④ Set the spectrophotometer to zero with double distilled water and measure the OD values of each tube with 1 cm optical path cuvette at 580 nm.

Calculation

The sample:

Serum (plasma) and other liquid samples:

$$\text{Urea content (mmol/L)} = \frac{\Delta A_1}{\Delta A_2} \times c \times f$$

[Note]

ΔA_1: $OD_{Sample} - OD_{Control}$

ΔA_2: $OD_{Standard} - OD_{Blank}$

c: Concentration of standard (10 mmol/L urea nitrogen=280.1 mg/L)

f: Dilution factor of sample before test.

Appendix I Performance Characteristics

1. Parameter:

Intra-assay Precision

Three human serum samples were assayed in replicates of 20 to determine precision within an assay. (CV = Coefficient of Variation)

Parameters	Sample 1	Sample 2	Sample 3
Mean (mmol/L)	3.50	16.80	22.40
%CV	5.2	4.6	4.0

Inter-assay Precision

Three human serum samples were assayed 20 times in duplicate by three operators to determine precision between assays.

Parameters	Sample 1	Sample 2	Sample 3
Mean (mmol/L)	3.50	16.80	22.40
%CV	5.4	4.8	3.9

Recovery

Take three samples of high concentration, middle concentration and low concentration to test the samples of each concentration for 6 times parallelly to get the average recovery rate of 102%.

	Sample 1	Sample 2	Sample 3
Expected Conc. (mmol/L)	8.5	18.5	26
Observed Conc. (mmol/L)	8.4	19.4	26.5
Recovery rate (%)	99	105	102

Sensitivity

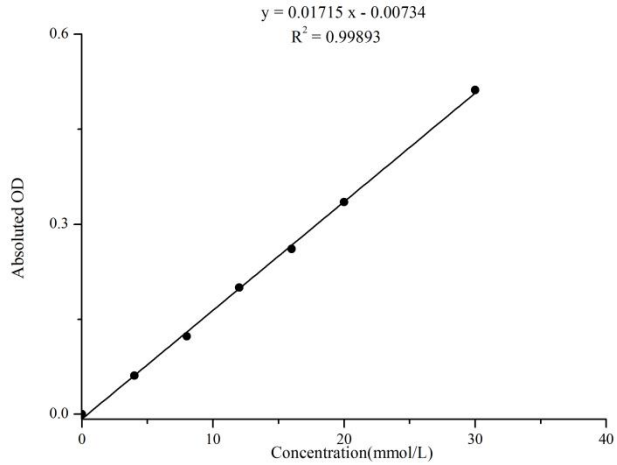
The analytical sensitivity of the assay is 0.114 mmol/L. This was determined by adding two standard deviations to the mean O.D. obtained when the zero standard was assayed 20 times, and calculating the corresponding concentration.

2. Standard curve

(It doesn't need to prepare the standard curve for this kit and the provided standard curve is for reference only)

As the OD value of the standard curve may vary according to the conditions of the actual assay performance (e.g. operator, pipetting technique or temperature effects), so the standard curve and data are provided as below for reference only.

Concentration (mmol/L)	0	4	8	12	16	20	30
Average OD	0.007	0.068	0.13	0.207	0.268	0.342	0.519
Absoluted OD	0	0.061	0.123	0.2	0.261	0.335	0.512



Appendix Π Example Analysis

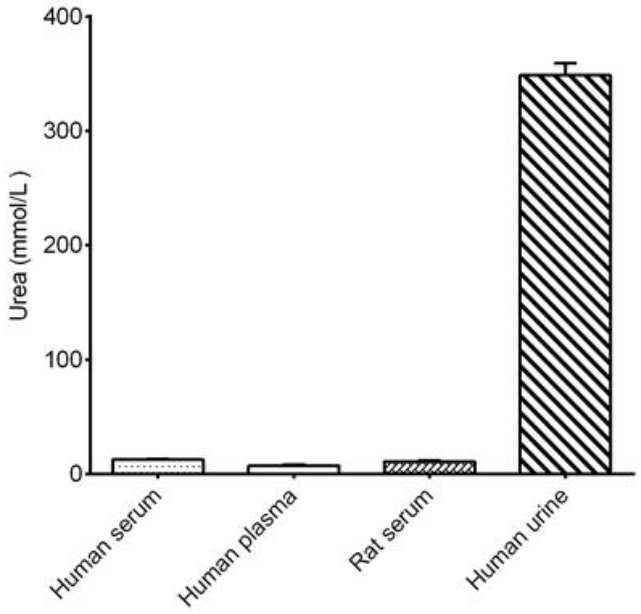
Example analysis：

Dilute human urine with 0.9% NaCl at the ratio of 1:49, take 0.02 mL of diluted human urine, and carry the assay according to the operation steps. The results are as follows:

The average OD value of the sample is 0.134, the average OD value of the blank is 0.010, the average OD value of the standard is 0.175, the average OD value of the control is 0.017, and the calculation result is:

$$\text{Urea nitrogen content (mmol/L)} = \frac{0.134 - 0.017}{0.175 - 0.010} \times 10 \times 50 = 354.55 \text{ mmol/L}$$

Detect human serum, human plasma, rat serum and human urine (dilute for 50 times) according to the protocol, the result is as follows:



Appendix III Publications

1. Fang X, Ding , Chen Y, et al. Wireless Optogenetic Targeting Nociceptors Helps Host Cells Win the Competitive Colonization in Implant - Associated Infections[J]. Small Methods, 2024, 8(12). DOI: 10.1002/smtd.202400216.
2. Zheng B, Zhang H, Wang J, et al. A mucoadhesive-to-penetrating nanomotors-in-hydrogel system for urothelium-oriented intravesical drug delivery[J]. Journal of Nanobiotechnology, 2024, 22(1). DOI: 10.1186/s12951-024-02816-7.
3. Rui Wang, Yanfang Sun, Han Wang, et al. Correction: Core–shell structured microneedles with programmed drug release functions for prolonged hyperuricemia management[J]. Journal of Materials Chemistry, B: Materials for Biology and Medicine, 2025, 13(8). DOI: 10.1039/D5TB90023A.
4. Karaa M S, Yeilkent E N, Kizir D, et al. Esculetin improves inflammation of the kidney via gene expression against doxorubicin-induced nephrotoxicity in rats: In vivo and in silico studies[J]. Food Bioscience, 2024, 62(000). DOI: 10.1016/j.fbio.2024.105159.
5. Chen J, Li M, Gao Q, et al. Dihydromyricetin, a flavonoid from vine tea (Ampelopsis grossedentata) provides hepatoprotection by modulating gut microbiota-mediated bile acid homeostasis[J]. Microelectronics Journal, 2024, 18(000). DOI:10.1016/j.jafr.2024.101376.

Statement

1. This assay kit is for Research Use Only. We will not response for any arising problems or legal responsibilities causing by using the kit for clinical diagnosis or other purpose.
2. Please read the instructions carefully and adjust the instruments before the experiments. Please follow the instructions strictly during the experiments.
3. Protection methods must be taken by wearing lab coat and latex gloves.
4. If the concentration of substance is not within the detection range exactly, an extra dilution or concentration should be taken for the sample.
5. It is recommended to take a pre-test if your sample is not listed in the instruction book.
6. The experimental results are closely related to the situation of reagents, operations, environment and so on. Elabscience will guarantee the quality of the kits only, and NOT be responsible for the sample consumption caused by using the assay kits. It is better to calculate the possible usage of sample and reserve sufficient samples before use.