



Laboratory Report

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Report # H2AR-250321-1B

Introduction

This report summarizes the analysis of the hydrogen water bottle manufactured by ZYNAFLO®. The product was tested for dissolved hydrogen concentration on the 5 and 10-minute cycles.

Product Description

Name: H2-Max Hydrogen Water Bottle Generator Brand: ZYNAFLO® SKU#: ZF-HG-03-BL GS-1#: 507000285810 Vol: 208 mL

The bottle was received for testing on 3/19/25 in factory-new packaging and included a base unit, bottle, screw-on cap, USB-C charging cable, and user manual. The base unit was sealed with a removable shipping cap to prevent the membrane from drying out. The bottle has an internal rechargeable battery and uses a proton exchange membrane (PEM) and platinum electrodes to produce hydrogen gas (H₂) via electrolysis. When the cap is tightly secured and the electrolysis cycle begins, the internal pressure rises as the H₂ gas is produced, elevating the level of dissolved H₂ in the water above the sea level saturation point of 1.57 mg/L (1570 ppb) according to Henry's law. The PEM allows the bottle to produce hydrogen water using any type of potable water including distilled. Two timed cycles are available, 5 minutes & 10 minutes. The time remaining in the selected cycle is shown on the front panel digital display which also has a battery-charge indicator. The cap includes a manual pressure relief button and also has an internal pressure relief valve to maintain a safe amount of internal pressure. Oxygen gas (O₂) produced at the anode is vented through a hole in the bottom of the base unit.

Materials & Methods

Test water: Distilled (generic); temperature: 25°C ± 1.5°; ec: 6 us/cm; pH: 6.48
Laboratory elevation: 864 meters (0.91 atm); all measurements adjusted to SATP
Test Equipment: SRI 8610C gas chromatograph (GC), Torrance, CA; Column: Hayesep-D 6M; temp: 60°C; Detector: TCD; Carrier: N₂
Calibration Gas: Gasco, Cal Cas Direct, Inc., Oldsmar, FL; 2500 & 5000 ppm. Method: static headspace analysis

Before testing, the unit's internal battery was charged overnight and the membrane was wetted using warm distilled water (60°C). On the day of testing, the GC was permitted to warm up for two hours and then calibrated. For each test, the bottle was connected to a power transformer via the USB-C cable, filled with distilled water, and the cap was securely tightened. After completion of each cycle, the cap was removed and a 2000 uL sample was drawn from the bottle using a gas-tight syringe. The sample was injected into the headspace vial and placed into a centrifuge for three minutes to permit the dissolved H₂ to equilibrate with the headspace. After equilibration, a 1000 uL sample of the headspace was drawn using a gas-tight syringe and injected into the GC for analysis. Three tests were conducted for each cycle time, the results recorded, and the mean and standard deviations calculated. Based on the dissolved H₂ concentration and the water volume, the amount of H₂ that will be consumed when running each cycle and drinking the entire contents was reported as "Available H₂".

Dissolved H₂ Results

5 min: Mean – 3.15 mg/L (ppm) SD - 0.28 Available H₂: 0.72 mg
10 min: Mean – 6.11 mg/L (ppm) SD - 0.61 Available H₂: 1.41 mg



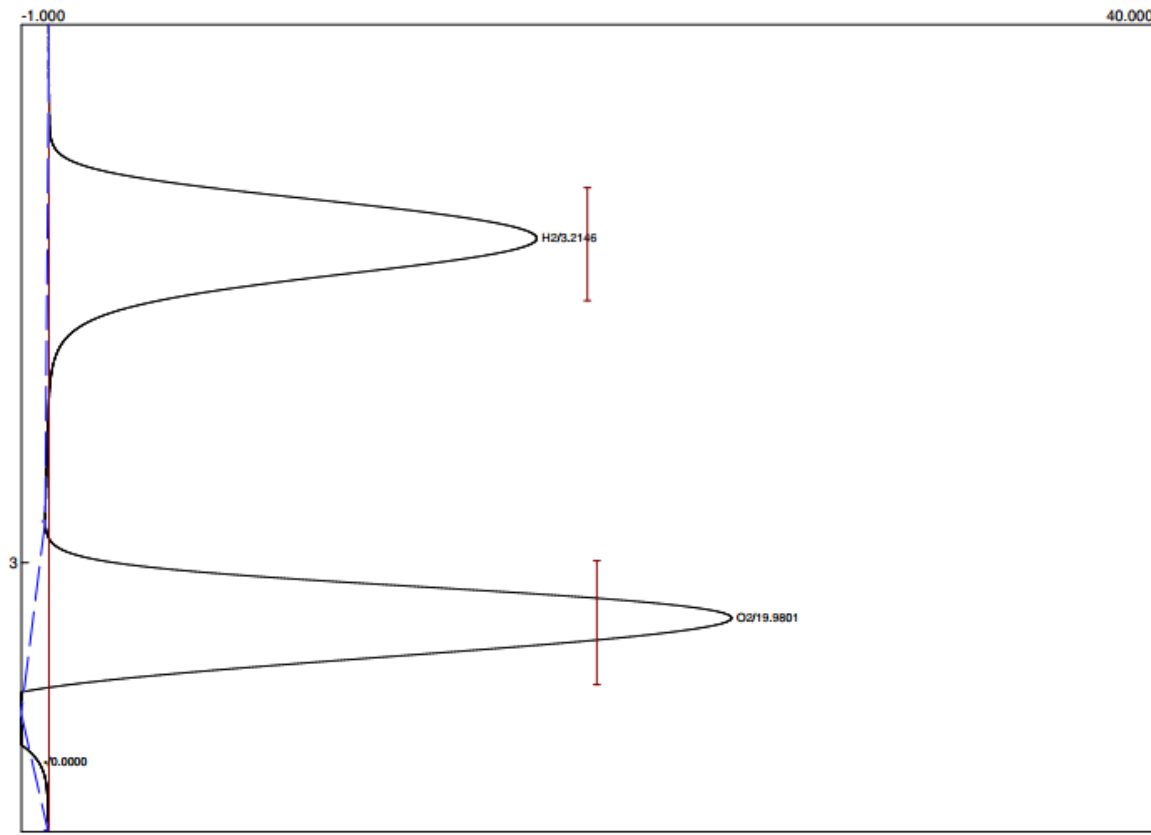
Approved By: *RSS Sharpe*

Randy Sharpe, Director of Testing

Report Date: 3/21/2025



Lab name: H2 Analytics
Client: ZYNAFLO
Collected: 3-20-25
Holding time: 3 min
Analysis date: 03/20/2025 09:40:07
Method: Static HS Analysis (GCHS)
Lab ID: HNV
Description: TCD CH1 60C
Column: Hayesep-D 6 meters 60C
Carrier: N2 @ 20psi (20 mL/min)
Integration: Peak sens=95.0 Base sens=50.0 Min area= 0.10 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: Zynaflo05..CHR ()
Sample: H2 Bottle
Operator: rs
Comments: H2 Test Run
QC batch: 2024/11/25



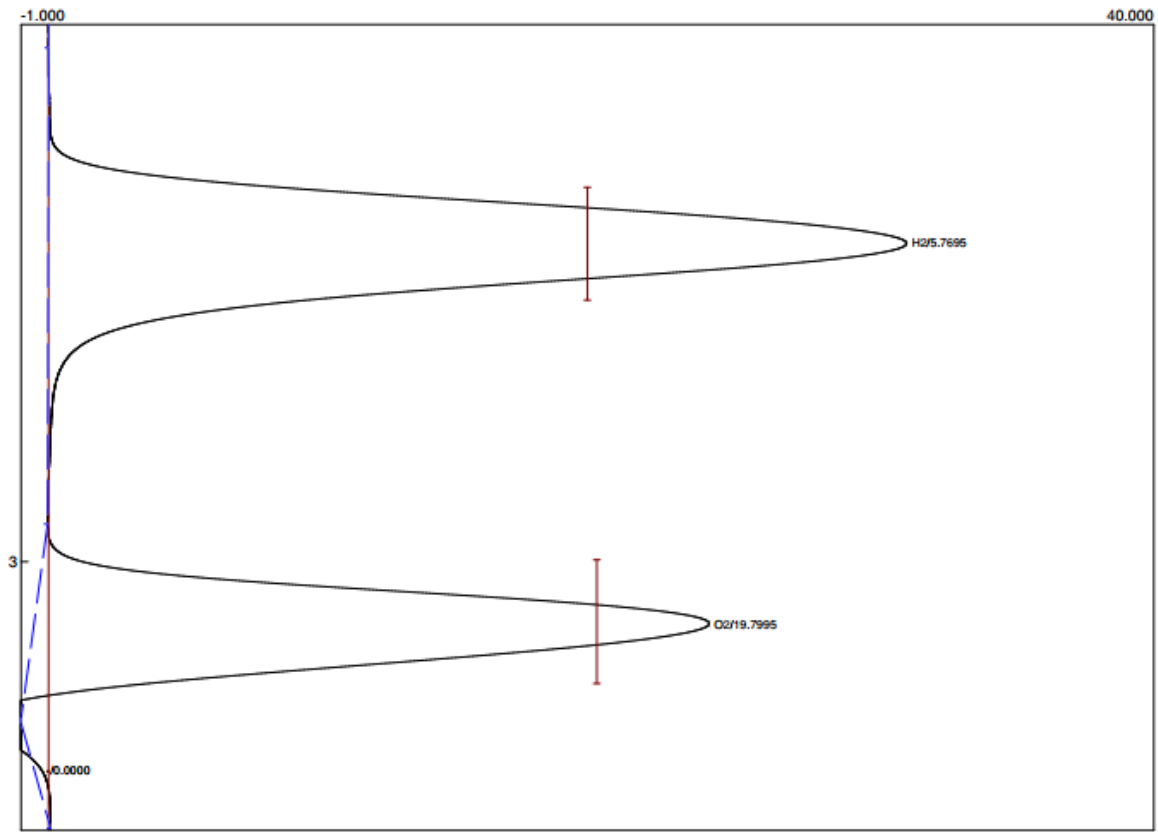
Component	Retention	Area	Internal	Units
H2	2.396	176.0979	3.2146	mg/L
O2	3.103	224.2204	19.9801	%eff

ZYNAFLO® H2 Bottle Sample Chromatogram (5-min)



Hydrogen Water Testing & Certification

Lab name: H2 Analytics
Client: ZYNAFLO
Collected: 3-20-25
Holding time: 3 min
Analysis date: 03/20/2025 09:51:26
Method: Static HS Analysis (GCHS)
Lab ID: HNV
Description: TCD CH1 60C
Column: Hayesep-D 6 meters 60C
Carrier: N2 @ 20psi (20 mL/min)
Integration: Peak sens=95.0 Base sens=50.0 Min area= 0.10 Standard= 1.000 Sample= 1.000 Tangents=off
Data file: Zynaflo06..CHR ()
Sample: H2 Bottle
Operator: rs
Comments: H2 Test Run
QC batch: 2024/11/25



Component	Retention	Area	Internal	Units
H2	2.406	316.0556	5.7695	mg/L
O2	3.116	222.1945	19.7995	%eff

ZYNAFLO® H2 Bottle Sample Chromatogram (10-min)