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H2HUBB Official Test Report

Evaluation Introduction

This report provides a comprehensive analysis of the H2JI1 Hydrogen Inhalation Device from Doctors Man, a company based in Japan. H2HUBB classifies this device as a Clinical Grade, mid-flow hydrogen inhalation system. It is equipped with an advanced hydrogen electrolytic cell utilizing a PEM/SPE membrane, ensuring the production of pure hydrogen gas with only deionized or distilled water required for operation. The device supports continuous hydrogen gas production, allowing users to extend inhalation sessions for as long as they prefer. We thoroughly evaluated the system's hydrogen gas output in mL/min to verify its performance. Additionally, we assessed its safety features and operations to confirm the presence of appropriate mechanisms for safe and reliable usage. Our investigation determines whether the H2JI1 device meets our H2 product performance standards required for approval and recommendation by H2HUBB. For more information about our performance standards for hydrogen inhalation systems, please visit **H2HUBB.**

H2 Products

- Company: Doctors Man
- Product Name: H2JI1
- Type: Pure H2 Inhalation Device (99.999%/5N)
  - PEM/SPE
  - Mid-Flow Rate
- Mfgr rated H2 Output: 250 mL/min
- URL Link: https://doctorsman-global.com/product/hydrogen-gas-inhaler/

Method and Procedure

- Distilled Water (used for testing): 6.0 pH
- Water Temperature: 65~70F/ 18~21C
- Reservoir Vol Size: 2.5 L/2500 mL (0.66 gals)
- H2 Output: 250 mL/min or 20.61 mg/min (@ SATP)
- Test Location: 277 meters (909 ft elevation)
- H2 Flow Test: mL/min, normal timing for a breathing session (1 hr)
- Test methodology: Alicat H2 Mass Flow Meter
- All measurements converted to SATP where applicable

Test Results

To conduct the hydrogen gas flow rate test, the system was set up and filled to the appropriate level using distilled water. The device was activated for a 1-hour session, running for 10 minutes prior to taking initial measurements. The produced hydrogen gas was directed through a dryer and passed through a humidity and temperature sensor before being routed to the Alicat Mass Flow Meter for precise measurement of molecular hydrogen output. To ensure the accuracy of the readings, the hydrogen mass flow meter was allowed to stabilize for 5-10 minutes, ensuring no atmospheric air interference. Minor adjustments were made to account for any reduction in flow rate due to the dryer and humidity traveling with the hydrogen gas. A minimum of three tests were conducted, and the results were averaged. The flow rate values presented in this report reflect these averaged results for the device.
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H2 Flow Rate Test Results at SATP:

- Device H2 mL/min (mg/min) avg: ≅ 305 mL/min (25.14 mg/min)
- Device O2 mL/min (mg/min) avg: ≅ 152.50 mL/min
- Device Total H2/O2 mL/min avg: ≅ 457.50 mL/min

Claimed Mfgr's H2 mL/min (mg/min) confirmed: Yes

H2HUBB Hydrogen Flow Rate Assessment

- H2HUBB's hydrogen gas flow rate test results confirm the manufacturer's claims regarding the device's gas production capabilities. Specifically, at a pressure setting of 250 kPa, the device generates 305 mL/min of hydrogen gas, exceeding the manufacturer's stated flow rate by 22%. These findings not only validate the device's specifications under optimal conditions but also highlight its exceptional performance. The overproduction of hydrogen suggests that the manufacturer is conservative in its marketing claims, further emphasizing the device's reliability and efficiency. Our calculations indicate that, when used with a nasal cannula, the device delivers an inhaled hydrogen concentration of approximately 2-2.5% for the average adult male or female. Furthermore, the test results surpass the **H2HUBB performance standards** for hydrogen inhalation products, qualifying this device as a **Level 3 hydrogen inhalation device** according to our performance criteria.

INTERNAL BREAKDOWN AND PERFORMANCE:

Manufacturer's Rated Electrical Values:

- Type of device/electrolytic cell
  - Pure H2: PEM/SPE membrane
- Applied volts:
  - 3.5 volts
- Total Amps:
  - 40 amps
- Total watts:
  - 140 watts

Confirmed Electrical Values

- Electrolysis volts at cell:
  - 1.93 volts (DC)
- Electrolysis amps at cell:
  - 41.0 amps (DC)
- Electrolysis watts at cell:
  - 79.13 watts

H2 Production: (Based on measured amperage @SATP)

- Total Theoretical Max H2 production (@ 100% cell efficiency)
  - Total: 312.05 mL/min (25.72 mg/min)
- Measured H2 production
  - 305 mL/min (25.14 mg/min)
- Electrolytic cell efficiency
  - 97.75%

Product Assessment

Functionality:

- **Power**
  - Power input/Power cord: Located on the back of the system and provides power to the device.
  - Master switch: Located on the back of the system.
- **Digital Display and control panel**
  - Displays the device's operational status, including modes such as Standby, Reached Normal Pressure, Normal Flow, and others.
  - Displays the device's set pressure, which is adjustable to accommodate different operational requirements.
  - Displays the hydrogen gas production.
  - Displays the quality of the distilled water in the unit.
  - **Start/Stop button:**
  - Initiates electrolysis for hydrogen inhalation and allows the system to build adequate pressure.
  - **Open/Close button:**
  - Pressing "Open" initiates the H2 inhalation session, while pressing "Close" ends the session.
  - Enables the produced hydrogen gas to exit the device and flow through the nasal cannula for inhalation.
  - **Menu button:**
  - Enable users to adjust pressure settings, system configurations, and other parameters of the device.
- **Reservoir (2.5L or 0.66 gals)**
  - Requires 2.5L liters of distilled water.
- **H2 ports (1X)**
  - Delivers the H2 gas production for H2 inhalation for single users.
- **O2 Vent (1X)**
  - Vents O2 gas production from electrolysis.
- **Drain port**
  - Allows you to drain the distilled water reservoir with a special fitting.

Product Safety

Safety Components:

- The system has 5 fundamental safety mechanisms for ensuring the device's safety.
  - Low-water protection
    - Protects cells from excessive heat
  - Large distilled water reservoir
    - Protects cells from excessive heat
  - Internal Fans
    - Prevents hydrogen gas build-up in case of leaks and may also aid in preventing overheating
  - Internal gas separator
    - The apparatus helps to improve H2 gas purity.
  - Internal deionization resin filters
    - Improves gas purity and reduces ions (mineral, metal, etc.)
  - Heat Vents
    - Prevents excessive heat in the system

The system theoretically should only be combustible at the tip of the nasal cannula as the system produces >99% pure hydrogen gas. As with all inhalation devices that produce pure hydrogen gas, care should be taken to avoid exposing the cannula tip to any source of ignition (such as an open flame or a spark) which could result in the combustion of the gas.

Overall Opinion

The Doctors Man H2JI1 Hydrogen Inhalation Device has been confirmed through our testing as a clinical-grade, well-engineered system for hydrogen inhalation. The manufacturer rates the device to deliver 250 mL/min of 99.999% pure hydrogen gas under standard operating conditions. Our testing verified these claims, demonstrating that the device consistently meets the specified hydrogen output.

Hydrogen gas output flow rates are a critical performance parameter for inhalation devices. At H2HUBB, the minimum standard for hydrogen generators or inhalation units (whether pure hydrogen, oxyhydrogen, or H2 mixed with air) is 120 mL/min of H_2. This rate corresponds to approximately 0.7-1.3% H_2 at typical resting breathing rates (4-6 L/min) when using a nasal cannula for an average adult. Scientific studies on molecular hydrogen inhalation therapy generally utilize concentrations between 0.5% and 4% or more at resting breathing rates, a range that has been shown to provide therapeutic benefits. Given these findings, H2HUBB establishes 120 mL/min of H_2 as the baseline requirement for hydrogen inhalation devices to ensure effectiveness. The Doctors Man H2 inhalation device significantly exceeds this minimum standard, delivering performance well within the therapeutic range.

The H2JI1 is equipped with a highly advanced PEM/SPE electrolytic cell in a single-cell configuration, designed to consistently produce ultra-pure hydrogen gas (>99.999%). During our testing, the system's electrical values were measured at 1.932V and 41A at full production capacity. This means the cell draws 41 amps at 1.932V. Based on these values, our measurement of approximately 305 mL/min (25.14 mg/min) not only confirms but exceeds the manufacturer's claim of 250 mL/min, aligning well with our findings. The theoretical maximum hydrogen gas output from our electrical measurements, assuming 100% cell efficiency, would be approximately 312.05 mL/min at SATP (Standard Ambient Temperature and Pressure). Therefore, the cell is operating at an impressive 97.75% efficiency, which is exceptional. Our recorded output of 305 mL/min under SATP conditions surpasses the manufacturer's claim by 22%, demonstrating that the device performs slightly above expectations. This suggests that the manufacturer has taken a commendable approach of under-promising and over-delivering with the H2JI1, which is noteworthy and deserving of recognition. Based on current research, we conclude that the device's hydrogen flow rate is sufficient to deliver therapeutic levels of hydrogen gas, achieving an inhaled H2 concentration of 2-2.5% for an average adult at resting breathing rates. **According to our flow-rate test results, the product will be featured on our website as a Level 3 hydrogen inhalation device.** You can view the meaning of this ranking **here**.

According to our testing, this device is an exceptionally engineered hydrogen inhalation system and ranks among the highest-grade devices H2HUBB has analyzed. We are particularly impressed by its inclusion in clinical research **[1][2]**, which underscores its efficacy and therapeutic potential. Furthermore, the company has taken a safe and thoughtful approach by ensuring that the administered hydrogen gas flow rate results in a 2-2.5% inhaled H2 concentration. This is an important safety feature, as it keeps the hydrogen concentration well below its flammability and detonability thresholds in ambient air, which are 4.6-75% and 18-59% (vol/vol), respectively**[3][4]**.

Based on the average inhalation dynamics of a healthy adult male or female, the device, with a measured hydrogen production capacity of approximately 305 mL/min (25.14 mg/min), generates a 2% inhaled H_2 concentration when using a nasal cannula during inhalation. Here's how we calculated these results:

After accounting for hydrogen gas losses, the delivered flow rate of 305 mL/min is significantly reduced. The actual administered hydrogen flow rate—the amount inhaled by the user per minute—is approximately 101.67 mL/min. This was calculated by first converting the flow rate mL per minute to mL per second (305 mL/min ÷ 60 = 5.08 mL/sec). Since an individual typically spends around 20 seconds inhaling per minute, we multiplied 5.08 mL/sec by 20 seconds, resulting in an actual administered flow rate of 101.67 mL/min (5.08 mL/sec × 20 sec = 101.67 mL/min). This calculation demonstrates a 66.67% reduction in the hydrogen flow rate during the breathing cycle, primarily due to exhalation. Since no hydrogen is inhaled during exhalation, and the average person spends approximately 40 seconds per minute exhaling, this significantly reduces the overall amount of hydrogen gas inhaled. Given that the ventilation rate for an average adult at rest is between 4-7 liters per minute, we determined the inhaled H_2 concentration by dividing the actual administered hydrogen flow rate (101.67 mL/min) by 5 liters (5000 mL/min), yielding a concentration of 2%.

Calculation Summary:

- Actual administered flow rate: 101.67 mL H_2 ÷ 5000 mL ventilation per minute = 0.0203
- 0.0203 × 100 = 2.03% H_2 concentration

The final hydrogen concentration of this device remains safely below the flammability and detonation thresholds for hydrogen, as advertised by Doctors Man. It is important to note that modifying respiratory dynamics, such as adjusting tidal volume (Vt) within the range of 250-500 mL or ventilation minute volume (Vm) between 4-7 L/min, would alter the hydrogen concentration delivered.

The manufacturer's claims regarding the molecular hydrogen output flow rate have been validated by our tests, and the device's performance aligns well with the product's marketing materials. No safety concerns were identified, as the system appears to incorporate adequate safety measures. Overall, we are satisfied with the device's performance. The H2JI1 device exceeded H2HUBB's minimum performance standards, and in our assessment, it is both safe and effective for in-home hydrogen inhalation. Based on these findings, we are confident in recommending this product to the public.

Doctors Man

Approved by:

Tywon Hubbard

CEO, H2HUBB LLC

H2HUBB APPROVED

PRODUCT PASSED STANDARDS