MEDTEST DX
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Creatinine Reagent Set

Intended Use
For the quantitative determination of creatinine in serum using the Mindray BS-200 analyzer. For *in vitro* diagnostic use only.

Clinical Significance
Creatinine assays are most frequently performed to aid in the determination of renal function.

Method History
In 1886, Jaffe[1] described a method for the determination of creatinine involving a protein free filtrate and a reaction with picric acid in alkaline solution. Although several methods have been described since then, the classic Jaffe reaction is still the most widely used. The Jaffe reaction is subject to interferences by a number of substances, including protein and glucose.[2,3,4] Modifications of the procedure have been developed to combat the drawbacks.[5] The kinetic procedures[6] have become popular because they are fast, simple and avoid interference. The present method is based on a modification of the above procedure, incorporating a surfactant and other ingredients to minimize protein and carbohydrate interferences.

Principle
Creatinine + Sodium Picrate ---(Alkali)---➢ Creatinine-picrate complex (yellow-orange)

Creatinine reacts with picric acid in alkaline conditions to form a color complex that absorbs at 510 nm. The rate of formation of color is proportional to the creatinine in the sample.

Reagents
Creatinine R1 Reagent: Alkaline Buffer
Creatinine R2 Reagent: Picric Acid 40mM, Surfactant

Reagent Preparation
Reagents are ready to use.

Reagent Storage and Stability
Both reagents are stored at room temperature. (15-30˚C) The reagents are stable until the expiration date appearing on the label when stored as directed.

Reagent Deterioration
Do not use if:
1. The reagent is cloudy (contaminated).
2. The reagent fails to achieve assigned values on fresh control sera.

Precautions
1. This reagent is for *in vitro* diagnostic use only.
2. Picric Acid is a strong oxidizing agent. Avoid contact with skin. WIPE ANY SPILLAGE, SINCE EVAPORATED PICRIC ACID IS EXPLOSIVE.
3. All specimens and controls should be handled in accordance with good laboratory practices using appropriate precautions as described in the CDC/NIH Manual, "Biosafety in Microbiological and Biomedical Laboratories", 2nd Ed. 1988, HHS Publication No. (CDC) 88-8395.

Specimen Collection and Storage
1. Serum is recommended.
2. Creatinine in serum is stable for twenty-four hours at refrigerated temperatures (2-8°C) and for several months when frozen (-20°C) and protected from evaporation and contamination.
3. 24-hour urine specimens must be preserved with 15 grams of boric acid.
4. Specimen collection should be carried out in accordance with NCCLS M29-T2.[7] No method can offer complete assurance that human blood samples will not transmit infection. Therefore, all blood samples should be considered potentially infectious.

Interferences
1. A number of substances affect the accuracy of creatinine. See Young, et al.[8]
2. The method is not influenced (< 10%) by hemoglobin values up to 500mg/dl, bilirubin levels up to 20mg/dl and lipemia / Triglycerides (Intralipid used to simulate) to 1000mg/dl. The studies were performed on the Hitachi 717™ analyzer following a modification of the guidelines contained in NCCLS document EP7-P.[9]

Materials Provided
1. Creatinine R1 Reagent
2. Creatinine R2 Reagent

Materials Required but not Provided
1. Mindray BS-200 Analyzer.
2. BS-200 Operation manual.
3. Chemistry Calibrator, catalog number C7506-50
4. Chemistry control, catalog number C7592-100

Mindray BS-200 Test Parameters

Test::	CREAT	R1:	200
No.:	013	R2:	40
Full Name:	Creatinine	Sample Volume:	12
Standard No.:		R1 Blank:	
Reac. Type:	Fixed-time	Mixed Rgt. Blank:	
Pri. Wave:	510nm	Linearity Range:	0.1 – 25.0
Sec. Wave:	578nm	Linearity Limit:	
Direction:	Increase	Substrate Limit:	
Reac. Time:	2 / 7	Factor:	
		Compensate: Slope 1.0	Intercept: 0
Incuba. Time:	3	□ Prozone check	
Unit:	mg/dl	q1: q2: q3: q4:	
Precision:	0.01	PC:	Abs:

Calibration Parameters (NOTE: See Calibration section for use instructions)

Rule:	Two-point linear	Calibrator 1:	Deionized Water
Sensitivity:		Calibrator 2:	Chem Cal
Replicates:	2	Calibrator 3:	
Interval (day):		Calibrator 4:	
Difference Limit:		Calibrator 5:	
SD:		Calibrator 6:	
Blank Response:			
Error Limit::			
Coefficient::	0		

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Limitations
Samples with values above 25 mg/dl should be diluted 1:1, re-assayed and results multiplied by two.

Calibration
Use an NIST-traceable serum calibrator. The procedure should be calibrated according to the instrument manufacturer's calibration instructions. If control results are found to be out of range, the procedure should be re-calibrated. **NOTE:** The creatinine instrument reagent containers should be capped when not in use. This will improve calibration stability, otherwise it is suggested that the assay be calibrated daily.

Calculation (Example)
The creatinine value of the unknown is determined by comparing its absorbance change with that of a known standard.

$$\text{Mg/dl} = \frac{\Delta \text{ Abs (Unknown)}}{\Delta \text{ Abs (Standard)}} \times \text{Concentration of Std. (mg/dl)}$$

Where: Δ Abs. = Absorbance change between readings (A_2-A_1)

Sample Calculation

If: Δ Abs/Unknown = 0.02
Δ Abs/Standard = 0.05
Conc. of Standard = 2.5 mg/dl

Then: $\frac{0.02}{0.05} \times 2.5 = 1.0$ mg/dl creatinine

Quality Control
The integrity of the reaction should be monitored by use of normal and abnormal control sera with known creatinine values. These controls should be run at least with every working shift in which creatinine assays are performed. It is recommended that each laboratory establish its own frequency of control determination. Quality control requirements should be performed in conformance with local, state, and/or Federal regulations or accreditation requirements.

Expected Values
0.40 – 1.40 mg/dl

It is highly recommended that each laboratory establish its own reference range.

Performance
1. Assay Range: 0.1 - 25.0 mg/dL
2. Correlation: A study was performed between the Mindray BS-200 and a similar analyzer using this method, resulting in a correlation coefficient of y=1.018 x - 0.03, r^2 = 0.999 (n=50)
3. Precision: Precision studies were performed using the Mindray BS-200 analyzer following a modification of the guidelines which are contained in NCCLS document EP5-T2.[10]

Within Day			Day to Day		
Mean	**S.D.**	**C.V.%**	**Mean**	**S.D.**	**C.V.%**
1.49	0.06	4.0	1.24	0.04	3.2
6.33	0.12	1.9	7.11	0.41	5.8

References

1. Jaffe, M., Z. Physiol. Chem. 10:391 (1886).
2. DiGiorgio, J., Clinical Chemistry: Principles and Technics, 2nd Ed., Edited by Henry, R.J., et al, Hagerstown (MD), Harper & Row, pp. 541-553 (1974).
3. Cook, J.G.H., Ann. Clin. Biochem. 12:219 (1975).
4. Taussky, H.H., Standard Methods of Clinical Chemistry, Vol. 3, New York Academic Press, p. 99 (1966).
5. Heinegard, D., Tiderstom, G., Clin. Chem. Acta, 43:305 (1973).
6. Fabiny, D.L., Ertingshausen, G., Clin. Chem. 17:391 (1971).
7. NCCLS document "Protection of Laboratory Workers form Infectious Disease Transmitted by Blood, Body Fluids, and Tissue", 2nd Ed. (1991).
8. Young, D.S. et al, Clin. Chem. 21:1D (1975).
9. NCCLS document "Interference testing in Clinical Chemistry", 2nd Ed. (1992).
10. NCCLS document "Evaluation of Precision Performance of Clinical Chemistry Devices", 2nd Ed., (1992).

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Use by (YYYY-MM) | LOT Lot and batch code | REF Catalog number | Manufacturer | IVD *In vitro* diagnostic medical device
Temperature limitation | Consult instructions for use | CE mark | EC REP Authorized representative in the European Community