Audit Diagnostics

CE

ALP-LO

ALP-LQ (Alkaline phosphatase)

p-Nitrophenylphosphate. kinetic. Liquid. DGKC

Quantitative determination of alkaline phosphatase (ALP) IVD

Store at 2-8ºC

PRINCIPLE OF THE METHOD

Alkaline phosphatase (ALP) catalyses the hydrolysis of p-nitrophenyl phosphate at pH 10.4, liberating p-nitrophenol and phosphate, according to the following reaction:

$$\text{p-Nitrophenylphosphate} + H_2O \xrightarrow{\text{ALP}} \text{p-Nitrophenol} + \text{Phosphate}$$

The rate of p-nitrophenol formation, measured photometrically, is proportional to the catalytic concentration of alkaline phosphatase present in the sample[1,2].

CLINICAL SIGNIFICANCE

Alkaline phosphatase is an enzyme present in almost all weaves of the organism, being particularly high in bone, liver, placenta, intestine and kidney. Both increases and decreases of plasma ALP are of importance clinically.
Causes of increased plasma ALP: Paget's disease of bone, obstructive liver disease, hepatitis, hepatotoxicity caused by drugs or osteomalacia.
Causes of decreased plasma ALP: Cretinism and vitamin C deficiency[1,5,6].
Clinical diagnosis should not be made on a single test result; it should integrate clinical and other laboratory data.

REAGENTS

R 1 Buffer	Diethanolamine (DEA) pH 10.4 Magnesium chloride	1 mmol/L 0.5 mmol/L
R 2 Substrate	p-Nitrophenylphosphate (*p*NPP)	10 mmol/L

PREPARATION

Working reagent (WR)
Mix: 4 vol. (R1) Buffer + 1 vol. (R2) Substrate

Stability: 1 month at 2-8ºC or 10 days at room temperature (15-25ºC).

STORAGE AND STABILITY

All the components of the kit are stable until the expiration date on the label when stored tightly closed at 2-8ºC, protected from light and contaminations prevented during their use.
Do not use reagents over the expiration date.
Signs of reagent deterioration:
- Presence of particles and turbidity.
- Blank absorbance (A) at 405 nm ≥ 1.30.

ADDITIONAL EQUIPMENT

- Spectrophotometer or colorimeter measuring at 405 nm.
- Thermostatic bath at 25ºC, 30ºC o 37ºC (± 0.1ºC)
- Matched cuvettes 1.0 cm light path.
- General laboratory equipment.

SAMPLES

Serum or heparinzed plasma[1]. Use unhemolyzed serum, separated from the clot as soon as possible. Stability : 3 days at 2-8ºC.

PROCEDURE

1. Assay conditions:
   Wavelength: . . . . . .405 nm
   Cuvette: . . . . . 1 cm light path
   Constant temperature . . . . . 25ºC / 30ºC / 37ºC
2. Adjust the instrument to zero with distilled water or air.
3. Pipette into a cuvette:

WR (mL)	1.2
Sample (µL)	20

4. Mix, incubate for 1 minute.
5. Read initial absorbance (A) of the sample, start the stopwatch and read absorbances at 1 min intervals thereafter for 3 min.
6. Calculate the difference between absorbances and the average absorbance differences per minute (ΔA/min).

CALCULATIONS

ΔA/min x 3300 = U/L de ALP

Units: One international unit (IU) is the amount of enzyme that transforms 1 µmol of substrate per minute, in standard conditions. The concentration is expressed in units per litre of sample (U/L).

Temperature conversion factors
To correct results to other temperatures multiply by:

Assay temperature	Conversion factor to		
	25ºC	30ºC	37ºC
25ºC	1.00	1.22	1.64
30ºC	0.82	1.00	1.33
37ºC	0.61	0.75	1.00

QUALITY CONTROL

Control sera are recommended to monitor the performance of assay procedures: CONTROL Normal and Pathologic.
If control values are found outside the defined range, check the instrument, reagents and technique for problems.
Each laboratory should establish its own Quality Control scheme and corrective actions if controls do not meet the acceptable tolerances.

REFERENCE VALUES[1]

	25ºC	30ºC	37ºC
Children (1-14 years)	< 400 U/L	< 480 U/L	< 645 U/L
Adults	60 - 170 U/L	73 - 207 U/L	98 - 279 U/L

Factors affecting ALP activities in a normal population include exercise, periods of repaid growth in children and pregnancy.
These values are for orientation purpose; each laboratory should establish its own reference range.

PERFORMANCE CHARACTERISTICS

Measuring range: From detection limit of 0,6845 U/L to linearity limit of 1200 U/L.
If the results obtained were greater than linearity limit, dilute the sample 1/10 with NaCl 9 g/L and multiply the result by 10.
Precision:

	Intra-assay (n=20)		Inter-assay (n=20)	
Mean (U/L)	174	443	175	434
SD	0,72	1,56	6,88	11,93
CV (%)	0,41	0,35	3,93	2,75

Sensitivity: 1 U/L = 0,0003 ΔA/min.
Accuracy: Results obtained using Audit Diagnostics reagents (y) did not show systematic differences when compared with other commercial reagents (x).The results obtained using 50 samples were the following:
Correlation coefficient (r): 0,99938.
Regression equation: y= 1,025x – 1,105.
The results of the performance characteristics depend on the analyzer used.

INTERFERENCES

Fluoride, oxalate, citrate and EDTA inhibit alkaline phosphate activity and should therefore not be used as anticoagulants. Haemolyses interferes due to the high concentration of alkaline phosphatase in red cells[1,2].
A list of drugs and other interfering substances with acid phosphatase determination has been reported by Young et. al[3,4].

NOTES

Audit Diagnosticshas instruction sheets for several automatic analyzers Instructions for many of them are available on request.
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BIBLIOGRAPHY

1. Wenger C. et al. Alkaline phosphatase. Kaplan A et al. Clin Chem The C.V. Mosby Co. St Louis. Toronto. Princeton 1984; 1094-1098.
2. Rosalki S et al. Clin Chem 1993; 39/4: 648-652.
3. Young DS. Effects of drugs on Clinical Lab. Tests, 4th ed AACC Press, 1995.
4. Young DS. Effects of disease on Clinical Lab. Tests, 4th ed AACC 2001.
5. Burtis A et al. Tietz Textbook of Clinical Chemistry, 3rd ed AACC 1999.
6. Tietz N W et al. Clinical Guide to Laboratory Tests, 3rd ed AACC 1995.

Manufactured By: AUDIT DIAGNOSTICS
Business & Technology Park, Carrigtwohill, Co. Cork (Ireland)
Tel: 00353 - (0) 21 – 4533 652 *Fax:* 00353 - (0) 21 – 4533 653
E-mail: info@auditdiagnostics.ie *Website:* www.auditdiagnostics.ie