



Chem 4ab Calibration Verification / Linearity Test Kit

INTENDED USE

VALIDATE Chem 4ab Calibration Verification / Linearity Test Kit solutions are intended for *in vitro* diagnostic use in the quantitative determination of linearity, calibration verification and verification of reportable range in automated, semi-automated and manual instrument systems for the following analytes: alkaline phosphatase (ALP), alanine aminotransferase (ALT), amylase (AMY), aspartate aminotransferase (AST), creatine kinase (CK), gamma- glutamyl transferase (GGT), lactate dehydrogenase (LD) and lipase (LIP).

Each test kit consists of one bottle each of Levels 1 through 6. Each bottle contains 5.0 milliliters. There exists a linear relationship among Levels 1 through 6.

SUMMARY

Each **VALIDATE** Chem 4ab Calibration Verification / Linearity Test Kit contains purified materials in a solution of bovine albumin stabilized with ethylene glycol. The test kit will assist in the documentation of linearity, calibration verification and verification of reportable range required by many inspection agencies. The solutions will also provide assistance when troubleshooting instrument systems, reagent problems and calibration anomalies.

REAGENTS

Reactive Ingredients:

Purified enzymes: ALP from human placenta, ALT from porcine heart, AMY from porcine pancreas, AST from porcine heart, CK from rabbit muscle, GGT from bovine kidney, LD from chicken heart and LIP from porcine pancreas. The purified materials are in a solution of bovine albumin stabilized with ethylene glycol.

Nonreactive Ingredients:

Preservatives and stabilizers.

Precautions and Warnings

For In Vitro Diagnostic Use

Disposal of all waste material should be in accordance with local guidelines.

WARNING: Potentially Biohazardous

Human source material is considered potentially biohazardous. Material of human origin used in the manufacture of this test kit was tested at the donor level using FDA approved methods and found to be nonreactive for HBsAg and to antibodies to HCV and HIV-1/2. Because no test method can offer complete assurance that infectious agents are absent, these specimens should be handled and treated as potentially infectious.

STORAGE AND STABILITY

VALIDATE Chem 4ab Calibration Verification / Linearity Test Kits are stored at -10° to -20°C. **Do NOT store in a frost-free freezer.** Test kits are stable

until the expiration date printed on the bottle and storage container when handled according to instructions.

PREPARATION

Prior to use, remove the **VALIDATE** Chem 4ab Calibration Verification / Linearity Test Kit from storage and allow to come to room temperature (18° to 25°C). Invert gently several times before dispensing.

To maximize stability, it is recommended that exposure to room temperature be minimized. Tightly cap opened bottles and return to -10° to -20°C immediately after dispensing.

Discard any solutions that appear to have gross bacterial contamination.

The **VALIDATE** Chem 4ab Calibration Verification / Linearity Test Kit should be treated in the same manner as patient samples. If dilutions or pre-treatment are required as part of the testing procedure, follow the manufacturer's instructions.

ASSAY

Analyze each level in replicates. If following the CLSI EP6 guidelines for linearity, use a random analytical sequence to assay each level.

CALCULATION OF RESULTS

VALIDATE Calibration Verification / Linearity material is prepared in a manner such that an equal distance (delta) exists between Levels 1 and 5. This dilution scheme is consistent with the CLSI EP6 recommendation for preparing linearity sets.

Level 6 is manufactured to a specific target and the theoretical value is determined by multiplying the theoretical value of Level 3 by the factors provided:

Analyte	Factor	Analyte	Factor
ALP	4.13	CK	N/A
ALT	8.72	GGT	11.99
AMY	4.36	LD	4.77
AST	9.20	LIP	N/A

For CK and LIP, assay Levels 1 through 5 only.

Two examples for calculating the theoretical values of Levels 1 through 6 are provided below. In these examples the analyte is LD.

Example 1:

Choose two consecutive levels and calculate the delta between the recovered values. The following example demonstrates the use of the delta between Levels 2 and 3 to calculate the theoretical value for Levels 1, 4 and 5:

Mean Recovered Values

Level 1	1
Level 2	495
Level 3	990
Level 4	1,489
Level 5	1,984
Level 6	4,714

Using Level 2 and Level 3 recovered values to calculate the Delta, the above data produces the following:

Level 3 – Level 2 = Delta, or (990 - 495 = 495)

Level 1 Theoretical = Level 2 Recovered – Delta (495 - 495 = 0)

Level 4 Theoretical = Level 3 Recovered + Delta (990 + 495 = 1,485)

Level 5 Theoretical = Level 4 Theoretical + Delta (1,485 + 495 = 1,980)

Level 6 Theoretical = Level 3 Recovered * 4.77 (LD factor) = 4,722

Using the delta between Level 2 and Level 3, the theoretical value for each level would be:

Level	Theoretical (x-axis)	Recovered (y-axis)
1	0	1
2	495	495
3	990	990
4	1,485	1,489
5	1,980	1,984
6	4,722	4,714

NOTE: The user can select the calculated delta between any two consecutive levels to calculate the theoretical values. Typically, the user should choose an area of recovery known to be linear for the method being studied.

Example 2:

Theoretical values can be determined using the recovered values for Levels 1 and 5. Using this method, the following formulas apply:

Level 2 = 0.75 * (Level 1) + 0.25 * (Level 5)

Level 3 = 0.5 * (Level 1) + 0.5 * (Level 5)

Level 4 = 0.25 * (Level 1) + 0.75 * (Level 5)

Using the recovered values for Level 1 (1) and Level 5 (1,984), the following applies:

Level 2 = 0.75 * (1) + 0.25 * (1,984) = 497

Level 3 = 0.5 * (1) + 0.5 * (1,984) = 993

Level 4 = 0.25 * (1) + 0.75 * (1,984) = 1,488

Level 6 = L3 theoretical (993) * 4.77 (LD factor) = 4,737

Level	Theoretical (x-axis)	Recovered (y-axis)
1	1	1
2	497	495
3	993	990
4	1,488	1,489
5	1,984	1,984
6	4,737	4,714

After the theoretical values are calculated, for each analyte plot the expected (Theoretical) value on the x-axis versus the Recovered value on the y-axis using standard linear graph paper. If the system is linear, the plot should approximate a straight line. The point at which the line is no longer straight can be used to determine the limit of linearity or the reportable range.

Data reduction is available from Maine Standards Company (see worksheet for instructions).

Commercially available linear regression software may also be used. The software should provide data point display and x-y graphical presentation. Linear regression should be interpreted using standard statistical analysis and the results should be compared with the instrument manufacturer's claims for linearity or with individual laboratory performance requirements. The degree of acceptable non-linearity is an individual judgment based on methodology, clinical significance and medical decision levels of the test analyte.

LIMITATIONS

VALIDATE Chem 4ab Calibration Verification / Linearity Test Kit solutions are not intended for use as routine quality control materials or as calibration materials.

These solutions are not intended for use on systems employing reflectance spectroscopy.

EXPECTED VALUES

VALIDATE Chem 4ab Calibration Verification / Linearity Test Kits are manufactured such that a linear relationship exists among Levels 1 through 6.

TYPICAL VALUES

Actual results obtained may vary depending on instrumentation, methodology and assay temperature. Results may also be dependent on the accuracy of the instrument/reagent system calibration. The degree of acceptable non-linearity is an individual judgment based on methodology, clinical significance and medical decision levels of the test analyte.

Typical Values by Level 104ab							
Analyte	Units	1	2	3	4	5	6
ALP	U/L	0	550	1,100	1,650	2,200	4,555
ALT	U/L	0	235	470	705	940	4,113
AMY	U/L	0	750	1,500	2,250	3,000	6,554
AST	U/L	0	228	455	683	910	4,202
CK	U/L	0	1,067	2,134	3,200	4,267	N/A
GGT	U/L	0	385	770	1,155	1,540	9,256
LD	U/L	0	495	990	1,485	1,980	4,732
LIP	U/L	0	300	600	900	1,200	N/A

ORDERING and SUPPORT INFORMATION

VALIDATE Chem 4ab

Calibration Verification / Linearity Test Kit: 6 x 5 mL

VALIDATE Chem 4ab Calibration Verification / Linearity Test Kits are manufactured by Maine Standards Company exclusively for Abbott Laboratories.

To Order:

Abbott Diagnostics Customer Support
1-800-323-9100
List Number 03L45-02.

For Technical Assistance:

Maine Standards Company
1-800-377-9684

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