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Report #: 23091301

Laboratory Report

Introduction

This report summarizes the testing of a hydrogen water bottle from Evolv LLC. 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 (H2) than can be attained under conditions of normal atmospheric pressure. This testing was requested by Evolv, LLC’s manufacturer. The bottle was received for testing on 6/5/2023 in a factory-new box and included a USB-C power cable and user manual.

Tests requested: Dissolved H2 for the following cycle times: 5-min, 10-min, & 20-min

Product Description

Name: Superwater Bottle Brand: Evolv Model #: H2GO Series #: 2023/05/11

The bottle is a battery-operated device that uses electrolysis to produce and infuse hydrogen into the drinking water. It has a single-walled, Tritan reservoir with a volume of ≈ 200 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). 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 battery to permit portable use and includes a charging cable (magnetic USB-C). 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 water, regardless of the mineral content.

Materials & Methods

Water: generic, distilled, pH 6.45 ± 0.25; starting temperature 25.2°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: tungsten-rhenium TCD; carrier gas: N2
GC Test Method: Static headspace analysis (HS-GC)
Calibration (H2): 2-point (1.42 / 7.17 mg/L), performed on day of testing using H2-saturated water & 1000 ppm calibration gas
pH meter: Oakton pH 6+, 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 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 20-minute tests, an additional 10-minute cycle was initiated after the first 10-minute cycle was finished without opening the bottle. 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 H2 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 H2 concentrations were calculated. Based on the mean dissolved H2 concentration and the volume of water in the bottle, the average amount of H2 that would be ingested when drinking the entire contents was calculated and reported as “Available H2”. Attachment 1 includes a sample chromatogram from a 10-minute test and a picture of the bottle.

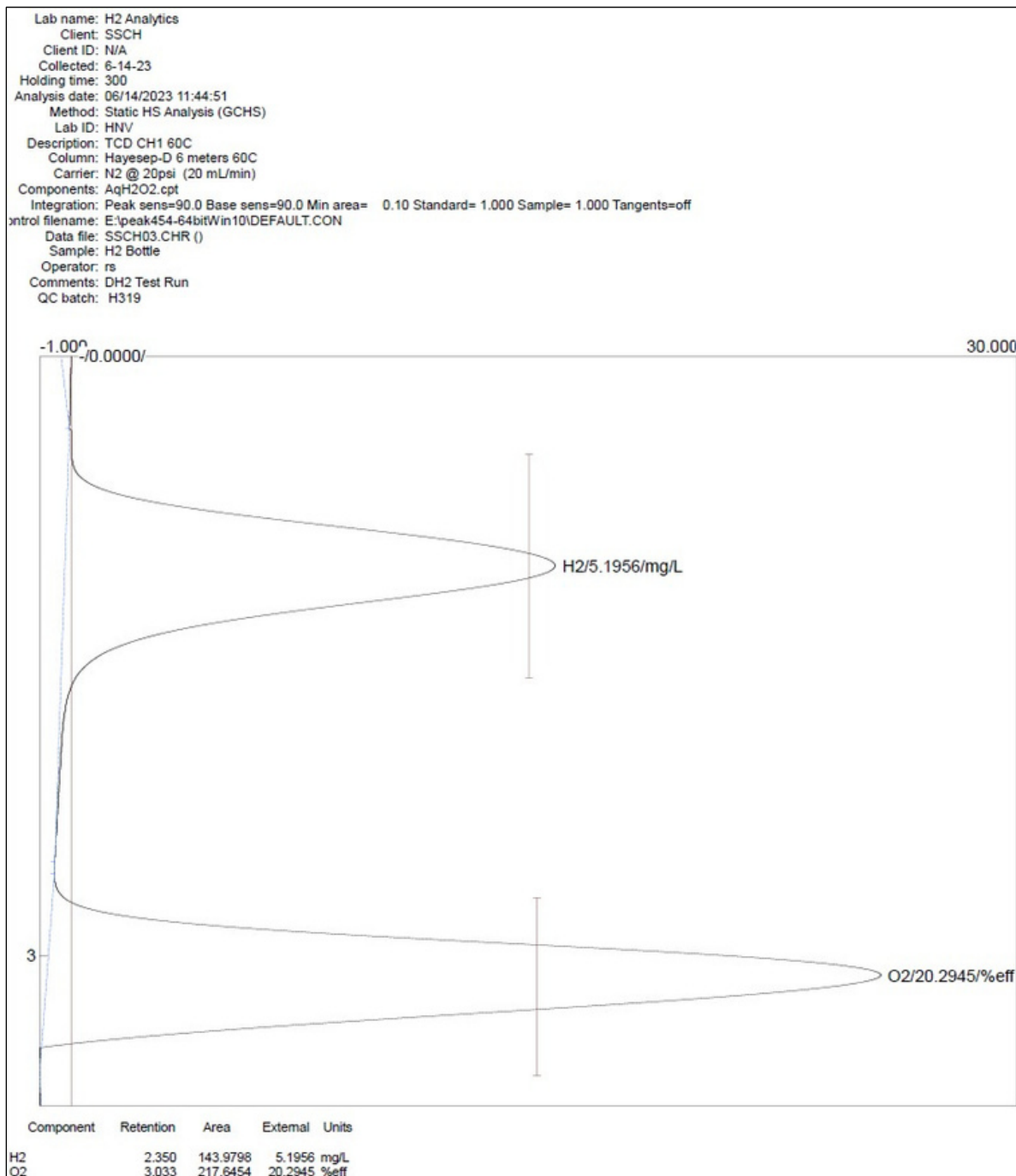
Results

Mean dissolved H2, 5-min: 3.67 mg/L (3670 ppb) SD: 0.33; Available H2: 0.73 mg
Mean dissolved H2, 10-min: 4.89 mg/L (4890 ppb) SD: 0.27; Available H2: 0.98 mg
Mean dissolved H2, 20-min: 5.37 mg/L (5370 ppb) SD: 0.08; Available H2: 1.07 mg



Approved By: Randy Sharpe

Title: Director of Testing Report Date: 9/13/2023



Sample Chromatogram (10-min cycle)



Evolv H2GO Hydrogen Water Bottle