



SYNCHRON System(s)
Chemistry Information Sheet

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ALT
Alanine Aminotransferase

REF

442620 (200 tests/cartridge)
 476826 (400 tests/cartridge)

For *In Vitro* Diagnostic Use

Rx Only

ANNUAL REVIEW

Reviewed by	Date	Reviewed by	Date

PRINCIPLE

INTENDED USE

ALT reagent, when used in conjunction with UniCel Dx C 600/800 System(s), is intended for the quantitative determination of alanine aminotransferase activity in human serum or plasma.

CLINICAL SIGNIFICANCE

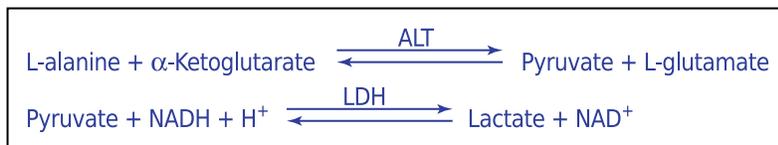
Alanine aminotransferase measurements are used in the diagnosis and treatment of certain liver diseases (e.g., viral hepatitis and cirrhosis) and heart diseases.

METHODOLOGY

ALT reagent is used to measure analyte activity by a kinetic rate method.^{1,2} In the reaction, alanine aminotransferase catalyzes the reversible transamination of L-alanine and alpha-ketoglutarate to pyruvate and L-glutamate. The pyruvate is then reduced to lactate in the presence of lactate dehydrogenase (LDH) with the concurrent oxidation of reduced β-nicotinamide adenine dinucleotide (NADH) to β-nicotinamide adenine dinucleotide (NAD).

The SYNCHRON System(s) automatically proportions the appropriate sample and reagent volumes into the cuvette. The ratio used is one part sample to 11 parts reagent. The system monitors the change in absorbance at 340 nanometers. This change in absorbance is directly proportional to the activity of ALT in the sample and is used by the System to calculate and express the ALT activity.

CHEMICAL REACTION SCHEME



E015177L.EPS

SPECIMEN

TYPE OF SPECIMEN

Biological fluid samples should be collected in the same manner routinely used for any laboratory test.³ Freshly drawn serum or plasma are the specimens of choice. Acceptable anticoagulants are listed in PROCEDURAL NOTES section of this chemistry information sheet. Whole blood is not recommended for use as a sample.

SPECIMEN STORAGE AND STABILITY

1. Tubes of blood are to be kept closed at all times and in a vertical position. It is recommended that the serum or plasma be physically separated from contact with cells within two hours from the time of collection.⁴
2. Separated serum or plasma should not remain at room temperature longer than 8 hours. If assays are not completed within 8 hours, serum or plasma should be stored at +2°C to +8°C. If assays are not completed within 48 hours, or the separated sample is to be stored beyond 48 hours, samples should be frozen at -15°C to -20°C. Frozen samples should be thawed only once. Analyte deterioration may occur in samples that are repeatedly frozen and thawed.⁴
3. Refer to references (4,5) for additional information on the effects of preanalytical variables on sample storage and stability. Each laboratory should determine if the recommended requirements are appropriate.

Additional specimen storage and stability conditions as designated by this laboratory:

SAMPLE VOLUME

The optimum volume, when using a 0.5 mL sample cup, is 0.3 mL of sample. For optimum primary sample tube volumes and minimum volumes, refer to the Primary Tube Sample Template for your system.

CRITERIA FOR UNACCEPTABLE SPECIMENS

Refer to the PROCEDURAL NOTES section of this chemistry information sheet for information on unacceptable specimens.

Criteria for sample rejection as designated by this laboratory:

PATIENT PREPARATION

Special instructions for patient preparation as designated by this laboratory:

SPECIMEN HANDLING

Special instructions for specimen handling as designated by this laboratory:

REAGENTS

CONTENTS

Each kit contains the following items:

Two Alanine Aminotransferase Reagent Cartridges (2 x 200 tests) or (2 x 400 tests and 2 bottles of ALT [A-reagent])

VOLUMES PER TEST

Sample Volume	23 μ L
ORDAC Sample Volume	3 μ L
Total Reagent Volume	250 μ L
Cartridge Volumes	
A	242 μ L
B	8 μ L
C	--

REACTIVE INGREDIENTS

REAGENT CONSTITUENTS

α -Ketoglutarate	16 mmol/L
Lactate dehydrogenase (LD)	>2300 IU/L
L-Alanine	500 mmol/L
Tris buffer	97 mmol/L
NADH	0.18 mmol/L

Also non-reactive chemicals necessary for optimal system performance.

 **CAUTION**

Sodium azide preservative may form explosive compounds in metal drain lines. See NIOSH Bulletin: Explosive Azide Hazard (8/16/76).

To avoid the possible build-up of azide compounds, flush wastepipes with water after the disposal of undiluted reagent. Sodium azide disposal must be in accordance with appropriate local regulations.

Avoid skin contact with reagent. Use water to wash reagent from skin.

GHS HAZARD CLASSIFICATION

Alanine Aminotransferase
Reagent (Compartment C)

WARNING



H316	Causes mild skin irritation.
H319	Causes serious eye irritation.
P280	Wear protective gloves, protective clothing and eye/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.
P337+P313	If eye irritation persists: Get medical advice/attention.
	Tris(hydroxymethyl)- aminomethane 1 - 5%
	α -Ketoglutaric Acid < 3%

Alanine Aminotransferase
Reagent (Compartment A)

WARNING

H316	Causes mild skin irritation.
P332+P313	If skin irritation occurs: Get medical advice/attention.
	Tris(hydroxymethyl)- aminomethane 1 - 5%

Alanine Aminotransferase
Reagent (Compartment B)

WARNING



H302

Harmful if swallowed.

P264

Wash hands thoroughly after handling.

P301+P312

IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell.

Ethylene Glycol > 90%

ALT (A-Reagent)

WARNING



H316

Causes mild skin irritation.

H319

Causes serious eye irritation.

P280

Wear protective gloves, protective clothing and eye/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.

P337+P313

If eye irritation persists: Get medical advice/attention.

Tris(hydroxymethyl)- aminomethane 1 - 5%

α -Ketoglutaric Acid < 3%

SDS

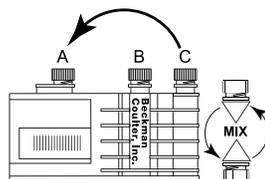
Safety Data Sheet is available at techdocs.beckmancoulter.com

MATERIALS NEEDED BUT NOT SUPPLIED WITH REAGENT KIT

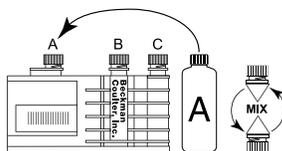
At least two levels of control material

Saline

REAGENT PREPARATION



For P/N 442620 (2 x 200 tests): Transfer all the contents of the smallest reagent compartment (C) into the largest reagent compartment (A).



For P/N 476826 (2 x 400 tests): Transfer all the contents of one ALT (A-reagent) bottle into the largest reagent compartment (A).

Replace cartridge caps and gently invert the cartridge several times to ensure adequate mixing.

ACCEPTABLE REAGENT PERFORMANCE

The acceptability of a reagent is determined by ensuring that quality control results are within your facility's acceptance criteria.

REAGENT STORAGE AND STABILITY

ALT reagent when stored unopened at +2°C to +8°C will obtain the shelf-life indicated on the cartridge label. Once prepared, the reagent is stable for 30 days at +2°C to +8°C unless the expiration date is exceeded. DO NOT FREEZE.

Reagent storage location:

CALIBRATION

CALIBRATOR REQUIRED

Calibration is not required.

TRACEABILITY

This measurand (analyte) is traceable to the manufacturer's selected Measurement Procedure as described in the Methodology section.

QUALITY CONTROL

At least two levels of control material, normal and abnormal, should be analyzed daily. In addition, these controls should be run with each new reagent cartridge and after specific maintenance or troubleshooting procedures as detailed in the appropriate system manual. More frequent use of controls or the use of additional controls is left to the discretion of the user based on good laboratory practices or laboratory accreditation requirements and applicable laws.

The following controls should be prepared and used in accordance with the package inserts. Discrepant quality control results should be evaluated by your facility.

Table 1.0 Quality Control Material

CONTROL NAME	SAMPLE TYPE	STORAGE

TESTING PROCEDURE(S)

1. If necessary prepare reagent as defined in the Reagent Preparation section of this chemistry information sheet and load the reagent onto the system.
2. Program samples and controls for analysis.
3. After loading samples and controls onto the system, follow the protocols for system operations.

For detailed testing procedures, refer to the UniCel DxC 600/800 System *Instructions For Use* (IFU) manual.

CALCULATIONS

The SYNCHRON System(s) performs all calculations internally to produce the final reported result. The system will calculate the final result for sample dilutions made by the operator when the dilution factor is entered into the system during sample programming.

REPORTING RESULTS

Equivalency between the SYNCHRON LX and UniCel DxC 600/800 Systems has been established. Chemistry results between these systems are in agreement and data from representative systems may be shown.

REFERENCE INTERVALS

Each laboratory should establish its own reference intervals based upon its patient population. The following reference intervals were taken from literature and a study performed on SYNCHRON Systems.⁶

Table 2.0 Reference intervals

INTERVALS	SAMPLE TYPE	CONVENTIONAL UNITS	S.I. UNITS
Literature	Serum or Plasma (Male)	10 – 40 IU/L	0.17 – 0.68 μ kat/L
	Serum or Plasma (Female)	7 – 35 IU/L	0.12 – 0.60 μ kat/L
SYNCHRON	Serum or Plasma (Male)	17 – 63 IU/L	0.29 – 1.07 μ kat/L
	Serum or Plasma (Female)	14 – 54 IU/L	0.24 – 0.92 μ kat/L

INTERVALS	SAMPLE TYPE	CONVENTIONAL UNITS	S.I. UNITS
Laboratory			

Refer to References (7,8,9) for guidelines on establishing laboratory-specific reference intervals.

Additional reporting information as designated by this laboratory:

PROCEDURAL NOTES

ANTICOAGULANT TEST RESULTS

- If plasma is the sample of choice, the following anticoagulants were found to be compatible with this method based on a study of 20 healthy volunteers:

Table 3.0 Compatible Anticoagulants

ANTICOAGULANT	LEVEL TESTED FOR IN VITRO INTERFERENCE	AVERAGE PLASMA-SERUM BIAS (IU/L)
Ammonium Heparin	14 Units/mL	NSI ^a
Lithium Heparin	14 Units/mL	NSI
Sodium Heparin	14 Units/mL	NSI

^a NSI = No Significant Interference (within ± 6.0 IU/L or 7%).

- The following anticoagulant was found to be incompatible with this method:

Table 4.0 Incompatible Anticoagulants

ANTICOAGULANT	LEVEL TESTED FOR IN VITRO INTERFERENCE	PLASMA-SERUM BIAS (IU/L) ^a
Potassium Oxalate/Sodium Fluoride	2.0 / 2.5 mg/mL	-15

^a Bias is based on worst case instead of average. Plus (+) or minus (-) signs in this column signify positive or negative bias.

LIMITATIONS

Samples with extremely high enzyme activity ($>12,000$ IU/L or >200.04 $\mu\text{kat/L}$) may consume all of the NADH substrate before the first absorbance measurement is taken after sample addition. These samples can report either very low enzyme activities or suppress the result as "OIR LO". These samples should be diluted 1:20 with saline and rerun.

INTERFERENCES

- The following substances were tested for interference with this methodology:

Table 5.0 Interferences

SUBSTANCE	SOURCE	LEVEL TESTED	OBSERVED EFFECT
Bilirubin	Bovine	30 mg/dL	NSI ^a
Lipemia	Intralipid ^b	300 mg/dL	NSI

a NSI = No Significant Interference (within ± 6.0 IU/L or 7%).

b Intralipid is a registered trademark of KabiVitrum, Inc., Clayton, NC 27250.

2. Samples showing evidence of hemolysis should not be used. Hemolysis may cause falsely elevated results.
3. Refer to References (10,11,5) for other interferences caused by drugs, disease and preanalytical variables.

PERFORMANCE CHARACTERISTICS

ANALYTIC RANGE

The SYNCHRON System(s) method for the determination of alanine aminotransferase provides the following analytical range:

Table 6.0 Analytical Range

SAMPLE TYPE	CONVENTIONAL UNITS	S.I. UNITS
Serum or Plasma	5 – 400 IU/L	0.09 – 6.80 μ kat/L
Serum or Plasma (ORDAC) ^a	350 – 2600 IU/L	5.8 – 43.0 μ kat/L

a Overrange Detection and Correction. Refer to the SYNCHRON LX *Operations Manual*, or the UniCel DxC 600/800 System *Instructions For Use* (IFU) manual for more details on this function.

Samples with activities exceeding the high end of the analytical range should be rerun with ORDAC enabled or diluted with saline and reanalyzed.

REPORTABLE RANGE (AS DETERMINED ON SITE):

Table 7.0 Reportable Range

SAMPLE TYPE	CONVENTIONAL UNITS	S.I. UNITS

SENSITIVITY

Sensitivity is defined as the lowest measurable concentration which can be distinguished from zero with 95% confidence. Sensitivity for ALT determination is 5 IU/L (0.08 μ kat/L).

EQUIVALENCY

Equivalency was assessed by Deming regression analysis of patient samples to accepted clinical methods.

Serum or Plasma (in the range of 5.0 to 389.1 IU/L):

Y (SYNCHRON LX Systems)

$$= 0.994X + 5.02$$

N

$$= 74$$

Serum or Plasma (in the range of 5.0 to 389.1 IU/L):

MEAN (SYNCHRON LX Systems)	= 86.9
MEAN (SYNCHRON CX7 DELTA)	= 82.3
CORRELATION COEFFICIENT (r)	= 0.9965

Refer to References (12) for guidelines on performing equivalency testing.

PRECISION

A properly operating SYNCHRON System(s) should exhibit precision values less than or equal to the following:

Table 8.0 Precision Values

TYPE OF PRECISION	SAMPLE TYPE	1 SD		CHANGEOVER VALUE ^a		% CV
		IU/L	µkat/L	IU/L	µkat/L	
Within-run	Serum/Plasma	3.0	0.05	85.7	1.43	3.5
	Serum/Plasma (ORDAC)	NA ^b	NA	NA	NA	10.0
Total	Serum/Plasma	4.5	0.08	85.7	1.43	5.3
	Serum/Plasma (ORDAC)	NA	NA	NA	NA	15.0

a When the mean of the test precision data is less than or equal to the changeover value, compare the test SD to the SD guideline given above to determine the acceptability of the precision testing. When the mean of the test precision data is greater than the changeover value, compare the test % CV to the guideline given above to determine acceptability. Changeover value = (SD guideline/CV guideline) x 100.

b NA = Not applicable.

Comparative performance data for a SYNCHRON LX System evaluated using the NCCLS Proposed Guideline EP5-T2 appears in the table below.¹³ Each laboratory should characterize their own instrument performance for comparison purposes.

Table 9.0 NCCLS EP5-T2 Precision Estimate Method

TYPE OF IMPRECISION	SAMPLE TYPE		No. Systems	No. Data Points ^a	Test Mean Value (IU/L)	EP5-T2 Calculated Point Estimates	
						SD	%CV
Within-run	Serum	Control 1	1	80	20.3	0.88	4.34
	Serum	Control 2	1	80	178.9	0.87	0.48
	Serum	Control 3	1	80	334.3	1.86	0.56
Total	Serum	Control 1	1	80	20.3	0.94	4.61
	Serum	Control 2	1	80	178.9	1.25	0.70
	Serum	Control 3	1	80	334.3	2.84	0.85

a The point estimate is based on the data from one system, run for twenty days, two runs per day, two observations per run on an instrument operated and maintained according to the manufacturer's instructions.

NOTICE

These degrees of precision and equivalency were obtained in typical testing procedures on a SYNCHRON LX System and are not intended to represent the performance specifications for this reagent.

ADDITIONAL INFORMATION

For more detailed information on UniCel DxC Systems, refer to the appropriate system manual.

Beckman Coulter, the stylized logo, and the Beckman Coulter product and service marks mentioned herein are trademarks or registered trademarks of Beckman Coulter, Inc. in the United States and other countries.

May be covered by one or more pat. -see www.beckmancoulter.com/patents.

SHIPPING DAMAGE

If damaged product is received, notify your Beckman Coulter Clinical Support Center.

REVISION HISTORY

Revision AF

Updated corporate address; updated OSHA precaution, removed insert reference from content description, and removed EDTA as an Acceptable Anticoagulant claim.

Revision AG

Corrected formatting in the Reagent Preparation section.

Revision AH

Added Reagent Preparation visual aid to the Reagent Preparation section.

Revision AJ

Added Revision History

Revision AK

Added new language requirement: Czech, and Korean.

Revision AL

Removed references to CX and LX systems as they are discontinued effective 12/2013.

Added Beckman Coulter trademark statement and disclaimer.

Revision AM

Added GHS Classification information

Revision AN

Added GHS Classification information

Revision AP

Added new language requirement: Romanian

Revision AR

Updates to comply with requirements per Beckman Coulter Global Labeling Policy.

Revision AT

Additional changes to comply with requirements per Beckman Coulter Global Labeling Policy.

Revision AU

Added new language requirement: Bulgarian, Serbian, and Vietnamese. Additional changes to comply with requirements per Beckman Coulter Global Labeling Policy.

SYMBOLS KEY

Table 10.0

	Catalogue Number		In Vitro Diagnostic
	Contents		Temperature limit
	Manufacturer		Expiration Date
	Batch code		Safety Data Sheet
	CE Mark		Consult Instructions for Use
	Authorized Representative in the European Community		Date of Manufacture
	Biological risks		WARNING
	Reagent Cartridges		ALT (A-Reagent)
	Do not reuse		
			Made in USA of US and Foreign Components

REFERENCES

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12. National Committee for Clinical Laboratory Standards, *Method Comparison and Bias Estimation Using Patient Samples* Approved Guideline, NCCLS publication EP9-A, Villanova, PA (1995).
13. National Committee for Clinical Laboratory Standards, *Precision Performance of Clinical Chemistry Devices* Tentative Guideline, 2nd Edition, NCCLS publication EP5-T2, Villanova, PA (1992).

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