Pariksha Biotech
A game changer in IVD

Lithium Estimation Kit

High-Q Lithium

Spectrophotometric Method

HIGH Q
Command on Quality

Intended Use
Reagent for the quantitative determination of Lithium concentrations in human serum for use on the Chemistry Analyzers

Summary:
Lithium is widely used in the treatment of manic depressive psychosis. Administered as Lithium Carbonate, it is completely absorbed by the gastro-intestinal tract, peak serum levels occur 2 to 4 hours after an oral dose. The half life in serum is 48 to 72 hours and it is cleared through the kidneys (excretion parallels that of sodium). Reduced renal function can prolong clearance time.
Lithium acts by enhancing the uptake of neurotransmitters which produces a sedative effect on the central nervous system. Serum Lithium concentrations are carried out essentially to ensure compliance and to avoid toxicity.
Early symptoms of intoxication include apathy, sluggishness, drowsiness, lethargy, speech difficulties, irregular tremors, myoclonic twitchings, muscle weakness and ataxia. Levels higher than 1.5 mmol/L (12 hours after a dose) indicate a significant risk of intoxication.

Methodology:
Lithium can be determined by atomic absorption spectrophotometry, flame emission photometry or ion - selective electrode. These methods require specific and often dedicated instrumentation.
The High-Q Lithium reagent is a spectrophotometric method which can be readily adapted to automated clinical chemistry analyzers. Lithium present in the sample reacts with a substituted porphyrin compound at an alkaline pH, resulting in a change in absorbance which is directly proportional to the concentration of Lithium in the sample

Reagent Composition:

Lithium Reagent	
Sodium Hydroxide	0.5 mol/L
EDTA	50 µmol/L
Substituted Porphyrin	15 µmol/L Preservative
Surfactant	
Lithium Calibrators	
Lithium Chloride	5 Level Different Concentrations

Warnings and Precautions:
1. For in vitro diagnostic use only.

Reagent Preparation:
Reagents and Calibrators and Controls are supplied ready to use.

Stability and Storage:
1. The reagents, Calibrators and Controls are stable until the expiration date when stored properly at 2 - 8°C. Do not freeze the reagents

Specimen collection and preparation:
It is recommended that a standardized 12-hour post dose serum Lithium concentration be used to assess adequate therapy. Peak concentration is reached 2 to 4 hours after oral dose.
Use only serum. Serum should be separated from cells if storage of more than 4 hours is anticipated. For analyzers which do not have automatic dilution, samples, controls and calibrators must be prediluted 1:10 with distilled or deionized water [1 part sample plus 9 parts water].

Sample Storage and Stability:
Samples are stable for one week at 2 - 8°C or > 1 year at -20°C.4

Limitations:
The reagent is light sensitive and will absorb atmospheric carbon dioxide. It is recommended that the reagent be stored capped and in a dark container when not in use for prolonged periods of time (eg. overnight). Interfering Substances
1. Studies to determine the level of interference from other cations normally present in serum were carried out in the presence of a lithium concentration of approximately 1 mmol/L and the following results were obtained:

Sodium:	Up to 200 mmol/L
Potassium:	Up to 8.00 mmol/L
Calcium:	Up to 4.00 mmol/L (16 mg/dL)
Magnesium:	Up to 2.00 mmol/L (4.86 mg/dL)
Iron:	Up to 200 µmol/L (1,117 µg/dL)
Zinc:	Up to 250 µmol/L (1,625 µg/dL)
Copper:	Up to 250 µmol/L (1,588 µg/dL)

No significant interference (<5% deviation from assigned Lithium concentration) were observed with this method.
2. Studies to determine the level of interference from Bilirubin, Lipemia (Triglyceride) and Hemoglobin in the presence of a lithium concentration of approximately 1 mmol/L were carried out and the following results were obtained:

Free Bilirubin:	Interference is less than 10% at 45 mg/dL
Conjugated Bilirubin:	Interference is less than 10% at 45 mg/dL
Lipemia:	Interference is less than 10% at 2000 mg/dL (Triglyceride)
Hemoglobin:	Interference is less than 5% at 2 g/L

Assay Procedure:

Sytem Parameters:	
Calibration Method	**Endpoint-Bichromatic-Non Linear-Multical-Spline**
Reaction Direction	Decreasing
Primary Wave Length	505
Secondary Wave Length	470 (470-480)
Flow Cell Temp.	37°C
Blank	Reagent Blank
Reagent Volume	400 µl (R1) + 100 µl (R2)
Sample Volume)	15 µl
Calibrators Conc: 1,2,3,4,5	Lot Specific (Check the labels))
Units	mMol/L
Low normal	0.1
High normal	1.2
Linearity	5

Procedure

Reagent	Reagent Blank	C	S
Li R1	400 µL	400 µL	400 µL
Li Calibrators (1,2,3,4,5)	----	15 µL	----
Sample	----	----	15 µL
Incubate 5 Minutes at 37°C			
Li R2	100 µL	100 µL	100 µL

Mix carefully and wait for about 5 minutes. Measure the absorbance of calibrators and of the samples against reagent blank.

Calculations:
The Multipoint Non Linear /Semi logarithmic calibration model was used , and the Spline function was used as the calculation model. The dose / response curve was made based on the value of the calibrator and the change of absorbance. The concentration of Lithium in the sample could be calculated on the dose/ response curve based on the change of absorbances

Calibration
The calibration frequency for this procedure is 30 days. Calibration of this lithium procedure is accomplished by use of the High-Q Lithium Calibrators provided in the kit. The High-Q Lithium Calibrators are traceable to NIST SRM 3129.
Recalibration of this procedure is required when a reagent lot number has changed or there is an observed shift in control values, if a critical part of the analyzer is replaced or, if a major preventative maintenance procedure was performed on the analyzer.

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Quality Control
Two levels of chemistry control sera (Optionally Available) should be analyzed routinely with each group of unknown samples, at least once per day. Results Results in mMol/L will be automatically printed for each sample assayed.

Expected Values:
- 12 hour post dose trough concentration: 1.0 - 1.2 mmol/L
- Minimum effective concentration: 0.6 mmol/L
- Values > 1.5 mmol/L 12 hours after dose indicates a significant risk of intoxication.

The quoted values should serve as a guide only. It is recommended that each laboratory verify this range or derives a reference interval for the population it serves5
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Performance Characteristics:
The following data was obtained using the Beckman Coulter AU analyzers according to established procedures. Results obtained in individual laboratories may vary.

High-Q Lithium Reagent
Test Method: High-Q Lithium suggested procedure
Number of sample pairs 67
Range of sample results 0.3 - 2.7 mMol/L
Mean of reference method results 0.89 mMol/L
Mean of test method results 0.88 mMol/L
Slope 0.969
Intercept 0.021 mMol/L
Correlation coefficient 0.994

Linearity / Dynamic Range
The High-Q Lithium procedure is linear from 0.1 mmol/L to 5.0 mmol/L.

Precision
Estimates of precision, based on CLSI recommendations7 , are less than 3% within run and total precision is less than 5% on the AU Chemistry Analyzers. Assays of control sera products were performed and the data produced following the CLSI guidelines above.

N= 80	Within Run		Total	
Mean (µmol/L)	SD	CV%	SD	CV%
1.00	0.017	1.6	0.024	2.3
1.50	0.019	1.2	0.027	1.7
2.00	0.035	1.7	0.048	2.3

Method Comparison:
The following data below demonstrates representative performance on Beckman Coulter AU Chemistry Analyzers. A comparison of this High-Q Lithium Reagent method (Method 1) Vs an on-market method (Method 2) was run per CLSI EP09-A2 utilizing 86 patient serum samples. The resulting data is as follows:

Correlation Coefficient: r = 0.998
Regression equation: Method 1 = 0.921x -0.003
Range of patients: 0.27 to 2.11 mmol/L

Lower Limit of Detection
The lower limit of detection was determined using CLSI EP17-A28 where:
LOD = LOB + 2SDWR
LOB = Limit of Blank
SDWR = Within Run standard deviation of a low level sample
When run as recommended the lowest limit of detection is 0.04 mmol/L

References:

1. Tietz Fundamentals of Clinical Chemistry, Sixth Edition Saunders Elservier Inc., 2008 pg 555, 556, 868.
2. Amdisen A. “Serum Lithium determinations for Clinical use.” Scand Jnl Clin Lab Invest. 1967; 20:104-8.
3. Young DS. “Effects of Preanalytical Variables on Clinical Laboratory Test” 2nd Ed. 1997, pg 3-360.
4. Tietz NW “Blood Gases and Electrolytes in Fundamentals of Clinical Chemistry, Philadelphia W.B. Saunders Co., 1976 pg 899-901.
5. Wachtel M et al, “Creation and Verification of Reference Intervals”, Laboratory Medicine 1995; 26:593-7.
6. Data is on file for specific AU analyzers.
7. Clinical and Laboratory Standards Institute. User evaluation of Precision Performance of Clinical Laboratory Devices. CLSI: 2004, CLSI Publication EP5-A2.
8. Clinical and Laboratory Standards Institute. Protocols for Determination of Limits of Detection and Limits of Quantitation. CLSI:2012, CLSI publication EP17-A2.

Ordering Information

Ref./Cat. No.	Pack Size	Presentation
P - LIT-25	25 ml	Two Liquid Reagents with 5 Levels of Liquid Calibrators

Product Features

- **Liquid Stable, Ready to use Two Reagents**
- **Multipoint, Bichromatic End Point, Spline Assay**
- **5 level Liquid Satble Calibrators are provided**
- **Linearity : 0.1 mmol/L to 5.0 mmol/L.**
- **Measuring Wavelength 505 nm (Primary Wavelength) 480 nms (Secondary Wavelength)**
- **Serum is the preferred Specimens**
- **Available as multipurpose reagents and dedicated system packs**

Symbols used with IVD devices

	Date of manufacture		Manufactured by
IVD	In vitro diagnostic medical device		Keep away from sunlight
	Do not freeze		This way up
	Use-by date		Do not use if package is damaged
	Keep dry	LOT	Batch Code
	Consult instructions for use	R	Reagent
eIFU Indicator	Consult electronic instructions for use	CAL	Calibrator Material
REF	Catalogue number		
	Caution		

eIFU Indicator

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SCAN TO EXPLORE MORE

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