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H₂HUBB Official Test Report

Evaluation Introduction

This report presents an analysis of the DAYS TM-1 Hydrogen Gas Injector System, developed by Doctors Man, a Japanese company. H₂HUBB classifies the DAYS TM-1 as a high-pressure hydrogen water injection system designed to produce hydrogen-rich water on demand. The device utilizes an Metal Hydride Alloy Hydrogen Tank to ensure the release of high-purity hydrogen gas for effective dissolution. The system includes a specialized hydrogen injection tube and dedicated bottle caps with one-way check valves, allowing hydrogen gas to be injected into bottled water while preventing gas escape. The device arrives preset with a hydrogen release pressure of 0.3 MPa (43 psi), enabling easy, on-demand hydrogen infusion with ordinary bottled water. Users simply inject the hydrogen gas into the water under pressure, creating hydrogen-rich water. We evaluated the DAYS TM-1's dissolved hydrogen performance at both the preset pressure of 0.3 MPa (43 psi) and the maximum pressure of >0.8 MPa (116 psi) to determine if it meets our performance standards for hydrogen products. Meeting these standards is required for our approval and recommendation. For details on H₂HUBB's performance criteria for hydrogen water devices, visit [H₂HUBB](https://www.h2hubb.com).

H₂ Products

- Company: Doctors Man
- Product Name: DAYS TM-1
- Type: Hydrogen gas injection technology
 - Metal Hydride Alloy Hydrogen Tank
 - High-concentration hydrogen water
 - On demand
- Model: DAYS-TM
- URL Link: <https://doctorsman-global.com/>

Method and Procedure

- Water Specifications:
 - Type: Distilled water: 6.0 pH
 - Initial pH: 6.0
 - pH Stability (Δ pH): No observed increase
 - Temperature Range: 65-70°F (18-21°C)
- Water Bottle Vol Size: 0.5 L or 500 mL
- Hydrogen Gas Source:
 - Tank Type: Metal Hydride Alloy Hydrogen Tank
 - H₂ Gas Release: Measured in mL at 0.3 MPa (43.5 psi) per bottle
 - Injection Count: Total injections recorded until tank depletion
 - Measured Tank Capacity in Liters.
- Test Location: 277 meters (909 ft elevation)

- Test Methodology:
- Titration Method: H₂Blue® Test Reagent
- Dissolved H₂ Concentration: All concentration values converted to SATP conditions
- Claimed Dissolved H₂ mg/L: 3.0 mg/L (post injection and 30 second agitation)

Test Results

To perform the dissolved hydrogen gas concentration test on the provided water bottle, we first filled it with distilled water, leaving a small air gap in the headspace, and securely tightened the specialized bottle cap provided with the unit. Next, the DAYS TM-1 system was prepared, verifying that the system's pressure setting was appropriately calibrated to the required MPa or Psi level. We opened the pressure valve on the Metal Hydride Alloy Hydrogen Tank to allow H₂ gas to release when the injection switch was activated. We then connected the specialized hydrogen injection tube from the device to the bottle and engaged the injection switch for three seconds, delivering hydrogen gas into the bottle to create hydrogen-rich water. After the injection, the bottle was agitated by shaking it for 30 seconds to ensure the proper dissolution of hydrogen gas. Following this agitation, the specialized cap was carefully removed, and the hydrogen gas concentration was measured immediately. All tests for dissolved molecular hydrogen concentration were conducted using H₂Blue® Test Reagent, and several tests were performed to ensure accuracy. The results focused primarily on the average hydrogen concentration, as this provides a more reliable measure than peak values alone. However, both average and peak concentrations are included in the results for a comprehensive analysis.

H₂ Concentration at Preset Pressure (SATP):

- Average H₂ Concentration at 0.3 MPa:
 - Measured Concentration: \cong 4.0 mg/L (ppm); SD: 0.06
- Peak H₂ Concentration at 0.3 MPa:
 - Measured Peak: \cong 4.0 mg/L (ppm)

Hydrogen Concentration at Maximum Pressure (SATP):

- Average H₂ Concentration at \geq 0.8 MPa:
 - Measured Concentration: \cong 10 mg/L (ppm); SD: 0.69
- Peak H₂ Concentration at \geq 0.8 MPa:
 - Measured Peak: \cong 10.75 mg/L (ppm)

Average Ingested H₂ Dose (Milligrams) in Designated Volume:

- Preset Pressure (0.3 MPa):
 - H₂ Ingested Dose: \cong 2.0 mg (\equiv 24.28 mL of dissolved hydrogen)
- Maximum Pressure (\geq 0.8 MPa):
 - H₂ Ingested Dose: \cong 5.0 mg (\equiv 60.70 mL of dissolved hydrogen)
- **Claimed H₂ mg/L (ppm) confirmed: Yes**

H₂HUBB Hydrogen Concentration Assessment

- According to our testing, the DAYS TM-1 Hydrogen Gas Injection Device achieved a dissolved molecular hydrogen concentration of 4.0 mg/L (ppm) at its preset pressure setting of 0.3 MPa (43.5 PSI). This H₂ concentration aligns with findings from current human studies indicating that it is sufficient to produce therapeutic effects. The device surpasses our H₂HUBB standards for both **H₂ Concentration and Daily Dose of H₂**. For user safety and optimal molecular hydrogen intake, it is essential to operate the device exclusively at the manufacturer-rated pressure setting.

Metal Hydride Hydrogen Tank: H₂ Release and Total Capacity Results

H₂ Gas Release at Preset Pressure per Injection

- H₂ Volume per Injection: 125-130 mL
- Total Recorded Injections Until Tank Depletion: 75

Estimated H₂ Tank Capacity

- Approximate Total H₂ Volume (Liters): 9-10 L

H₂HUBB Hydrogen Tank Assessment

- Our testing of the Tankman hydride alloy hydrogen storage tank shows it operates as a typical metal alloy hydrogen tank. The tank, weighing approximately 3.25 lbs (1.47 kg) with dimensions of 9 inches in height and 6.375 in diameter. It stores hydrogen gas within a metal lattice structure, enabling efficient hydrogen absorption and desorption during operation. Upon exposure to air, the tank releases hydrogen (H₂) on demand. The test results indicate that the Tankman tank released between 125-130 mL of H₂ per injection into a water bottle at a pressure of 43.5 psi. This process required 75 injections before the device's Original Pressure Manometer displayed a pressure drop to 0.2 MPa, indicating tank depletion. Overall, this corresponds to a total release of approximately 9-10 L of hydrogen gas, after which the tank could no longer sustain the required 0.3 MPa (43.5 psi) for optimal H₂ concentration. Under typical usage, the Tankman tank can conveniently produce 1-2 bottles of hydrogen-rich water daily, delivering approximately 2-4 mg of H₂ per day. Based on these figures, the tank is expected to last between 1 to 3 months before needing a refill, depending on the consumer's frequency of hydrogen water consumption. We are satisfied with these test results and conclude that the device preset rated pressure is safe for consumer use, posing no foreseeable risk under recommended conditions.

Internal Performance

Specifications Confirmed by Testing:

- **Type of device**
 - Hydrogen Gas Injector
 - Metal Hydride Alloy Hydrogen Storage Tank
 - High-Concentration Hydrogen Water.
- **Hydrogen Tank Dimensions**
 - 9" H x 6.375" D, 2" base width
- **Hydrogen Tank Capacity**
 - 9-10 Liters
- **Pressure Range (MPa)**
 - 0.1-0.9 MPa (≡ 14.5-130 PSI)
- **H₂ Gas Release**
 - On demand via pressure valve

Product Assessment

Functionality:

- **Device Housing**
 - Stainless steel housing that encases the hydrogen tank, referred to as "Tankman".
- **Tankman Hydrogen Tank**
 - Metal hydride alloy tank stores and releases pure hydrogen gas as needed.
- **Pressure Valve**
 - Located on the tank, opens during injections and closes afterward.
- **H₂ Gas Injection Switch**
 - Releases pure hydrogen gas for 3 seconds during injections, then should be turned off.
- **Injection Tubing**
 - Specialized tubing with connection ports for secure attachment to bottle caps.
- **Dedicated Bottle Caps**
 - Custom caps with one-way valves for safe hydrogen gas injection.
- **Pressure Gauges**
 - Injection Pressure Gauge: Shows the set injection pressure.
 - Tank Pressure Gauge: Displays tank pressure. Below 0.2 MPa signals refill needed.
- **Carrying Handle**
 - Located on top for easy transport.

Reliability

- New: Yes
 - Initial test results and evaluation are currently on the report. (see Overall Opinion)

Cost:

- DAYS Hydrogen Gas Injector: \$4600.00 USD
- H₂ Hubb discount: TBA
- H₂ Hubb recommendation cost: TBA

Overall Opinion

The DAYS Hydrogen Gas Injector System is a high-end, precision-engineered hydrogen water unit that utilizes a unique hydrogen injection method. Our evaluation demonstrated that the device achieved approximately 4.0 mg/L (ppm) of dissolved H₂ in 500 mL of water at its preset pressure setting of 0.3 MPa (43.5 psi), resulting in a total of 2.0 mg (≈24.28 mL) of H₂ dissolved in the bottle. This amount aligns well with the therapeutic dosage observed in human studies, which recommend a daily intake of 1-3 mg of H₂ to elicit beneficial effects [1].

The device's hydrogen injection process involves directly introducing hydrogen gas into an enclosed headspace above the water, maintained at a specific pressure. Based on Henry's Law of Gas Solubility, which states that the solubility of a gas is directly proportional to the partial pressure of the gas above the liquid, this method leverages the pressure within the headspace to drive hydrogen dissolution into the water [2]. When 100% hydrogen gas is injected under controlled pressure and the bottle is agitated for 30 seconds, the dissolution and equilibration of H₂ are significantly enhanced, allowing for rapid production of high-concentration hydrogen water in under a minute.

Our tests further confirmed the device's maximum hydrogen concentration capacity, yielding an average concentration of 10 mg/L (ppm) and a peak concentration of 10.75 mg/L (ppm)—an impressive result. Although consumer settings limit the device to lower concentrations for safety, these results underscore its potential application in medical or laboratory settings where higher hydrogen concentrations may be required.

Our testing corroborated the manufacturer's claims regarding both the safety and performance of the DAYS Hydrogen Gas Injector System. This system exemplifies one of the most innovative and effective methods for producing hydrogen-rich water that we have evaluated to date.

Dissolved hydrogen concentration (mg/L (ppm)) is a critical performance metric, as research suggests that 1-3 mg of H₂ or more per day appears to be therapeutic for humans. Furthermore, the **IHSA** standard for this type of product is a minimum of 0.5 mg/serving or 0.5 mg/L. H₂HUBB's performance standard for hydrogen water devices is slightly higher than IHSA, as we require the device to provide a concentration of 0.8 mg/L (ppm) and 0.8 mg/day consistently. The DAYS Hydrogen Gas Injection device surpassed H₂HUBB standards for both **H₂ Concentration and Daily Dose of H₂**. Based on current research data, we believe the device's mg/L (ppm) performance provides adequate levels of hydrogen gas to induce therapeutic effects in humans. **According to our test results, the product will be featured on our website as a Level 3 hydrogen water device.** You can view the meaning of this ranking [here](#). We are pleased with the device's dissolved hydrogen concentration.

The DAYS system utilizes an Metal Hydride Alloy Hydrogen Tank to inject hydrogen gas into water bottles. An Metal Hydride Alloy Hydrogen Tank contains specific metals combined with other metals to form a specialized alloy. This alloy has a unique chemical structure called a metal lattice, which is where hydrogen gas is stored. The storage process involves a chemical reaction in which hydrogen gas dissociates into hydrogen atoms that then occupy interstitial sites within the metal lattice, forming metal hydrides [3]. Consequently, these tanks are often referred to as Hydride Hydrogen Tanks. Due to the design, structure, and chemical properties of these tanks, they store and release highly pure hydrogen gas (99% or higher). The specific hydride hydrogen tank used with the DAYS device is called "Tankman," with measured dimensions of 9 inches in height, 6.375 inches in diameter, and a base width of 2 inches. Using the formula for the volume of a cylinder (volume = $\pi \times \text{radius}^2 \times \text{height}$) and converting units from cubic inches to liters, we calculated the physical volume of the tank to be 4.70 liters. However, since hydrogen alloy hydride tanks can store 1.5 to 2.5 times their physical volume due to hydrogen absorption into the metal lattice, the Tankman tank appears capable of storing approximately 7-11 liters of hydrogen gas [4].

Our testing measured an H₂ gas release of 125-130 mL at 0.3 MPa (43.5 psi) per injection, with a total injection count of 75 before the tank was depleted. This corresponds to a total stored hydrogen capacity of approximately 9–10 liters, aligning well with our calculated estimation of the tank's total H₂ gas volume capacity. Based on these results, the DAYS device can conveniently provide consumers with 1–2 bottles (500 mL–1 liter) of hydrogen water per day, delivering a daily dose of 2–4 mg of H₂. This means the tank can last 1–2 months before requiring a recharge. If the consumer drinks H₂ water five days per week, the tank can last up to 3 months. Recharging the tank is straightforward, following the DoctorMans model, in which the consumer sends their tank to a trained company for a modest recharging fee every other month. This setup allows the device to provide a total of 37.5 liters (nearly 10 gallons) of hydrogen water before the tank needs recharging—a remarkable capacity given the compact size of the device and tank. The Tankman tank is equipped with a reliable pressure valve and a metal quick-connect port for easy connection to the DAYS device. In summary, the hydride hydrogen tank performed well with the device, providing a safe and effective method for delivering hydrogen gas to water bottles.

Overall, the DAYS Hydrogen Gas Injector System is visually appealing, constructed with high-quality materials, and effectively dissolves a therapeutic concentration of hydrogen gas in 500 mL (16.9 oz) bottle waters. Our testing validated the manufacturer's claims about the bottle's hydrogen gas performance, with results aligning well with the product's marketing statements. We identified no safety concerns, as the system includes adequate safety features to protect users and avoids any contamination of the drinking water. One potential improvement would be for Doctorsman to consider designing caps that fit standard U.S. bottled water sizes, which commonly use 28 mm bottle caps, rather than the 30 mm caps prevalent in Japan. Alternatively, developing an adapter for compatibility with 28 mm caps could enhance the system's appeal to U.S. consumers.

Overall, we are pleased with the device's performance. The DAYS Hydrogen Gas Injector meets and exceeds our minimum performance standards, and H₂HUBB considers it safe and suitable for in-home hydrogen water therapy. We are moving forward with our recommendation of this product to the public.

H₂ Hubb LLC disclaimer: All tests conducted and test results produced by H₂ Hubb LLC have been done according to industry-accepted practices and standards. Nevertheless, these results may not necessarily reflect test results performed by manufacturers, suppliers or third-party labs. Our test results are independent of all other parties, and testing by other parties may produce different results. We understand that many variables are involved in testing, some of which are extremely difficult to control. These reports are not meant or intended for any other purpose but to uphold H₂ Hubb LLC's business practices and to validate the reasons for our recommendations.



Approved By: Tywon Hubbard

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