

EnzyFluo™ L-lactate Assay Kit (EFLLC-100)
Quantitative Fluorimetric Determination of L-Lactate

DESCRIPTION

LACTATE is generated by lactate dehydrogenase (LDH) under hypoxic or anaerobic conditions. Monitoring lactate levels is, therefore, a good indicator of the balance between tissue oxygen demand and utilization and is useful when studying cellular and animal physiology.

Simple, direct and automation-ready procedures for measuring lactate concentration are very desirable. BioAssay Systems' EnzyFluo™ lactate assay kit is based on lactate dehydrogenase catalyzed oxidation of lactate, in which the formed NADH reduces a probe into a highly fluorescent product. The fluorescence intensity of this product, measured at $\lambda_{ex/em} = 530/585$ nm, is proportional to the lactate concentration in the sample.

APPLICATIONS

Direct Assays: L-lactate in serum, plasma, urine, cell media samples and other biological samples.

KEY FEATURES

Sensitive and accurate. Detection limit of 1 μ M and linearity up to 50 μ M L-lactate in 96-well plate assay.

Convenient. The procedure involves adding a single working reagent, and reading the fluorescence after 60 min. Room temperature assay.

High-throughput. Can be readily automated as a high-throughput 96-well plate assay for thousands of samples per day.

KIT CONTENTS

Assay Buffer:	10 mL	Enzyme A:	120 μ L
NAD Solution:	1 mL	Enzyme B:	120 μ L
Probe:	750 μ L	Standard:	1 mL

Storage conditions. The kit is shipped on ice. Store all reagents at -20°C. Shelf life: 6 months after receipt.

Precautions: reagents are for research use only. Normal precautions for laboratory reagents should be exercised while using the reagents. Please refer to Material Safety Data Sheet for detailed information.

SAMPLE PREPARATION AND CONSIDERATIONS

The following substances interfere and should be avoided in sample preparation: EDTA (>0.5 mM), ascorbic acid, SDS (>0.2%), sodium azide, NP-40 (>1%) and Tween-20 (>1%). Serum and plasma samples should be diluted at least 200 \times with dH₂O. Samples containing higher than 100 μ M pyruvate (final concentration after any dilutions) require an internal standard.

PROCEDURES

- Standard Curve.** Prepare 1000 μ L 40 μ M L-lactate Premix by mixing 2 μ L 20 mM Standard and 998 μ L distilled water. For cell culture samples, prepare 1000 μ L 40 μ M L-lactate Premix by mixing 2 μ L 20 mM Standard and 998 μ L culture medium without serum. Dilute standard as follows.

No	Premix + H ₂ O or Medium	L-lactate (μ M)
1	100 μ L + 0 μ L	40
2	60 μ L + 40 μ L	24
3	30 μ L + 70 μ L	12
4	0 μ L + 100 μ L	0

Transfer 50 μ L standards into wells of a black 96-well plate.

Samples. Add 50 μ L of each sample to separate wells of a black 96-well plate.

Samples requiring an internal standard, will need two separate reactions: 1) Sample plus Standard and 2) Sample alone. In addition, each plate will need a Water Blank (0 μ M L-lactate) reaction. For the internal standard first prepare 400 μ L 250 μ M L-lactate standard by mixing 5 μ L 20 mM Standard and 395 μ L dH₂O. For the Sample plus Standard well, add 5 μ L 250 μ M L-lactate and 45 μ L sample. For the Sample wells, add 5 μ L dH₂O and 45 μ L sample. For the Water Blank add 50 μ L dH₂O.

- Reagent Preparation.** Spin the Enzyme tubes briefly before pipetting. For each Sample and Standard well, prepare Working Reagent by mixing 40 μ L Assay Buffer, 1 μ L Enzyme A, 1 μ L Enzyme B, 10 μ L NAD and 5 μ L Probe. Fresh reconstitution is recommended.
- Reaction.** Add 50 μ L Working Reagent per reaction well quickly. Tap plate to mix. Incubate for 60 min at RT protected from light.
- Read fluorescence** $\lambda_{ex/em} = 530/585$ nm.

CALCULATION

Plot the L-lactate Standard Curve and determine its slope. The L-lactate concentration of the sample is computed as follows:

$$[L\text{-Lactate}] = \frac{F_{\text{SAMPLE}} - F_{\text{BLANK}}}{\text{Slope } (\mu\text{M}^{-1})} \times n \quad (\mu\text{M})$$

where F_{SAMPLE} and F_{BLANK} are the fluorescence intensity values of the Sample and 0 μ M L-lactate (Std 4) respectively. Slope is the slope of the standard curve and n is the dilution factor (e.g. $n = 200$ for serum samples).

If an internal standard was needed, the sample L-lactate concentration is computed as follows:

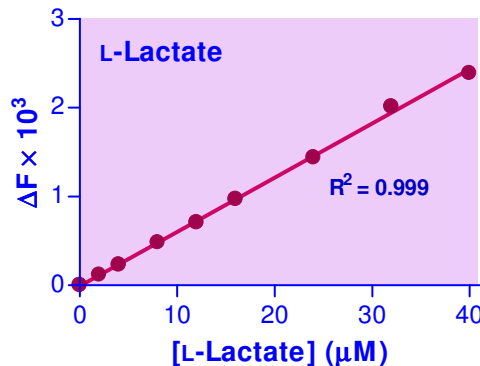
$$[L\text{-Lactate}] = \frac{F_{\text{SAMPLE}} - F_{\text{BLANK}}}{F_{\text{STANDARD}} - F_{\text{SAMPLE}}} \times 27.8 \quad (\mu\text{M})$$

where F_{SAMPLE} and F_{BLANK} are the fluorescence intensity values of the Sample and Water Blank respectively and F_{STANDARD} is the fluorescence intensity value of the Sample plus Standard.

Note: if the sample ΔF value is higher than the ΔF for 40 μ M L-lactate standard or greater than the ΔF for the internal standard, dilute the sample in water and repeat the assay. Multiply the results by the dilution factor.

MATERIALS REQUIRED, BUT NOT PROVIDED

Pipetting (multi-channel) devices. Black, flat bottom 96-well plates and fluorescent plate reader capable of reading at $\lambda_{ex/em} = 530/585$ nm.



Standard Curve in 96-well plate assay in water.

PUBLICATIONS

- Sengupta, D., et al (2019). Multiplexed single-cell measurements of fdg uptake and lactate release using droplet microfluidics. *Technology in Cancer Research & Treatment*, 18, 1533033819841066.
- Konrad, Csaba, et al (2017). Fibroblast bioenergetics to classify amyotrophic lateral sclerosis patients. *Molecular neurodegeneration* 12.1: 76.
- Mongersun, Amy, et al. (2016). Droplet Microfluidic Platform for the Determination of Single-Cell Lactate Release. *Analytical chemistry* 88.6: 3257-3263.

