Chloride 21 FS*

Diagnostic reagent for quantitative in vitro determination of chloride in serum or plasma on photometric systems

Order Information

Cat. No.	Kit size
1 1221 99 10 021	R1 5 x 20 mL + R2 1 x 25 mL

Summary [1,2]

Chloride is the most important anion in serum besides bicarbonate. Together with sodium it represents an essential osmotically active component in plasma which is involved in maintenance of water distribution and anion-cation-balance. Serum concentrations of chloride directly correlate with sodium levels and indirectly with bicarbonate. Increased chloride values occur in dehydration, metabolic acidosis related with prolonged diarrhea and bicarbonate loss, renal insufficiencies and endocrinological disorders as reduced or increased adrenal function. Decreased values are observed in metabolic acidosis with increased production of organic acids, salt-losing nephritis and excessive sweating.

Method

Photometric test using ferric (III) perchlorate

Principle

Chloride forms with ferric ions a yellow colored complex whose absorption is measured at 340 nm. A discoloring agent in reagent 2 displaces Chloride out of the complex, thereby discoloring the solution. The difference in absorbance between the colored and discolored state of the solution is proportional to the concentration of chloride in the sample.

Reagents

Components and Concentrations

R1:	Methanesulfonic acid	pH < 1.0	1 – 5%
	Ferric (III) perchlorate		< 1%
R2:	Inorganic salt		< 3%

Storage Instructions and Reagent Stability

The reagents are stable up to the end of the indicated month of expiry, if stored at 2 – 8°C and contamination is avoided. Do not freeze the reagents!

Warnings and Precautions

1. Reagent 1: Danger. H290 May be corrosive to metals. H314 Causes severe skin burns and eye damage. H411 Toxic to aquatic life with long lasting effects. P234 Keep only in original container. P260 Do not breathe vapors. P273 Avoid release to the environment. P280 Wear protective gloves/protective clothing/eye protection/face protection. P303+P361+P353 If on skin (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P310 Immediately call a poison center or doctor/physician. P390 Absorb spillage to prevent material damage.
2. The chloride test is very susceptible to chloride contamination. The sole use of ultrapure glass ware and disposable materials is strongly recommended.
3. In very rare cases, samples of patients with gammopathy might give falsified results [6].
4. Please refer to the safety data sheets and take the necessary precautions for the use of laboratory reagents. For diagnostic purposes, the results should always be assessed with the patient's medical history, clinical examinations and other findings.
5. For professional use only!

Waste Management

Please refer to local legal requirements.

Reagent Preparation

The reagents are ready to use.

Materials required but not provided

General laboratory equipment

Specimen

Serum or plasma (lithium heparin)
Separate from cellular contents immediately after blood collection.

Stability [3]:	at least one year	at	–20°C
	7 days	at	4 – 8°C
	7 days	at	20 – 25°C

Discard contaminated specimens. Freeze only once.

Assay Procedure

Application sheets for automated systems are available on request.

Wavelength	340/660 nm (bichromatic)
Optical path	1 cm
Temperature	37°C
Measurement	Against reagent blank

	Blank	Sample or calibrator
Sample or calibrator	-	40 µL
Dist. Water	40 µL	-
Reagent 1	900 µL	900 µL
Mix, incubate for 5 min. at 37°C, read absorbance A1, then add:		
Reagent 2	225 µL	225 µL
Mix, incubate for 1 min. at 37°C, then read absorbance A2.		

ΔA = (A2 – A1) Sample/Calibrator

Calculation

The concentration of chloride in unknown samples is derived from a linear calibration curve. It is obtained with the levels 1/2 and 3/4 of the electrolyte calibrator TruCal E.

Conversion factor

Chloride [mmol/L] = Chloride [mEq/L]

Chloride [mmol/L] x 3.545 = Chloride [mg/dL]

Calibrators and Controls

For calibration of automated photometric systems, DiaSys TruCal E calibrator is recommended. The assigned values of TruCal E have been made traceable to the NIST Standard Reference Material® SRM 956. DiaSys TruLab N and P controls should be assayed for internal quality control. Each laboratory should establish corrective action in case of deviations in control recovery.

	Cat. No.	Kit size
TruCal E	1 9310 99 10 079	4 x 3 mL
TruLab N	5 9000 99 10 062	20 x 5 mL
	5 9000 99 10 061	6 x 5 mL
TruLab P	5 9050 99 10 062	20 x 5 mL
	5 9050 99 10 061	6 x 5 mL

* fluid stable

Performance Characteristics

Measuring range

The test has been developed to determine chloride concentrations within a measuring range of 40 to 170 mmol/L.

Specificity/Interferences

Interfering substance	Interferences < 4.5%	Chloride [mmol/L]
Ascorbate	up to 30 mg/dL	91.6
	up to 30 mg/dL	113
Conjugated bilirubin	up to 30 mg/dL	89.2
	up to 42 mg/dL	111
Unconjugated bilirubin	up to 60 mg/dL	90.1
	up to 42 mg/dL	113
Lipemia (triglycerides)	up to 500 mg/dL	96.1
	up to 1000 mg/dL	110
Hemoglobin	up to 500 mg/dL	103
	up to 700 mg/dL	120
Albumin	up to 76 g/L	94.3
	up to 68 g/L	122
Bromide	up to 40 mmol/L	92.2
	up to 40 mmol/L	111
Iodide	up to 0.9 mmol/L	90.1
	up to 3 mmol/L	112
Fluoride	up to 105 µmol/L	87.5
	up to 105 µmol/L	107
For further information on interfering substances refer to Young DS [4].		

Limit of Detection

The lower limit of detection is 8 mmol/L.

Precision

Intra-assay n = 20	Mean [mmol/L]	SD [mmol/L]	CV [%]
Sample 1	87.3	0.84	0.96
Sample 2	100	0.55	0.55
Sample 3	116	1.60	1.37

Inter-assay n = 20	Mean [mmol/L]	SD [mmol/L]	CV [%]
Sample 1	88.3	1.56	1.77
Sample 2	102	1.64	1.61
Sample 3	116	1.85	1.59

Method Comparison

A comparison of DiaSys Chloride 21 FS (y) with the reference method Coulometry (x) using 185 samples gave following results: y = 1.01 x + 0.207 mmol/L; r = 0.986

Reference Range [1]

Adults:	95 – 105 mmol/L
Children:	
1 – 7 day(s)	96 – 111 mmol/L
7 – 30 days	96 – 110 mmol/L
1 – 6 month(s)	96 – 110 mmol/L
6 months – 1 year	96 – 108 mmol/L
> 1 year	96 – 109 mmol/L

Each laboratory should check if the reference ranges are transferable to its own patient population and determine own reference ranges if necessary.

Literature

1. Thomas L. Clinical Laboratory Diagnostics. 1st ed. Frankfurt: TH-Books Verlagsgesellschaft; 1998. p. 295-8.
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3. Guder WG, Zawta B et al. The Quality of Diagnostic Samples. 1st ed. Darmstadt: GIT Verlag; 2001; p. 22-3.
4. Young DS. Effects of Drugs on Clinical Laboratory Tests. 5th ed. Volume 1 and 2. Washington, DC: The American Association for Clinical Chemistry Press 2000.
5. Schoenfeld RG, Lewellen CJ. A colorimetric method for determination of serum chloride. Clin Chem 1964;10: 533-9.
6. Bakker AJ, Mücke M. Gammopathy interference in clinical chemistry assays: mechanisms, detection and prevention. ClinChemLabMed 2007;45(9):1240–1243.

Manufacturer

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