

Bloodox-2019

Oxygen Binding–Dissociation Analyzer

Real-Time Analysis of Hemoglobin Oxygen Binding and Release

Linking Oxygen Partial Pressure to Hemoglobin Oxygenation Status



The Bloodox-2019 Oxygen Binding–Dissociation Analyzer continuously records hemoglobin oxygen binding and release across a range of oxygen partial pressures. It generates oxygen-binding and oxygen-dissociation curves and calculates P50, the Hill coefficient, and other parameters for assessing oxygen affinity and oxygen transport characteristics.

Suitable for whole blood, red blood cell lysates, hemoglobin solutions, hemoglobin-based oxygen carriers, and related samples.

Key Features

Direct PO₂ Measurement with a Clark Oxygen Electrode

A Clark oxygen electrode continuously measures sample oxygen partial pressure (PO₂).

This established electrochemical method responds directly to changes in the oxygen partial pressure of the sample.

Bloodox-2019 combines Clark-electrode PO₂ measurement with dual-wavelength spectrophotometry to record, in real time:

Changes in oxygen partial pressure + changes in hemoglobin oxygenation

The result is a direct relationship between PO₂ and hemoglobin oxygenation status.

Dynamic Oxygen Binding and Release Profiles

The system continuously tracks hemoglobin responses as PO₂ changes:

Oxygen binding → higher oxygen saturation

Oxygen release → lower oxygen saturation

Complete oxygen-binding and oxygen-dissociation curves are generated.

These curves provide an intuitive view of hemoglobin oxygen binding and release at different PO₂ levels, enabling comparison between samples and test conditions.

Microliter-Scale Sample Requirement

Each test requires approximately 3–6 mg of hemoglobin.

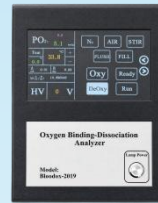
For whole blood, the typical sample volume is approximately 30–50 µL—ideal for limited or valuable samples and multi-group studies.

Compatible Samples

- Whole blood
- Red blood cell lysates
- Hemoglobin solutions
- Hemoglobin-based oxygen carriers
- Other samples requiring assessment of hemoglobin oxygen binding and release

Integrated Control for Reproducible Testing

Bloodox-2019 integrates gas delivery, temperature control, PO₂ monitoring, sample handling, and data acquisition for controlled oxygen-binding and oxygen-dissociation testing.



Touch Operated Interface

Precision Gas-Flow Control

Air and nitrogen flow can be set from 0 to 20 mL/min to control oxygenation and deoxygenation. Adjustable gas flow provides precise control over changes in the sample oxygen environment.

Precision Temperature Control

A microprocessor-controlled system continuously monitors and regulates the sample-chamber temperature.

The measurement temperature is maintained at 37 ± 0.1 °C, helping minimize the effect of temperature variation on oxygen-affinity results.

Centralized Touchscreen Control

The touchscreen interface provides control of:

- Air / nitrogen selection
- Gas-flow settings
- Oxygenation / deoxygenation
- Sample aspiration
- Sample discharge
- Real-time PO₂ monitoring
- Real-time temperature monitoring

Centralized control reduces repetitive manual steps and supports a more consistent workflow.

Measurement Principle

Deoxyhemoglobin and oxyhemoglobin have distinct optical absorption characteristics.

Bloodox-2019 uses dual-wavelength spectrophotometry to monitor hemoglobin oxygenation while a Clark oxygen electrode measures sample PO_2 in real time.

Air or nitrogen drives oxygenation or deoxygenation. Continuous acquisition of PO_2 and hemoglobin oxygenation data establishes their dynamic relationship and produces an oxygen-binding or oxygen-dissociation curve.

Sample Chamber

The sample chamber integrates:

Clark oxygen electrode | Temperature sensor | Magnetic stirring system

PO_2 and temperature are monitored simultaneously, while magnetic stirring keeps the sample homogeneous.

Connected to the gas, aspiration, and discharge lines, the chamber supports touchscreen-controlled:

- Automatic sample aspiration
- Air / nitrogen delivery
- Sample discharge

Minimizes manual handling during testing.

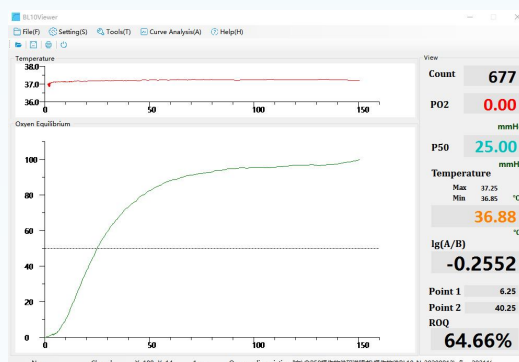


Data Analysis

Oxygen-Binding and Oxygen-Dissociation Curves

The software displays hemoglobin oxygen binding or release in real time as PO_2 changes. Processing options include:

- Raw Curve
- Translation
- Smooth
- LineFit
- Zero-Completion
- Raw-data export



P50

The oxygen partial pressure at which hemoglobin reaches 50% oxygen saturation.

P50 is a key indicator of hemoglobin oxygen affinity.

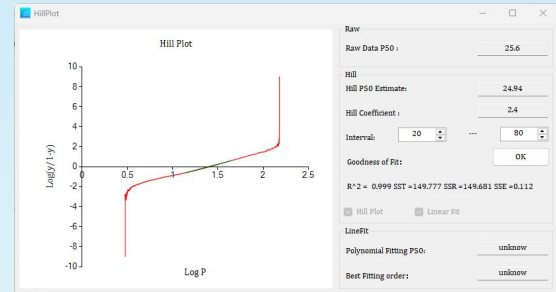
In general:

Higher P50

Lower oxygen affinity and a greater tendency to release oxygen

Lower P50

Higher oxygen affinity and a greater tendency to bind oxygen



Hill Coefficient

The Hill equation is used to assess cooperativity in hemoglobin–oxygen binding and to compare oxygen-binding characteristics across samples or test conditions.

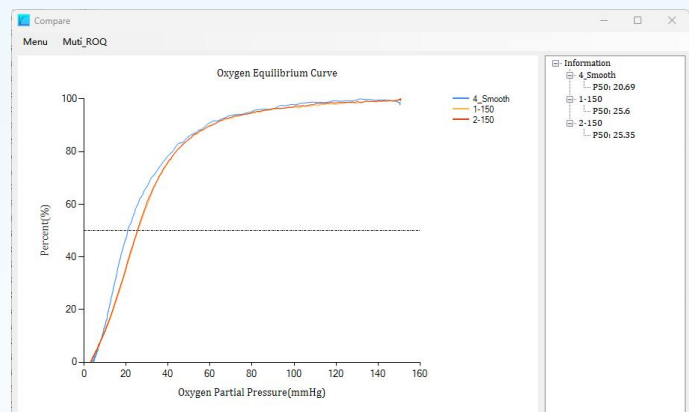
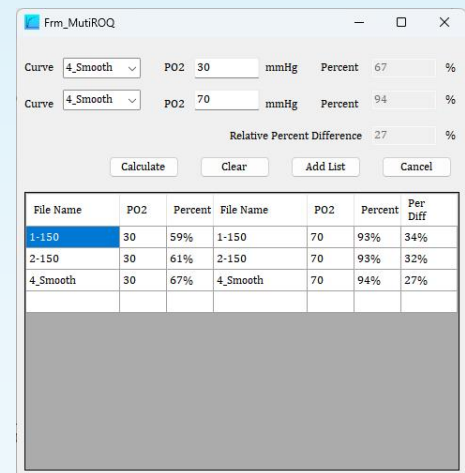
ROQ

Calculates the difference in oxygen saturation between any two selected PO₂ values, revealing changes in hemoglobin oxygenation across a defined PO₂ range.

Multi-Curve Comparison

Display multiple test curves simultaneously to compare:

- Leftward / rightward curve shifts
- Changes in P50
- Changes in oxygen affinity
- Oxygen-binding characteristics
- Oxygen-release characteristics
- Differences between test groups



Applications

Red Blood Cell Oxygen-Transport Research

- Assessment of oxygen binding and release in whole blood
- Red blood cell oxygen-affinity studies
- Studies of changes in red blood cell function

Blood Storage Research

- Changes in red blood cell function during storage
- Effects of storage conditions on oxygen binding and release
- Effects of processing methods on hemoglobin oxygen affinity

Hypoxia and High-Altitude Research

- Changes in hemoglobin oxygen affinity at high altitude
- Mechanisms of adaptation to hypoxia
- High-altitude-related changes in red blood cell function

Fundamental Blood Research

Supports evaluation of hemoglobin oxygen-transport function in research related to erythrocytosis, hyperviscosity, hemolysis, thrombosis, and other blood conditions.

Hemoglobin and Oxygen-Carrier Research

- Hemoglobin functional assessment
- Evaluation of hemoglobin-based oxygen carriers
- Effects of formulation and processing conditions on oxygen binding and release

Software

BL10 Data Acquisition Software

For experiment monitoring, parameter display, and raw-data acquisition.

BL10 Viewer Data Analysis Software

For curve processing, parameter analysis, and comparison of test results.

System Components

Bloodox-2019 includes the following modules:

- Dual-wavelength optical detection system
 - Clark oxygen electrode
 - Sample chamber
 - Gas-flow control system
 - Temperature-control system
 - Temperature sensor
 - Magnetic stirring system
 - Electronic control module
 - Touchscreen control system
 - Data acquisition and analysis software
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Technical Specifications

Item	Specification
PO ₂ measurement	Clark oxygen electrode
Hemoglobin measurement	Dual-wavelength spectrophotometry
Gases	Air / nitrogen
Gas-flow setting range	0–20 mL/min
Measurement temperature	37 ± 0.1 °C
Sample requirement	Approx. 3–6 mg hemoglobin
Communication interface	Serial-to-USB
Power supply	AC 110–240 V, 50/60 Hz
Main unit dimensions	64 × 40 × 32 cm
Data acquisition software	BL10
Data analysis software	BL10 Viewer

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