COD 11802 2 x 50 mL	COD 11502 4 x 50 mL	COD 11542 1 x 1 L
STORE AT 2-30ºC		
Reagents for measurement of creatinine concentration Only for *in vitro* use in the clinical laboratory		

CREATININE

BioSystems

CE

CREATININE
JAFFÉ

PRINCIPLE OF THE METHOD

Creatinine in the sample reacts with picrate in alkaline medium forming a coloured complex (Jaffé method). The complex formation rate is measured in a short period to avoid interferences[1,2]. Serum and plasma samples contain proteins that react in a non specific way; nevertheless, the results can be corrected subtracting a fixed value. The use of this correction is known as the Jaffé method compensated[6,7].

CONTENTS

	COD 11802	COD 11502	COD 11542
A. Reagent	1 x 50 mL	2 x 50 mL	1 x 500 mL
B. Reagent	1 x 50 mL	2 x 50 mL	1 x 500 mL
S. Standard	1 x 5 mL	1 x 5 mL	1 x 5 mL

COMPOSITION

A. Reagent. Sodium hydroxide 0.4 mol/L, detergent.

WARNING: H315: Causes skin irritation. H319: Causes serious eye irritation. P280: Wear protective gloves/protective clothing/eye protection/face protection. P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P332+P313: If skin irritation occurs: Get medical advice/attention.

B. Reagent. Picric acid 25 mmol/L.

S. Glucose/Urea/Creatinine Standard. Glucose 100 mg/dL, urea 50 mg/dL, creatinine 2 mg/dL (177 µmol/L). Aqueous primary standard.

For further warnings and precautions, see the product safety data sheet (SDS).

STORAGE

Store at 2-30ºC.

Reagents and Standard are stable until the expiry date shown on the label when stored tightly closed and if contaminations are prevented during their use.

Indications of deterioration:

- Reagents: Reagents: RA is a NaOH solution with high concentration. In some storage conditions (i.e. storage at a lower temperature than indicated) a precipitate may appear in the vial that will not affect the reagent performance and will disappear with a slight rotation of the vial before carrying out the analysis. RB, presence of particulate material, turbidity. Absorbance of the blank over 0.350 at 500 nm (1 cm cuvette).
- Standard: Presence of particulate material, turbidity.

AUXILIARY REAGENTS

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

REAGENT PREPARATION

Standard (S) is provided ready to use.

Working Reagent: Mix equal volumes of Reagent A and Reagent B. Mix thoroughly. Stable for 1 month at 2-8ºC.

ADDITIONAL EQUIPMENT

- Thermostatic water bath at 37ºC
- Analyzer, spectrophotometer or photometer able to read at 500 ± 20 nm.

SAMPLES

Serum, plasma or urine collected by standard procedures. Heparin, EDTA, oxalate and fluoride may be used as anticoagulants.

Creatinine in serum/plasma is stable up to 7 days at 20-25 ºC, 7 days at 2-8 ºC or 3 months at -20 ºC. Creatinine in urine is stable up to 2 days at 20-25 ºC, 6 days at 2-8 ºC or 6 months at -20 ºC[3].

PROCEDURE

1. Bring the Working Reagent and the photometer to 37ºC.
2. Pipette into a cuvette: (Note 1)

Working Reagent	1.0 mL
Standard (S) or Sample	0.1 mL

3. Mix and insert cuvette into the photometer. Start stopwatch.
4. Record the absorbance at 500 nm after 30 seconds (A_1) and after 90 seconds (A_2).

CALCULATIONS

The creatinine concentration in the sample is calculated using the following general formula (Note 2):

$$\frac{(A_2 - A_1)_{\text{Sample}}}{(A_2 - A_1)_{\text{Standard}}} \times C_{\text{Standard}} \times \text{Sample dilution factor} - \textit{Corrective Factor}^{5,6,7} = C_{\text{Sample}}$$

If the Creatinine Standard provided has been used to calibrate:

	Serum and plasma		Urine
	Jaffé non compensated	Jaffé compensated	
$\frac{(A_2 - A_1)_{\text{Sample}}}{(A_2 - A_1)_{\text{Standard}}}$	x 2] = mg/dL x 177] = µmol/L	x 2] - 0.2373 = mg/dL x 177] - 21 = µmol/L	x 100] = mg/dL x 8840] = µmol/L

If the Biochemistry Calibrator (BioSystems cod. 18011 or 18044) (not provided) has been used to calibrate.

	Serum and plasma		Urine
	Jaffé non compensated	Jaffé compensated	
$\frac{(A_2 - A_1)_{\text{Sample}}}{(A_2 - A_1)_{\text{Calibrator}}}$	x C Calibrator (non compensated)] = mg/dL or µmol/L	x C Calibrator (compensated) x 0.9] – 0.2373 = mg/dL x C Calibrator (compensated) x 0.9] – 21 = µmol/L	x C Calibrator (compensated) x 0.9 x 50] = mg/dL or µmol/L

REFERENCE VALUES

Serum and plasma[4]:

Method	Jaffé non compensated	Jaffé compensated
Men	0.9 - 1.3 mg/dL = 80 - 115 µmol/L	0.7 - 1.2 mg/dL = 62 - 106 µmol/L
Women	0.6 - 1.1 mg/dL = 53 - 97 µmol/L	0.5 - 0.9 mg/dL = 44 - 80 µmol/L

Urine[5]:

Men: 14 - 26 mg/kg/24-h = 124 - 230 µmol/kg/24-h

Women: 11 - 20 mg/kg/24-h = 97 - 177 µmol/kg/24-h

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

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 cod. 18043) and the Biochemistry Control Urine (cod. 18054 and cod. 18066) to verify the performance of the measurement procedure.

Each laboratory should establish its own internal Quality Control scheme and procedures for corrective action if controls do not recover within the acceptable tolerances.

METROLOGICAL CHARACTERISTICS

- Detection limit: 0.1 mg/dL creatinine = 8.84 µmol/L creatinine
- Linearity limit: 20 mg/dL = 1768 µmol/L creatinine. For higher values dilute sample 1/2 with distilled water and repeat measurement.
- Precision:

Serum. Mean (mg/dL) / (µmol/L)	Repeatability (CV)%	Reproducibility (CV)%
1.09 mg/dL = 96.6 µmol/L	3.0 %	4.4 %
3.32 mg/dL = 294 µmol/L	1.3 %	1.9 %
15.5 mg/dL = 1371 µmol/L	0.8 %	1.7 %

Urine. Mean (mg/dL) / (µmol/L)	Repeatability (CV)%	Reproducibility (CV)%
73 mg/dL = 6463 µmol/L	1.0 %	5.7 %
176 mg/dL = 15576 µmol/L	0.5 %	5.4 %
748 mg/dL = 66208 µmol/L	0.9 %	5.2 %

For repeatability and reproducibility studies, samples were measured on three different analyzers during five days, one run per day and five replicates per run.

- Trueness: Results obtained with this reagent did not show systematic differences when compared with reference reagents (Note 2). Details of the comparison experiments are available on request.
- Interferences: Bilirubin (up to 3 mg/dL), hemolysis (hemoglobin up to 500 mg/dL), lipemia (triglycerides up to 600 mg/dL) and protein and ketonic bodies do not interfere. High concentration of reducing compounds may interfere. Other drugs and substances may interfere[8].

These metrological characteristics have been obtained using an analyzer. Results may vary if a different instrument or a manual procedure are used.

DIAGNOSTIC CHARACTERISTICS

Creatinine is a catabolic end product of creatine (or phosphocreatine). The amount produced each day is related to the muscle mass. Creatinine is freely filtered by the glomerulus (small amounts are reabsorbed and are also secreted by the renal tubules).

Creatinine measurement is used almost exclusively in the assessment of kidney function (impaired renal perfusion, loss of functioning nephrons) and in the monitoring renal dialysis[5,9].

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

NOTES

1. These reagents may be used in several automatic analysers. Instructions for many of them are available on request.
2. For measurement in serum or plasma with the Jaffé method compensated, introduce the corrective value for the reaction of nonspecific proteins as a constant factor subtracted from the concentration value obtained[6,7].

BIBLIOGRAPHY

1. Bartels H, Böhmer M. Eine mikromethode zur kreatininbestimmung. *Clin Chim Acta* 1971; 32: 81-85.
2. Fabiny DL, Ertingshausen G. Automated reaction-rate method for determination of serum creatinine with CentrifiChem. *Clin Chem* 1971; 17: 696-700.
3. World HealthOrganization (WHO). Use of anticoagulants in diagnostic laboratory investigations. Document WHO/DIL/LAB/99.1, Rev.2; 2002.
4. Mazzachi BC, Peake MJ, Ehrhardt V. Reference range and method comparison studies for enzymatic and Jaffé creatinine assays in plasma and serum and early morning urine. *Clin Lab* 2000;46:53-55.
5. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 6th ed. Rifai N, Horvath AR,Wittwer CT.WB Saunders Co, 2018.
6. Weber JA, Van Zanten AP. Interferences in current methods for measurements of creatinine. *Clin Chem* 1991; 37: 695-700.
7. Peake M, Whiting M. Measurement of serum creatinine-current status and future goals. *Clin Biochem* 2006;27:173-184.
8. Young DS. Effects of drugs on clinical laboratory tests, 5th ed. AACC Press, 2000.
9. Friedman and Young. Effects of disease on clinical laboratory tests, 4th ed. AACC Press, 2001.

Digitally signed by Poiata Vitalie
Date: 2025.10.02 15:17:31 EEST
Reason: MoldSign Signature
Location: Moldova
MOLDOVA EUROPEANĂ

BioSystems S.A. Costa Brava, 30. 08030 Barcelona (Spain)
www.biosystems.global