

## Creatinine – Jaffé

REF: 234 001	(2 x 100 ml)	200 test
REF: 234 002	(4 x 100 ml)	400 test
REF: 234 003	(8 x 100 ml)	800 test
REF: 234 004	(2 x 500 ml)	1000 test
REF: 234 005	(2 x 250 ml)	500 test
REF: 234 006	(4 x 250 ml)	1000 test

### Intended Use

Spectrum Diagnostics creatinine reagent is intended for the in-vitro quantitative diagnostic determination of creatinine in human serum or urine on both automated and manual systems.

### Background

Creatine is synthesized in kidney, liver and pancreas. It is transported in blood to other organs such as muscle and brain where it is phosphorylated to phosphocreatine. Some free creatine in muscle is converted to creatinine daily and the amount of creatinine produced is proportional to muscle mass. In the absence of renal disease, excretion rate of creatinine in an individual is relatively constant. Therefore, measurement of creatinine clearance is useful in detecting renal disease and estimating the extent of impairment of renal function. Both serum creatinine and urea levels are elevated in patients with renal malfunction, especially decreased glomerular filtration. In the early stage of kidney damage, increase in serum urea level usually precedes the increase in serum creatinine. However serum urea levels may be affected by dehydration, diet and protein metabolism. On the other hand serum creatinine levels tend to be constant and unaffected by such factors. Thus serum creatinine is a significantly more reliable renal function screening test than serum urea.

### Method

Buffered Kinetic jaffé reaction without deproteinization.

### Assay Principle

Creatinine reacts with picric acid under alkaline condition to form a yellow-red complex. The absorbance of the color produced, measured at a wavelength 492 nm, is directly proportional to creatinine concentration in the sample.



### Reagents

#### Standard (ST)

2 mg/dL 177 μmol/L

#### Reagent 1 (R1)

Picric acid 25 mmol/L

#### Surfactants

Creatinine Picric Acid Reagent contains a low concentration of picric acid, a chemical which, in its dry form, is flammable and potentially explosive. For this reason, it is recommended that drains be well flushed with water when disposing the reagent, spills be cleaned up at once, and avoid dryness of the material around the reagent bottle opening.

#### Reagent 2 (R2)

Sodium hydroxide 0.4 mol/L

**Irritant (xi) R36/38:** Irritating to eyes and skin. **S26:** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. **S37/39:** Wear suitable gloves and eye/face protection.

For further information, refer to the Creatinine Jaffé reagent material safety data sheet.

### Precautions and Warnings

Do not ingest or inhale. In case of contact with eyes or skin; rinse immediately with plenty of soap and water. In case of severe injuries; seek medical advice immediately.

### Reagent Preparation

Prepare working solution as following:

Combine one volume of R1 with one volume of R2 e.g. 1.0 ml R1 + 1.0 ml R2.

### SYMBOLS IN PRODUCT LABELLING

	Authorised Representative		Use by/Expiration Date
	For in-vitro diagnostic use		CAUTION. Consult instructions for use
	Batch Code/Lot number		Manufactured by
	Catalogue Number		(Xi) - Irritant
	Consult instructions for use		
	Temperature Limitation		

### Reagent Storage and Stability

All reagents are stable until expiration date stated on label when stored at 15 - 25 °C. Working solution is stable for one day at 15 - 25 °C away from light.

### Deterioration

The creatinine reagents are not suitable for use if combined reagents have an absorbance greater than 0.8 at 492 nm measured in a 1cm lightpath or if the reagents develop a hazy appearance.

### Specimen Collection and Preservation

#### Serum or plasma

Both are suitable for analysis. The only acceptable anticoagulants are heparin and EDTA. Specimen should be promptly separated from cells after blood collection. The biological half-life of creatinine in blood is few minutes.

**Stability:** 7 day 2 - 8 °C ; > 1 year at -20 °C.

#### Urine

Thymol or toluene may be used for urine preservation. To determine creatinine concentration in urine, dilute 1 part sample with 49 parts isotonic saline prior to assay. Multiply result by 50 to compensate for dilution.

**Stability:** 2 days at 15 - 25 °C ; 6 days at 2 - 8 °C  
6 months at -20°C away from light

### System Parameters

Wavelength	492 nm
Optical path	1 cm
Assay type	Fixed Rate
Direction	increase
Sample : Reagent Ratio	1 : 10
e.g.: Reagent volume	1 ml
Sample volume	100 μl
First read time	30 seconds
delay time	120 seconds
last read time	150 seconds
Temperature	25 °C
Zero adjustment	Against Air
Reagent Blank Limits	Low 0.30 AU High 0.8 AU
Sensitivity	0.31 mg/dL (0.027 mmol/L)
Linearity	20 mg/dL (1.77 mmol/L)

### Procedure

#### Pipette into test tubes

Working solution	1.0 ml
Standard or Specimen	100 μl

Mix, and after 30 seconds. read the absorbance A1 of the standard or specimen. After exactly 2 minutes later, read absorbance A2 of standard or specimen.

### Calculation

A2 - A1 = A specimen or A standard.

Concentration of creatinine in serum:

$$\text{Creatinine (mg/dL)} = \frac{A_{\text{specimen}}}{A_{\text{standard}}} \times 2$$

Concentration of creatinine in urine:

$$\text{Creatinine (mg/dL)} = \frac{A_{\text{specimen}}}{A_{\text{standard}}} \times 2 \times 50$$

### Creatinine clearance (ml/minutes):

$$\frac{\text{mg creatinine / dl urine} \times \text{ml urine / 24 hours}}{\text{mg creatinine / dl serum} \times 1440}$$

Correction for body surface area can be done using the following formula for creatinine clearance:

Serum creatinine / min. per standard surface area =

$$\frac{\text{UCr} \times \text{V}}{\text{PCr}} \times \frac{1.73}{\text{A}}$$

Where: UCr = Concentration of creatinine in urine (mg/dl)  
PCr = Concentration of creatinine in plasma (mg/dl)  
V = Volume of urine flow in mL/min.  
A = Body surface area in square meter.  
1.73/A = Factor normalizes clearance for average body surface.

**Note:** Body surface area can be determined from height weight via normograms in Tietz (6).

### Quality Control

Normal & abnormal commercial control serum of known concentrations should be analyzed with each run.

### Performance Characteristics

#### Precision

Within run (Repeatability)

	Level 1	Level 2
n	20	20
Mean (mg/dL)	1.55	4.58
SD	0.069	0.1
CV%	4.45	2.2

Run to run (Reproducibility)

	Level 1	Level 2
n	20	20
Mean (mg/dL)	1.67	4.63
SD	0.081	0.19
CV%	4.58	2.7

### Methods Comparison

A comparison between Spectrum Diagnostics Creatinine Jaffé reagent and a commercial reagent of the same methodology was performed on 20 human sera. A correlation of 0.991 was obtained.

### Sensitivity

When run as recommended, the minimum detection of this assay is 0.31 mg/dL creatinine (0.027 mmol/L).

### Linearity

The reaction is linear up to serum creatinine concentration of 20mg/dL (1.77 mmol/L). Specimens showing higher concentration should be diluted 1+4 using physiological saline and repeat the assay (result\*5).

### Interfering Substances

Serum, plasma

### Haemolysis

Erythrocyte contamination doesn't elevate results.

### Icterus

Serum bilirubin levels higher than 5 mg/dL (85 µmol/L) decrease serum creatinine.

### Lipemia

Lipemic specimens may cause high absorbance flagging. Diluted sample treatment may be recommended.

### Expected Values

#### Serum, plasma

Females 0.7-1.3 mg/dL 62-115 µmol/L  
Males 0.9-1.5 mg/dL 80-133 µmol/L

#### Urine(24 hrs)

Females 0.9 – 1.6 g/24 hrs  
Males 1.1 – 2.8 g/24 hrs

#### Creatinine clearance

Females 75 – 115 ml / min.  
Males 85 – 125 ml / min.

**Spectrum Diagnostics does not interpret the results of a clinical laboratory procedure; interpretation of the results is considered the responsibility of qualified medical personnel. All indications of clinical significance are supported by literature references.**

### Analytical Range

0.31 – 20 mg/dL (0.027-1.77 mmol/L).

### Waste Disposal

This product is made to be used in professional laboratories. Please consult local regulations for a correct waste disposal.

**S56:** dispose of this material and its container at hazardous or special waste collection point.

**S57:** use appropriate container to avoid environmental contamination.

**S61:** avoid release in environment. refer to special instructions/safety data sheets.

### References

1. Bowers LD, Wong ET: kinetic serum creatinine assays. II. A critical evaluation and review. Clin Chem 26:555, 1980.
2. Doolan PD, Alpen EL, Theil GB: A clinical appraisal of the plasma concentration and endogenous clearance of creatinine. AM J Med 32:65, 1962.
3. Di Giorgio J: Nonprotein nitrogenous constituents. In: clinical chemistry – principles and technics, 2nd ed. RJ Henry, DC Cannon, JW Winkelman, editors, Harper and Row, Hagerstown (MD), 1974, pp 541-553.
4. Spencer K, Price CP: A review of Non-enzyme mediated reaction and their application to centrifugal analyzers. IN centerfugal analyzers in clinical chemistry, CP Price, K Spencer, editors, Praeger publishers, New York, 1980, p231.
5. Tobias GJ, McLaughlin RF, Hopper J: Endogenous creatine clearance. N Engl J Med 266:317, 1962.
6. Tietz NW: Textbook of clinical chemistry. WB saunders, philadelphia, 1986, pp 1271- 1281.

### ORDERING INFORMATION

CATALOG NO.	QUANTITY
234 001	2 x 100 ml
234 002	4 x 100 ml
234 003	8 x 100 ml
234 004	2 x 500 ml
234 005	2 x 250 ml
234 006	4 x 250 ml



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