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MAX  DISCOVERY™

# Blood Urea Nitrogen Enzymatic Kit Manual

Catalog #: 5602-01

# TABLE OF CONTENTS

<b>GENERAL INFORMATION .....</b>	<b>1</b>
<i>Product Description.....</i>	<i>1</i>
<i>Procedure Overview.....</i>	<i>1</i>
<i>Kit Contents, Storage and Shelf Life.....</i>	<i>2</i>
<i>Required Materials/Equipment Not Provided With the Kit .....</i>	<i>2</i>
<i>Warnings and Precautions .....</i>	<i>2</i>
<b>SAMPLE PREPARATION .....</b>	<b>3</b>
<i>Serum .....</i>	<i>3</i>
<b>UREA DETERMINATION TEST PROTOCOL.....</b>	<b>3</b>
<i>Set-Up .....</i>	<i>3</i>
<i>Reagent Preparation.....</i>	<i>3</i>
<i>Test Procedure.....</i>	<i>3</i>
<i>Standard Curve Construction .....</i>	<i>3</i>
<b>DATA ANALYSIS .....</b>	<b>4</b>
<i>Calculation of Blood Urea Nitrogen Concentration .....</i>	<i>4</i>

*MaxDiscovery™ Blood Urea Nitrogen Enzymatic Kit is intended for laboratory use only, unless otherwise indicated. This product is NOT for clinical diagnostic use. MaxDiscovery is a registered trademark of Bioo Scientific Corporation.*



## GENERAL INFORMATION

### Product Description

The *MaxDiscovery™ Blood Urea Nitrogen Enzymatic Kit* is a microplate-based colorimetric assay for the determination of urea in serum samples produced from blood. Blood urea nitrogen (BUN) is an important marker for normal kidney and liver function. Elevation of BUN levels is often an indication of intestinal and kidney obstruction and cardiac failure. Decreased BUN levels are often associated with kidney and liver damage. BUN is also a very useful tool for preclinical investigation of experimental drug formulations and BUN levels are commonly used to monitor and attenuate the toxic effects of experimental drug formulations in rodents.

*MaxDiscovery Blood Urea Nitrogen Enzymatic Kit* uses an enzyme-based assay to determine urea in liquid samples such as serum. The test is based on a highly proven method for urea determination. The *MaxDiscovery Blood Urea Nitrogen Enzymatic Kit* contains sufficient materials to test 42 samples in duplicate.

The assay utilizes urease, a metabolic enzyme, to specifically detect urea in serum. The *MaxDiscovery Blood Urea Nitrogen Enzymatic Kit* provides rapid, accurate, proven results even in complex liquid mixtures. The limit of detection for the test is 8 ppm urea for serum. The linear range of the assay is 8 – 200 ppm analyte.

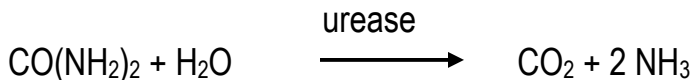
The unique features of the kit are:

- Rapid and simple method
- Minimal sample prep
- Highly accurate and reproducible

The kit is designed to be used with a microplate reader. The kit contains urea standards to construct a linear calibration curve and verify assay performance.

### Procedure Overview

The *MaxDiscovery Blood Urea Nitrogen Enzymatic Kit* measures the concentration of urea using the urease enzyme, which converts urea to ammonia.



The ammonia produced from the urea is then directly detected by a colorimetric chemical reaction.



## **Kit Contents, Storage and Shelf Life**

The *MaxDiscovery Blood Urea Nitrogen Enzymatic Kit* has the capacity for 96 determinations or testing of 42 samples in duplicate (using 12 wells for standards). Store the kit at 4°C. The shelf life is 6 months when the kit is properly stored.

<b>Kit Contents</b>	<b>Amount</b>	<b>Storage</b>
Microtiter Plate	1 x 96-well Plate (8 wells x 12 strips)	Room temp
Urea Standards:		
0 ppm (white cap tube)	0.4 mL	4°C
8 ppm (yellow cap tube)	0.4 mL	
25 ppm (orange cap tube)	0.4 mL	
50 ppm (pink cap tube)	0.4 mL	
100 ppm (purple cap tube)	0.4 mL	
200 ppm (blue cap tube)	0.4 mL	
Urease Mix	1 vial	4°C
Alkaline Hypochlorite Solution	20 mL	4°C

## **Required Materials/Equipment Not Provided With the Kit**

- Microtiter plate reader (*with 620 nm absorbance filter*)
- Microcentrifuge
- Microcentrifuge tubes
- Multichannel pipet (*recommended*)
- Normal saline or PBS (Phosphate-buffered saline, pH 7.4)

## **Warnings and Precautions**

BIOO strongly recommends that you read the following warnings and precautions to ensure your full awareness of the techniques and other details you should pay close attention to when running the assays. Periodically, optimizations and revisions are made to the kit and manual. Therefore, it is important to follow the protocol coming with the kit. If you need further assistance, you may contact your local distributor or BIOO at [techsupport2@biooscientific.com](mailto:techsupport2@biooscientific.com).

- Do not use the kit past the expiration date.
- Do not intermix reagents from different kits or different lots.
- Try to maintain a laboratory temperature of 20°–25°C (68°–77°F).
- Make sure you are using only distilled or deionized water since water quality is very important.
- When pipetting samples or reagents into an empty microtiter plate, place the pipette tips in the lower corner of the well, making contact with the plastic.

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## SAMPLE PREPARATION

### Serum

1. Allow 0.2 – 1 mL blood sample to coagulate in a microfuge tube for 20 minutes at 37°C and then centrifuge for 5 minutes at 9,000 rpm.
2. Transfer the supernatant (serum) to a clean tube. It is best to test the serum immediately; however if the samples cannot be tested within 6 hours of collection, store the them at 4°C and test no later than 3 days after collection.
3. Note: Immediately before testing, dilute the serum 1:4 into normal saline or PBS.

## UREA DETERMINATION TEST PROTOCOL

### Set-Up

Warm up kit reagents to room temperature. Turn on plate reader, allow the light source to warm up, and set absorbance wavelength to 620 nm (other wavelengths in the range of 590 – 630 nm can also be used for the assay, but the sensitivity will be slightly lower).

### Reagent Preparation

#### Preparation of Urease Mix

To reconstitute the Urease Mix, add exactly 20 mL of deionized or distilled water to the Urease Mix powder. Mix by swirling or inverting the bottle 10 times. Allow contents to dissolve for 10 minutes at room temperature. **The Urease Mix is stable for 4 months after reconstitution with water.**

**IMPORTANT: The reconstituted Urease Mix can be left at room temperature for short periods (30 – 60 minutes) prior to use. Between uses, the reconstituted Urease Mix should be stored at 4°C for up to 4 months. Discard the Urease Mix 4 months after reconstitution.**

### Test Procedure

1. **Serum:** Before testing, dilute serum samples 1:4 in either normal saline or PBS (dilution factor = 5). Add 5 µL of diluted serum (in duplicate) to the microplate wells; then add 150 µL of Urease Mix solution to the wells. Tap plate gently 3-4 times to mix sample and enzyme. Incubate 15 minutes at room temperature.
2. Add 150 µL of Alkaline Hypochlorite to each well. Incubate for 10 minutes at room temperature.
3. Measure the absorbance of each sample in duplicate at 620 nm.

### Standard Curve Construction

A calibration curve constructed using the urea standards supplied with the kit is required to determine the urea concentration in the samples.

1. Add 5 µL of each standard in duplicate into 150 µL Urease Mix solution in microplate wells.



- Tap plate gently 3-4 times to mix sample and enzyme. Incubate 15 minutes at room temperature.
2. Add 150  $\mu$ L Alkaline Hypochlorite to each well. Incubate for 10 minutes at room temperature.
  3. Measure the absorbance of each sample in duplicate at 620 nm.

A plot of average absorbance at 620 nm as a function of urea concentration should provide a tight linear curve. Each of the standard points should be resolved from the other neighboring points.

## DATA ANALYSIS

### Calculation of Blood Urea Nitrogen Concentration

A standard curve can be constructed by plotting the average corrected absorbance obtained from each reference standard against its concentration in ppm.

Calculate the slope and the y-intercept for the line which fits the standard curve data.

The urea concentration (dilution factor = 5) in the well can be determined using the equation:

Blood Urea Nitrogen concentration = dilution factor x (Average absorbance – y-intercept)/slope

Blood Urea Nitrogen concentration = 5 x (Average absorbance – y-intercept)/slope