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Laboratory Report

Introduction

This report summarizes the analysis of the Echo Ultimate™ hydrogen water machine manufactured by Echo Technologies LLC, Pleasant Grove, UT, USA. The product was tested for dissolved hydrogen concentration in two modes of operation, neutral-pH hydrogen drinking water and level 4 alkaline water. During the alkaline water testing, the change in pH was measured by subtracting the starting pH from the ending pH.

Product Description

Echo Ultimate™ Flow-Through Hydrogen Water Machine, Model # - Echo Ultimate™

Product was received for testing 4/28/2021

Methods

Dissolved hydrogen concentration (H_2)

Test water: ASTM Type I ultrapure ChemWorld, Salt Lake City, UT, USA; temperature: 25ºC ± 1.5º; ec: 0 us/cm; pH: 6.4
Laboratory elevation: 864 meters (0.91 atm); all measurements adjusted to SATP. GC Test Method: Static headspace analysis
Test Equipment: SRI 8610C gas chromatograph, Torrance, CA USA
Column: Hayesep-D 6M packed column temp: 80°C
Detector: Tungsten-Rhenium TCD (5000 mvsec max)
Carrier gas: Nitrogen (99.999%) @20 PSI, 20 mL/min
Calibration: Performed on day of testing using third-party calibration gas
FloJet BW5000 water dispenser system w/ 5 gal bottle reservoir, Xylem Inc., Irvine, CA, USA
pH meter: Oakton pH6+, 3-point calibration performed on day of testing (4.01, 7.01, 10.01)

Test Configuration: The Flojet reservoir was filled with ultrapure water and the Flojet siphon tube was connected to the reservoir. The Flojet output tube (1/4" pvc) was connected to the machine's water input port. The unit's top spout was positioned above a sink to permit collection of output water. Both the Echo Ultimate™ and Flojet were connected to 110 vac power. On the day of testing, the GC was permitted to warm up for two hours and then calibrated. Prior to testing, the Echo Ultimate™ was set to the "High" setting. When testing the dissolved H_2 level of the hydrogen drinking water, the front panel "Hydrogen" (H2) mode was selected; when testing the dissolved H_2 level of the alkaline water, the "Alkaline Level 4" mode was selected. For each test, the unit was allowed to run for 1 minute to ensure that only fresh hydrogen water was flowing from the output hose. After one minute, a 500 mL beaker was placed under the water stream and 500 mL of sample water was collected. A test sample was immediately taken from a depth of 20 mm using a gas-tight syringe. The sample was injected into the headspace vial and agitated on an equilibrator device for five minutes to permit the dissolved H_2 to equilibrate with the headspace. After equilibration, the headspace was then sampled using a gas-tight syringe and injected into the gas chromatograph for analysis. Three tests were conducted, results recorded, and the mean and standard deviation calculated.

Results

H_2 Water Dissolved H_2:	Mean -	1.65 mg/L (ppm)	SD -	0.07
Alkaline Water Dissolved H_2:	Mean -	0.51 mg/L (ppm)	SD -	0.01
Alkaline Water Δ pH:	Mean -	+4.66	SD -	0.27

Approved By: RSSharpe Randy Sharpe, Director of Testing Report Date 6/24/2021