H2 Analytics
2505 Anthem Village Dr. Suite E385
Henderson, NV 89052
support@h2-analytics.com

Report #: H2AR-240731-1

Laboratory Report

Introduction

This report summarizes the testing of a hydrogen water bottle distributed by Ultrahealth Technologies LLC, New York, NY. The product is a battery-operated portable bottle that produces hydrogen water using electrolysis. The bottle is a sealed system that allows the internal gas pressure to build resulting in a higher concentration of molecular hydrogen gas (H_2) than can be attained under conditions of normal atmospheric pressure. This testing was requested by Ultrahealth Technologies LLC, New York, NY. The bottle was received for testing on 7//23/24 in a factory-new box and included a USB-C power cable and user manual.

Tests requested: Dissolved H_2 for the following cycle times: 5-min & 10-min

Product Description

Name: UltraHY ™ Hydrogen Water Bottle

The bottle is a battery-operated device that uses electrolysis to produce and infuse hydrogen gas (H_2) into the drinking water. It has a single-walled reservoir with a volume of ≈ 280 mL. Because the design allows for pressure to build during electrolysis, it is capable of dissolving hydrogen at concentrations higher than the maximum concentration at sea level, 1.57 mg/L (1570 ppb). To prevent an unsafe buildup of pressure, the cap includes an internal pressure relief valve. The unit has two pre-programmed cycle times, 5 minutes (by touching the power button once) and 10 minutes (by touching the power button a second time). The bottle has a rechargeable lithium-ion battery to permit portable use and includes a USB-C charging cable. The front panel digital display shows the battery level and the amount of time remaining in the selected cycle. Because the design utilizes a proton-exchange membrane (PEM, Nafion®) sandwiched between two platinum electrodes, this unit will work with any type of drinking water, including distilled, regardless of the mineral content.

Materials & Methods

Water: generic, distilled, pH 6.25± 0.25; starting temperature 24.7°C ± 1.5 EC: 2 us/cm
Laboratory elevation: 883 meters (0.90 atm); all measurements adjusted to sea level where applicable.
Gas Chromatograph: SRI 8610C; column: Hayesep-D 6M; column/oven temp: 60°C; detector: TCD; carrier gas: N_2
GC Test Method: Static headspace analysis (HS-GC)
Calibration (H_2): 3-point, performed on day of testing
pH meter: Oakton pH 6+ w/temp probe, three-point calibration (4.0, 7.0, 10.0) performed on the day of testing; digital stopwatch, generic software app
The battery was fully charged and the membrane wetted overnight before testing. All tests were conducted with the USB charging cable connected.

For each dissolved H_2 test, the bottle was filled with distilled water just below the cap threads, the cap was tightened, and the power button was pressed, either once to start the 5-minute cycle, or twice to start the 10-minute cycle. After each cycle was completed, the cap was removed, and a 100 mL test sample was immediately poured into a glass beaker. A 1000 uL aliquot of the beaker water was then drawn using a gas-tight syringe and injected into the headspace vial. The test sample was then placed into a 2400 rpm centrifuge for 3 minutes to permit the dissolved H_2 in the water sample to equilibrate with the headspace. After equilibration, a 1000 uL aliquot of the headspace was drawn using a gas-tight syringe and injected into the GC for analysis. After completing three tests, the results were recorded, and the mean and standard deviations of the three dissolved H_2 concentrations were calculated. Based on the mean dissolved H_2 concentration and the volume of water in the bottle, the average amount of H_2 that would be ingested when drinking the entire contents was calculated and reported as "H_2 Ingested Dose". Attachment 1 includes a sample chromatogram.

Results

Mean dissolved H_2, 5-min: 4.16 mg/L (4160 ppb); SD: 0.41; H_2 Ingested Dose: 1.16 mg
Mean dissolved H_2, 10-min: 6.21 mg/L (6210 ppb); SD: 0.45; H_2 Ingested Dose: 1.74 mg

Approved By: Randy Sharpe Title: Director of Testing Report Date: 7/30/2024

Attachment 1

Lab name: H2 Analytics
Client: Ultrahealth
Client ID: H2A-1038
Collected: 7-30-24
Holding time: 180 sec
Method: Static HS Analysis (GCHS)
Lab ID: HNV
Description: TCD CH1 60C
Column: Hayesep-D 6 meters 60C
Carrier: N2 @ 20psi (20 mL/min)
Components: H2Gas.cpt
Integration: Peak sens=90.0 Base sens=40.0 Min area= 15.00 Standard= 1.000 Sample= 1.000 Tangents=off
ontrol filename: DEFAULT.CON
Data file: UltrahealthSample.CHR ()
Sample: H2 Bottle
Operator: rs
Comments: DH2 Test Run
QC batch: UltraHy

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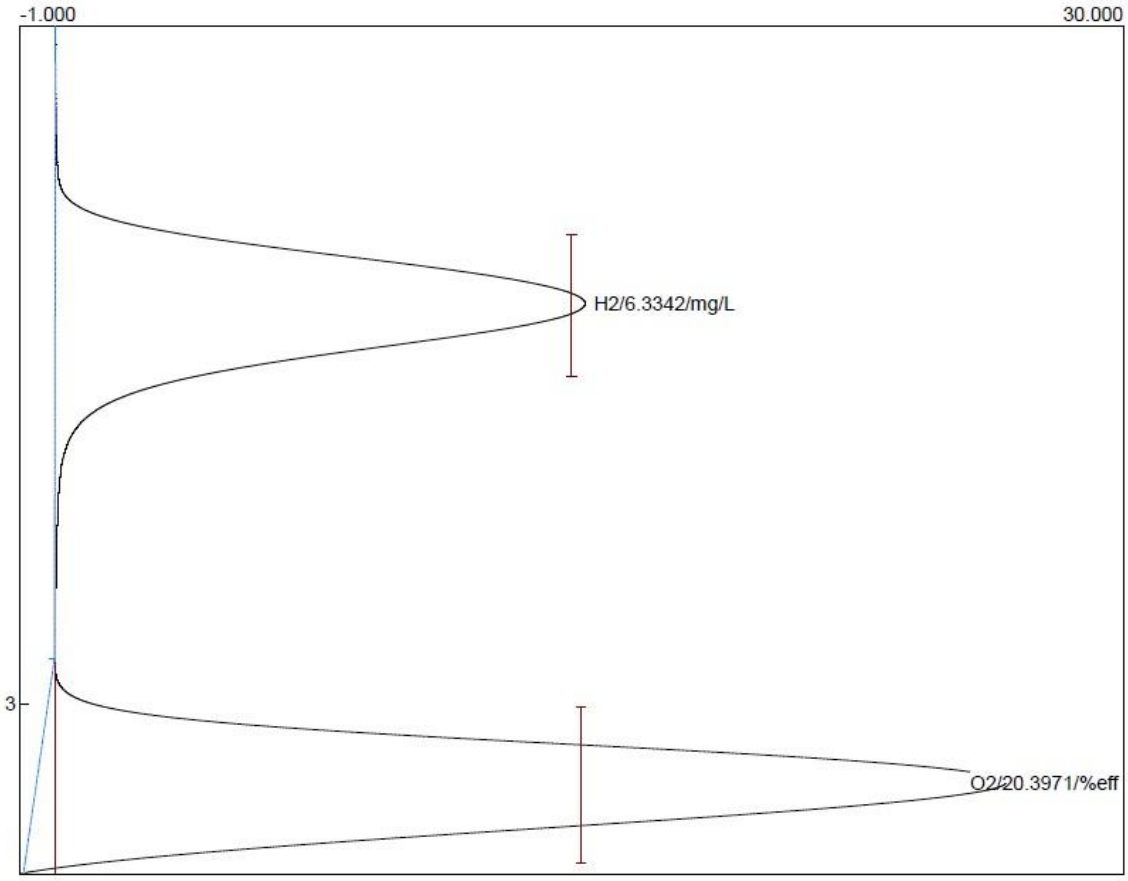
Hydrogen Water Testing & Certification



Component	Retention	Area	External	Units
H2	2.410	144.9484	6.3342	mg/L
O2	3.116	231.7558	20.3971	%eff