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Report #: 22052801A

Laboratory Report

Introduction

This report summarizes our analysis of the electric hydrogen water bottle manufactured for LifeWater Systems, LLC. Whitefish, Montana, USA 59937. The product is a battery-operated portable device that uses electrolysis and pressure to infuse molecular hydrogen gas (H_2) into the drinking water.

The bottle was received for testing 5/26/2022.

Tests requested: Dissolved H_2 (mg/L) on 5-min & 10-min cycles; additional tests performed: ΔpH

Product Description

Name: Fountain of Life H2 Water Bottle Model #: H2-2R Lot #: N/A Serial #: N/A

The bottle has a single-walled food grade polycarbonate reservoir with a volume of 210 mL. The manufacturer suggests filling the bottle close to the top to minimize the headspace and maximize the level of dissolved hydrogen gas in the water. Because the design allows for pressure to build during electrolysis, it is capable of dissolved hydrogen concentrations higher than 1.57 mg/L, the maximum concentration at sea-level pressure (1 atm). The unit has two pre-programmed cycle times, 5 minutes (by pressing the power button once) and 10 minutes (by pressing the power button a second time). The bottle has a rechargeable battery to permit portable use and includes a charging cable (USB-C). The front panel 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-over-titanium electrodes, this unit will work with any type of potable water source, including distilled water, regardless of mineral content. After the completion of a cycle, the manufacturer suggests shaking the bottle to boost the dissolved H_2.

Materials & Methods

Water: generic, distilled, pH 6.29 ± 0.25; starting temperature 25.1°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: 80°C; detector: tungsten-rhenium TCD; carrier gas: nitrogen (99.999%)
GC Test Method: Static headspace analysis (HS-GC)
Calibration (H_2): 2-point (1.72 / 6.88 mg/L), performed on day of testing using 1000 ppm calibration gas
The battery was fully charged and the membrane wetted overnight prior to testing. All tests were conducted with the USB charging cable connected.

For each test, the bottle was completely filled with distilled water to minimize the volume of the headspace, the cap was securely 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 bottle was shaken for 30 seconds before removing the cap and gently pouring a 100 mL sample into a glass beaker. 1000 uL of the water was immediately drawn using a gas-tight syringe and then injected into the headspace vial. The test sample was then agitated on an equilibrator device for five minutes to permit the dissolved H_2 in the water sample 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. After completion of testing for each cycle, results were recorded, and the mean and standard deviations of the 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 “Available H_2”. Tests were also performed to measure how much the bottle changed the water’s original pH and reported as “ΔpH”. Attachment 1 shows a sample chromatogram (10-minute cycle) and an image of the bottle.

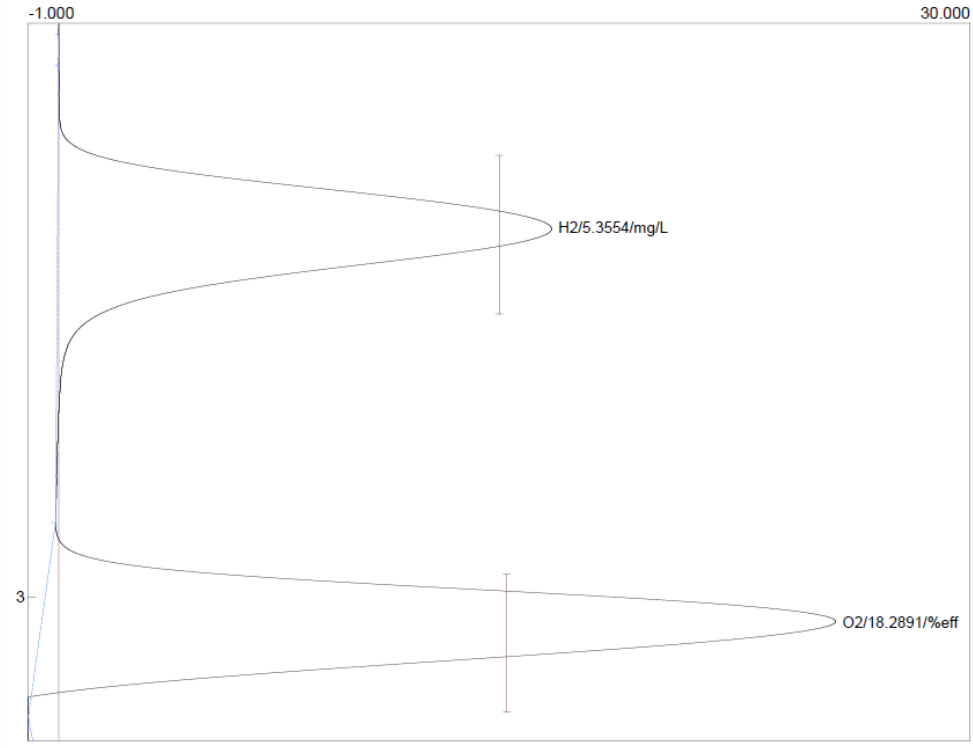
Results

Dissolved H_2 (5-minute):	3.44 mg/L (3440 ppb)	SD: 0.16 mg/L	Available H_2: 0.72 mg	ΔpH: + 0.15
Dissolved H_2 (10-minute):	5.14 mg/L (5140 ppb)	SD: 0.69 mg/L	Available H_2: 1.08 mg	ΔpH: + 0.19

Approved By: RSSharpe Title: Director of Testing Report Date: 5/28/2022

attachment 1

Lab name: H2 Analytics
Client: LifeWater Systems
Collected: 5-27-22
Holding time: 120
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: AqH2O2.cpt
Integration: Peak sens=75.0 Base sens=50.0 Min area= 0.10 Standard= 1.000 Sample= 1.000 Tangents=off
Sample: H2-2 Bottle
Operator: rs
Comments: DH2 Test Run
QC batch: n/a



Component	Retention	Area	External	Units
H2	2.356	154.5527	5.3554	mg/L
O2	3.043	220.8655	18.2891	%eff

Sample Chromatogram (10-min Cycle)

Fountain of Life®

LifeWater Systems Fountain of Life®
H2 Water Bottle Model H2-2R