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REF 1300141447
REAGENT 1 2 x 37 mL
REAGENT 2 2 x 11 mL

IVD CE 2797

HORIBA ABX SAS
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FRANCE

Yumizen C Urea

- **Yumizen C230**
- **Yumizen C240**

Diagnostic reagent for quantitative *in vitro* determination of Urea / Blood Urea Nitrogen in serum, plasma and urine by colorimetry.

Intended Use

Yumizen C Urea reagent is intended for the quantitative *in vitro* diagnostic determination of urea/urea nitrogen (an end-product of nitrogen metabolism) in human serum, plasma and urine based on an enzymatic UV test using urease and glutamate dehydrogenase.
Clinical laboratories use.
Urea/Urea nitrogen (BUN) measurements are used in the diagnosis and treatment of certain renal and metabolic diseases.
Assessing the physiologic and pathologic variations of Urea/Urea nitrogen (BUN) concentration in human serum, plasma and urine is useful for screening or follow-up of these diseases.

Clinical Interest (1, 2)

Urea is the nitrogen-containing end product of protein catabolism. States associated with elevated levels of urea in blood are referred to as hyperuremia or azotemia. Parallel determination of urea and creatinine is performed to differentiate between pre-renal and post-renal azotemia. Pre-renal azotemia, caused by e.g. dehydration, increased protein catabolism, cortisol treatment or decreased renal perfusion, leads to increased urea levels, while creatinine values remain within the reference range. In post-renal azotemias, caused by the obstruction of the urinary tract, both urea and creatinine levels rise, but creatinine in a smaller extent. In renal diseases urea concentrations are elevated when the glomerular filtration rate is markedly reduced and when the protein intake is higher than 200 g/ day.

Method (3)

''Urease - GLDH'': enzymatic UV test.

$$\text{Urea} + 2H_2O \xrightarrow{\text{Urease}} 2NH_4^+ + 2\,HCO_3^-$$

$$\text{2-Oxoglutarate} + NH_4^+ + \text{NADH} \xrightarrow{\text{GLDH}} \text{L-Glutamate} + NAD^+ + H_2O$$

(GLDH = Glutamate dehydrogenase)

Reagents

Yumizen C Urea is ready-to-use.

Reagent 1 (R1):	
TRIS pH 7.8	150 mmol/L
2-Oxoglutarate	9 mmol/L
ADP	0.75 mmol/L
Urease	≥ 7 kU/L
GLDH (Glutamate dehydrogenase)	≥ 1 kU/L
Reagent 2 (R2):	
NADH	1.3 mmol/L

Yumizen C Urea should be used according to this notice. The manufacturer cannot guarantee its performance if used otherwise.

Handling

1. Remove the caps of the cassettes.
2. If present, remove foam by using a plastic pipette.
3. Place the cassettes into the refrigerated reagent compartment.

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Calibrator

For calibration, use:
ABX Pentra Multical (A11A01652) (not included)
10 x 3 mL (lyophilisate)

Control

For internal quality control, use:

- **ABX Pentra N MultiControl** (1300054414) (not included)
  10 x 5 mL (lyophilisate)
- **ABX Pentra P MultiControl** (1300054415) (not included)
  10 x 5 mL (lyophilisate)
- **Yumizen C Urine Level 1 Control** (1300023946) (not included)
  6 x 5 mL
- **Yumizen C Urine Level 2 Control** (1300023947) (not included)
  6 x 5 mL

Each control should be assayed daily and/or after a calibration.
The frequency of controls and the confidence intervals should correspond to laboratory guidelines and country-specific directives. You should follow federal, state and local guidelines for testing quality control materials. The results must be within the range of the defined confidence limits. Each laboratory should establish a procedure to follow if the results exceed these confidence limits.

Materials Required but not Provided

- Automated clinical chemistry analyzer: Yumizen C230/C240
- Calibrator: **ABX Pentra Multical** (A11A01652)
- Controls:
  ABX Pentra N MultiControl (1300054414)
  ABX Pentra P MultiControl (1300054415)
  Yumizen C Urine Level 1 Control (1300023946)
  Yumizen C Urine Level 2 Control (1300023947)
- Standard laboratory equipment.

Specimen

This device intended testing population is general population.

Specimen types

- Serum.
- Plasma in lithium heparin.
- Fresh urine.

Anticoagulants other than those listed have not been tested by HORIBA and are therefore not recommended for use with this assay.

Stability

Serum, plasma (1)

- At room temperature: 2 days
- At 4-8°C: 1 week

Urine (4)

- At - 20°C: 4 weeks if pH < 7.0
- At 4-8°C: 7 days if pH < 7.0
- At 20-25°C: 2 days if pH < 7.0

Reference Range

Each laboratory should establish its own reference ranges. The values given here are used as guidelines only.

Serum, plasma (1)

	Urea		BUN
Adults:	**[mg/dL]**	**[mmol/L]**	**[mg/dL]**
Global	17 - 43	2.8 - 7.2	7.9 - 20.2
Women < 50 years	15 - 40	2.6 - 6.7	7.3 - 18.8
Women > 50 years	21 - 43	3.5 - 7.2	9.8 - 20.2
Men < 50 years	19 - 44	3.2 - 7.3	9.0 - 20.5
Men > 50 years	18 - 55	3.0 - 9.2	8.4 - 25.8

	Urea		BUN
Children:	**[mg/dL]**	**[mmol/L]**	**[mg/dL]**
1 - 3 years	11 - 36	1.8 - 6.0	5.1 - 16.8
4 - 13 years	15 - 36	2.5 - 6.0	7.0 - 16.8
14 - 19 years	18 - 45	2.9 - 7.5	8.1 - 21.1

Urine (5)

Urea [mmol/24h]	BUN [mg/24h]
430 - 710	1207 - 1993

Clinical sensitivity and specificity, positive predictive value and negative predictive value are not commonly reported for this analyte. This is largely attributed to the fact that

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this analyte is not sole indicator for the intended purpose and patient treatment decision making. To arrive at a diagnosis and a course of treatment, results from others routine clinical chemistry tests should be used in conjunction with other diagnostic information and the attending health-care professional's evaluation of the patient's condition.

Storage and Stability

Stability before opening:

Stable up to the expiry date on the label if stored at 2-8°C.

Stability after opening:

Refer to the paragraph "Performance on Yumizen C230/C240".

Do not freeze.

Waste Management

- Please refer to local legal requirements.
- This reagent contains less than 0.1% of sodium azide as a preservative.

General Precautions

- This reagent is for professional *in vitro* diagnostic use only.
  For laboratory use.
- For prescription use only.
- This reagent is classified as non-hazardous in compliance with regulation (EC) N°.1272/2008.
- **Reagent 1 (R1):**
  Warning: This reagent is obtained from substances of animal origin. Consequently, it should be treated as potentially infectious and handled with the appropriate cautions in accordance with good laboratory practices (6).
- Do not pipette by mouth.
- Do not replenish the reagents.
- Do not swallow. Avoid contact with skin and mucous membranes.
- Observe the standard laboratory precautions for use.
- The reagent cassettes are disposable and should be disposed of in accordance with the local legal requirements.
- Please refer to the SDS associated with the reagent.
- Do not use the product if there is visible evidence of biological, chemical or physical deterioration.
- Do not use the product if the recommended storage conditions, including temperature, are not followed.
- User must be trained by a HORIBA representative before attempting to operate the device.
- It is the user's responsibility to verify that this document is applicable to the reagent used.
- For technical assistance, you can call +33 (0)4 67 14 15 16.
- Any serious incident that has occurred in relation to the device shall be reported to the manufacturer and the competent authority of the country in which the user and/or the patient is established.

Performance on Yumizen C230/C240

Serum, plasma

The performance data listed below have been obtained on the Yumizen C230/C240 analyzer.

Number of tests: approximately 2 x 238 tests

On Board Reagent Stability

Once opened, the reagent cassette placed in the refrigerated Yumizen C230/C240 compartment is stable for 70 days.

Sample volume: 2 µL/test

Lowest Detectable Level

The lowest detectable level represents the lowest measurable level of analyte that can be distinguished from zero. It is calculated as the absolute mean plus three standard deviations of 20 replicates of an analyte free sample. The lowest detectable level is estimated at 0.23 mmol/L (1.38 mg/dL).

Limit of Quantitation

The limit of quantitation is determined according to CLSI (NCCLS), EP17-A2 protocol (7) and equals 0.50 mmol/L (3.00 mg/dL).

Accuracy and Precision

Repeatability (within-run precision)

Repeatability according to the recommendations found in the CLSI (NCCLS), EP05-A3 protocol (8) with samples tested 20 times:

- 2 controls
- 3 specimens (low / medium / high levels)

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	Mean value mmol/L	Mean value mg/dL	CV %
Control specimen 1	6.11	36.68	1.9
Control specimen 2	19.55	117.40	1.6
Specimen 1	2.75	16.52	3.6
Specimen 2	9.30	55.83	2.2
Specimen 3	23.39	140.46	1.3

Reproducibility (total precision)

Reproducibility according to the recommendations found in the CLSI (NCCLS), EP05-A3 protocol (8) with samples tested in duplicate for 20 days (2 series per day):

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value mmol/L	Mean value mg/dL	CV %
Control specimen 1	5.85	35.14	2.6
Control specimen 2	19.62	117.84	2.3
Specimen 1	2.79	16.76	4.4
Specimen 2	9.55	57.36	2.4
Specimen 3	23.64	141.98	2.4

Measuring Range

The assay confirmed a measuring range from 0.50 mmol/L (3 mg/dL) to 40 mmol/L (240 mg/dL).
The measuring range is extended up to 160 mmol/L (960 mg/dL) with the automatic post-dilution.
The reagent linearity has been assessed up to 40 mmol/L (240 mg/dL) according to the recommendations found in the CLSI (NCCLS), EP06-Ed2 protocol (9).

Correlation

Patient samples: Serum
Number of patient samples: 102
Specimens are correlated with a commercial reagent taken as reference according to the recommendations found in the CLSI (NCCLS), EP09c protocol (10).
Values ranged from 3.02 mmol/L (18.14 mg/dL) to 38.60 mmol/L (231.83 mg/dL).
The equation for the allometric line obtained using Passing-Bablok regression procedure (11) is:
Y = 0.9954 X – 0.038 (mmol/L)
Y = 0.9954 X – 0.228 (mg/dL)
with a correlation coefficient r^2 = 0.998.

Interferences

Haemoglobin: No significant influence is observed up to 579 µmol/L (1000 mg/dL).
Triglycerides: No significant influence is observed up to a triglyceride concentration of 22.86 mmol/L (2000 mg/dL).
Total Bilirubin: No significant influence is observed up to 652.76 µmol/L (38.19 mg/dL).
Direct Bilirubin: No significant influence is observed up to 527.27 µmol/L (30.85 mg/dL).

Other limitations are given by Young as a list of drugs and preanalytical variables known to affect this methodology (12, 13).

Calibration Stability

The reagent is calibrated on Day 0. The calibration stability is checked by testing 2 control specimens.
The calibration stability is 35 days.
Note: A recalibration is recommended when reagent lots change, and when quality control results fall outside the range established.

Conversion Factor

Urea (mmol/L) = Urea (mg/dL) x 0.1665
BUN (mg/dL) = Urea (mg/dL) / 2.14
BUN (mg/dL) = Urea (mmol/L) / 0.3561

Urine

The performance data listed below have been obtained on the Yumizen C230/C240 analyzer.

Number of tests: approximately 2 x 238 tests

On Board Reagent Stability

Once opened, the reagent cassette placed in the refrigerated Yumizen C230/C240 compartment is stable for 70 days.

Sample volume: 2 µL/test

Lowest Detectable Level

The lowest detectable level represents the lowest measurable level of analyte that can be distinguished from zero. It is calculated as the absolute mean plus three standard deviations of 20 replicates of an analyte free sample. The lowest detectable level is estimated at 3.88 mmol/L (23.30 mg/dL).

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Limit of Quantitation

The limit of quantitation is determined according to CLSI (NCCLS), EP17-A2 protocol (7) and equals 10 mmol/L (60 mg/dL).

Accuracy and Precision

Repeatability (within-run precision)

Repeatability according to the recommendations found in the CLSI (NCCLS), EP05-A3 protocol (8) with samples tested 20 times:

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value mmol/L	Mean value mg/dL	CV %
Control specimen 1	137.71	827.09	2.4
Control specimen 2	271.97	1633.43	1.1
Specimen 1	74.77	449.06	2.3
Specimen 2	122.54	736.00	1.2
Specimen 3	360.43	2164.75	0.9

Reproducibility (total precision)

Reproducibility according to the recommendations found in the CLSI (NCCLS), EP05-A3 protocol (8) with samples tested in duplicate for 20 days (2 series per day):

- 2 controls
- 3 specimens (low / medium / high levels)

	Mean value mmol/L	Mean value mg/dL	CV %
Control specimen 1	137.91	828.29	3.5
Control specimen 2	275.86	1656.82	3.0
Specimen 1	71.47	429.25	4.1
Specimen 2	136.41	819.28	3.4
Specimen 3	450.66	2706.67	2.8

Measuring Range

The assay confirmed a measuring range from 10 mmol/L (60 mg/dL) to 700 mmol/L (4204 mg/dL).
The measuring range is extended up to 2800 mmol/L (16816 mg/dL) with the automatic post-dilution.
The reagent linearity has been assessed up to 700 mmol/L (4204 mg/dL) according to the recommendations found in the CLSI (NCCLS), EP06-Ed2 protocol (9).

Correlation

Patient samples: urine
Number of patient samples: 119
Specimens are correlated with a commercial reagent taken as reference according to the recommendations found in the CLSI (NCCLS), EP09c protocol (10).
Values ranged from 24.58 mmol/L (147.63 mg/dL) to 406.20 mmol/L (2439.64 mg/dL).
The equation for the allometric line obtained using Passing-Bablok regression procedure (11) is:
Y = 1.108 X – 5.170 (mmol/L)
Y = 1.108 X – 31.05 (mg/dL)
with a correlation coefficient r^2 = 0.983.

Interferences

Haemoglobin: No significant influence is observed up to 579 µmol/L (1000 mg/dL).
Triglycerides: No significant influence is observed up to a triglyceride concentration of 22.86 mmol/L (2000 mg/dL).
Direct Bilirubin: No significant influence is observed up to 547.72 µmol/L (32.04 mg/dL).

Other limitations are given by Young as a list of drugs and preanalytical variables known to affect this methodology (12, 13).

Calibration Stability

The reagent is calibrated on Day 0. The calibration stability is checked by testing 2 control specimens.
The calibration stability is 35 days.
Note: A recalibration is recommended when reagent lots change, and when quality control results fall outside the range established.

Conversion Factor

Urea (mmol/L) = Urea (mg/dL) x 0.1665
BUN (mg/dL) = Urea (mg/dL) / 2.14
BUN (mg/dL) = Urea (mmol/L) / 0.3561

Reference

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