



OXYVIEW 1 SYSTEM

- Convenient, low-cost system for teaching of photosynthesis & respiration measurements using oxygen electrode.
- DWI/AD electrode chamber with base mounted SI oxygen electrode disc.
- Oxyview control unit with integral magnetic stirrer.
- Oxygen content of sample displayed as mV or percentage O₂.
- User-friendly configuration via a responsive 4 button control panel & a series of comprehensive menu screens.
- Analogue output for connection to a chart recorder or other external recording device.

Overview

The Oxyview 1 liquid-phase oxygen electrode teaching system has been designed in response to the ever-increasing demand for a low-cost system for teaching photosynthesis and respiration measurements using oxygen electrode techniques. The system is designed to be used in a busy teaching environment but is equally at home in a modern research facility.

The Oxyview 1 system provides a high degree of flexibility allowing oxygen evolution or consumption to be demonstrated from a wide range of samples from isolated chloroplasts to mitochondria suspensions in assays for both photosynthesis and cellular respiration studies.

The system is setup and configured in minutes allowing multiple systems to be used easily amongst large groups for student practicals and techniques demonstrations.

Clark Type Oxygen electrodes have been in use in bio-sensing assays since their development in the early 1960's by Prof. Leland Clark. Their use was first demonstrated as an effective tool for monitoring glucose in blood samples.

Subsequently, Clark type oxygen electrodes are now used in an enormous number of different bio-sensing applications from measurement of mitochondrial respiration in bio-medical applications and as a probe of photosynthetic performance in plant biology labs.

The Oxyview 1 system is an ideal solution for practical demonstrations of this significant and highly flexible method of bio-sensing throughout all areas of the biological sciences. The following sections describe the main features and functions of the Oxyview 1 system.

Components of the System

The Oxyview 1 system consists of the following individual items:

OXYVI Oxyview Control Unit

The OXYV1 Oxyview control unit has been designed as a convenient, low cost oxygen electrode control unit for teaching studies of photosynthesis and cellular respiration using the oxygen electrode measurement technique. The Oxyview control unit is fully compatible with the range of oxygen electrode chambers produced by Hansatech Instruments thus allowing a wide range of different assays to be performed in both liquid and gas-phases.

The Oxyview is configured and controlled via a front mounted control panel featuring 4 touch-sensitive buttons. Configuration is achieved by navigating through a series of simple menu screens and following the displayed guidelines for each step of the setup process. These configuration steps include setting of the stirrer speed (for liquid-phase measurements) and back-off and gain settings. Once configured, the Oxyview control unit provides an accurate and stable reading of the oxygen content of the sample in question.

The Oxyview control unit has an integral magnetic stirrer for liquid-phase applications allowing the overall footprint of the Oxyview 1 system to be minimal (90 x 135mm); convenient when multiple setups are required for teaching programmes in limited space.

The Oxyview control unit is powered by a 12V DC wall cube which connects directly to the rear of the unit. Also at the rear is a 0 - 5V analogue output. This allows the measured values from the control unit to be logged to an external recording device such as a chart recorder or similar datalogger accepting a 0 - 5V analogue input.

DWI/AD Electrode Chamber

The DW1/AD oxygen electrode chamber provides a highly versatile solution to measurements of dissolved oxygen in liquid-phase samples. It can be used for a wide range of applications from basic teaching through to more advanced research assays.



However, due to the gas-tight plunger assembly, the DW1/AD lends itself particularly well to respiration assays in small sample volumes where any minute diffusion of ambient oxygen into the chamber may cause measurement artefacts. The DW1/AD oxygen electrode chamber is constructed from clear cast acrylic providing good sample visibility & uniform illumination.

Precise temperature control of the sample and electrode disc can be achieved by connecting the water jacket of the DW1/AD to a thermoregulated circulating water bath. The sample is housed within a borosilicate glass reaction vessel which has a variable sample volume of between 0.2 and 2.5ml controlled by the gas-tight adjustable plunger assembly. This plunger has a stoppered central precision bore allowing additions/subtractions to be made to/from the reaction mixture using a standard Hamilton type syringe.

S1 Oxygen Electrode Disc

The Oxyview 1 system is based around the S1 Clark type polarographic oxygen electrode disc. When fitted, the dome of the electrode disc forms the floor of the electrode chamber reaction vessel providing a sensitive and rapid response to small changes in oxygen tension within the sample.



The electrode disc comprises a central platinum cathode and a concentric silver anode. Preparation of the electrode includes the addition of electrolyte and the application of a thin oxygen permeable P.T.F.E. membrane to the electrode dome. Once prepared and positioned in the electrode chamber, the disc is connected to the Oxyview control circuitry which applies a small polarising voltage between the platinum and silver electrodes. In the presence of oxygen, a small current is generated proportional to oxygen activity in the sample.

Technical Specifications

OXYVI Oxyview Electrode Control Unit

Measuring Range	0 - 100% oxygen
Min. O ₂ Resolution	Typically 10 x 10 ⁻⁶ μmols/ml at 20 °C
Integral Magnetic Stirrer	Manually operated between 250 - 900rpm in % steps
Polarising Voltage	Selectable between 0.4 - 0.9V (0.7V recommended default)
Gain/Back Off Control	Signal back off in 1mV steps. Signal gain in 2 modes: Coarse gain x1, x2, x5, x10, x20, x50, x100. Fine gain in 1mV steps
Integral Test Resistor	Yes
Signal Inputs	Electrode disc input
Signal Output	0 - 5V analogue output of electrode signal
Dimensions	90 (w) x 135 (d) x 85mm (h). Weight: 320g
Power Supply	95 - 260V universal input mains supply. Output 12V DC 2.5A
Electrode Chamber Compatibility	All Hansatech Instruments electrode chambers

DWI Oxygen Electrode Chamber

Measurement Suitability	Liquid-phase respiration/photosynthesis
Construction	Clear cast acrylic
Sample Chamber	Precision bore, borosilicate glass tube
Sample Volume	0.2 - 2.5ml
Temperature Control	Water jacket connected to thermoregulated circulating water bath
Dimensions	65 (d) x 105mm (h). Weight 100g
Additional Information	Variable plunger assembly with central bore for sample additions

S1 Oxygen Electrode Disc

Electrode Type	Clark type polarographic oxygen sensor
Electrode Output	Typically 1μA at 21% O ₂ . Residual current in 0% O ₂ typically 0.02μA
Response Time	10 - 90% typically < 5 seconds
Oxygen Consumption	Typically < 0.015μmol hr ⁻¹