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

Report #: 24120401 (final)

Laboratory Report

Introduction

This report summarizes the testing of a hydrogen water bottle distributed by Yunshen Smart Tech (Shenzhen) Co Ltd, China. 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 Yunshen Smart Tech, Shenzhen, China. The bottle was received for testing on 11/6/2024 in a factory-new box and included a magnetic USB-C power cable, spare seals, and a user manual. Two replacement bottles/caps (#12 & #13 without bases) were received for additional testing on 11/29/24.

Tests requested: Dissolved H_2 for the following cycle times: 5-min, 10-min, & 15-min; Retest 15-min cycle by using two replacement bottles on the original electrolysis base.

Product Description

Name: Supersaturated High Concentration Hydrogen Rich Water Bottle Brand: H2yunshen Model #: H-B-HEX5

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, polycarbonate reservoir with a volume of ≈ 230 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 charging cable (magnetic USB). 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) 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 6.28± 0.25; starting temperature 23.9°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, Torrance, CA; column: Hayesep-D 6M; column/oven temp: 60°C; detector: tungsten-rhenium TCD; carrier gas: N_2
Calibration gas: Cal Gas Direct, Huntington Beach, CA; GC Test Method: Static headspace analysis (HS-GC)
Calibration (H_2): 2-point (3.05 / 6.09 mg/L), performed on the day of testing using H_2 calibration gas
The battery was fully charged and the membrane wetted overnight before testing. All tests were conducted with the USB charging cable connected.

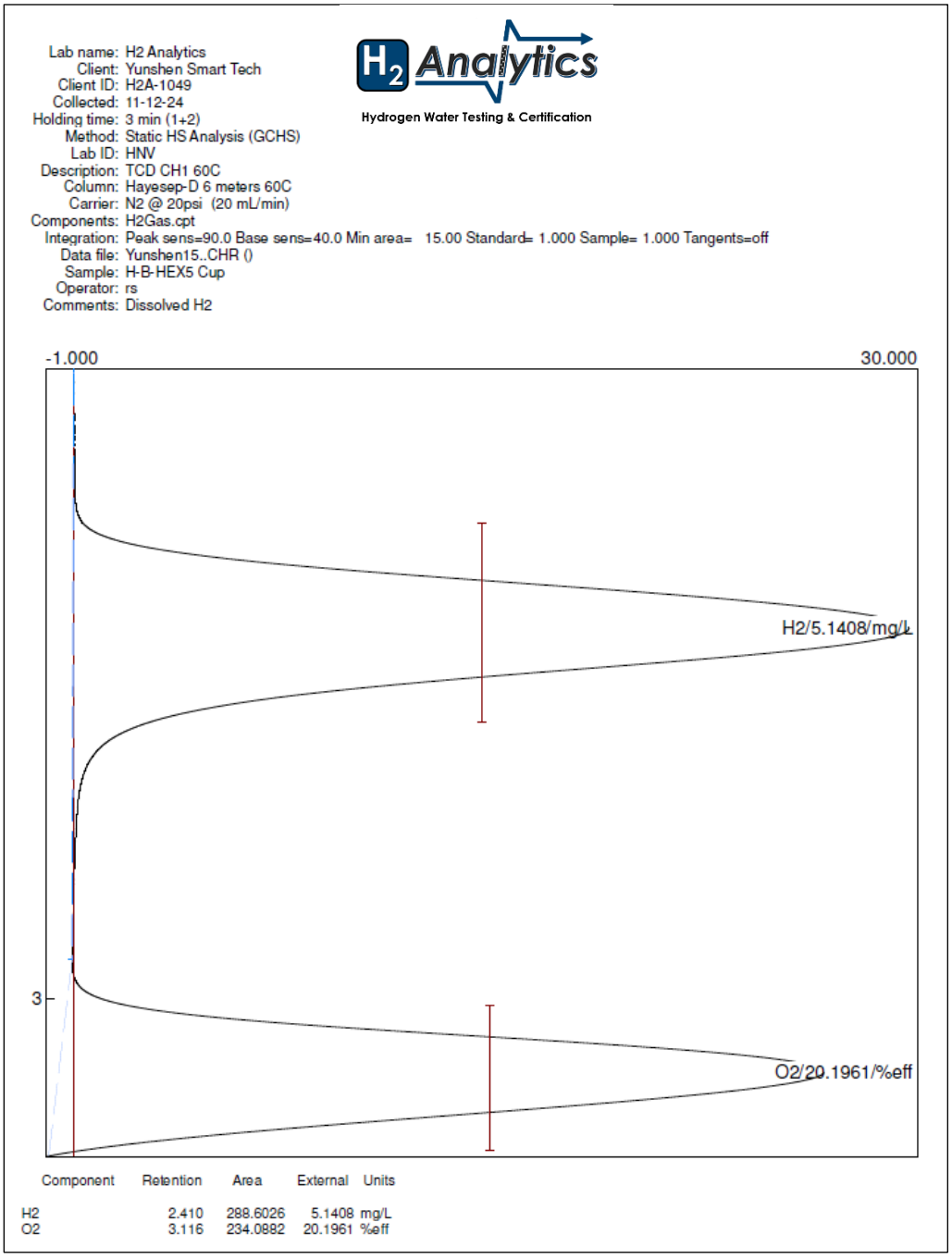
For each dissolved H_2 test, the bottle was filled with distilled water just below the cap threads, the cap was securely tightened, and the power button was pressed either once to start the 5-minute cycle, or twice to start the 10-minute cycle. For the 15-minute tests, an additional 5-minute cycle was initiated at the end of the first 10-minute cycle (without opening the bottle). After each cycle was completed, the cap was removed, and a 2000 uL sample was drawn using a gas-tight syringe and injected into the headspace vial. The headspace vial was then placed into a 2400 rpm centrifuge for 1 minute followed by a 2-minute rest 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 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 (10-minute test). A single test was repeated for each replacement bottle/cap as described above (no SD calculated).

Results

Mean dissolved H_2, 5-min:	2.42 mg/L (2420 ppb);	SD: 0.09;	H_2 Ingested Dose: 0.56 mg
Mean dissolved H_2, 10-min:	5.06 mg/L (5060 ppb);	SD: 0.48;	H_2 Ingested Dose: 1.16 mg
Mean dissolved H_2, 15-min:	5.03 mg/L (5030 ppb);	SD: 0.08;	H_2 Ingested Dose: 1.16 mg
Mean dissolved H_2, 15-min (#12):	6.69 mg/L (6687 ppb);		H_2 Ingested Dose: 1.54 mg
Mean dissolved H_2, 15-min (#13)	6.89 mg/L (6891 ppb);		H_2 Ingested Dose: 1.58 mg

Approved By: Randy Sharpe Title: Director of Testing Report Date: 12/4/2024

attachment 1



Sample Chromatogram (10-minute cycle)