Overland Park KS
Tywon@H_2HUBB.com
www.H_2HUBB.com

Date: 5/22/2025

H_2HUBB Official Test Report

Evaluation Introduction

This report provides a comprehensive analysis of the Nord Inhale 2.0 Hydrogen Inhalation Device from Nord Hydrogen, a company based in Sweden. H_2HUBB classifies this device as a Household-Grade, mid-to-high flow hydrogen inhalation system. It is equipped with an 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 up to 6 hours. 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 Nord Inhale 2.0 device meets our H_2 product performance standards required for approval and recommendation by H_2HUBB. For more information about our performance standards for hydrogen inhalation systems, please visit **H_2HUBB.**

H_2 Products

- Company: Nord Hydrogen
- Product Name: Nord Inhale 2.0
- Type: Pure H_2 Inhalation Device (99.9%/3N)
  - PEM/SPE
  - Mid-to- high Flow Rate
- Mfgr rated H_2 Output: 600 mL/min
- URL Link: https://nordhydrogen.com/products/nord-inhale-2-0

Method and Procedure

- Distilled Water (used for testing): 6.0 pH
- Water Temperature: 65~70F/ 18~21C
- Reservoir Vol Size: 1.0 L/1000 mL (0.26 gals)
- H_2 Output: 600 mL/min or 49.46 mg/min (@ SATP)
- Test Location: 277 meters (909 ft elevation)
- H_2 Flow Test: mL/min, normal timing for a breathing session (1 hr)
- Test methodology:
  - Alicat H_2 Mass Flow Meter
  - Gas Displacement
- All measurements converted to SATP where applicable

Test Results

To conduct the hydrogen gas flow rate test, the system was properly assembled and filled with distilled water to the recommended level. The device was set to the 900 mL/min output mode (comprising 600 mL/min of H_2 and 300 mL/min of O_2) and activated for a 1-hour session, with a 10-minute warm-up period prior to measurement. The generated hydrogen gas was directed through a dryer, then passed through a humidity and temperature sensor before entering the Alicat Mass Flow Meter for precise measurement of molecular hydrogen output. To ensure measurement accuracy, the system was allowed to stabilize for 5–10 minutes, preventing interference from ambient air. Minor adjustments were applied to account for any flow reduction caused by moisture or resistance due to the dryer. A minimum of three tests were conducted, and the final flow rate values presented in this report represent the average of those tests.

H_2 Flow Rate Test Results at SATP:

- Device H_2 mL/min (mg/min) avg: ≅ 661 mL/min (11.0 mL/sec) (54.46 mg/min)
- Device O_2 mL/min (mg/min) avg: ≅ 330.51 mL/min
- Device Total H_2/O_2 mL/min avg: ≅ 991.50 mL/min
- Device H_2 mL/sec per-breath Pulse Mode (effective range): ≅ 44–60.5 mL/sec
  - (Combined standard and stored H_2 during enhanced inhalation)
- Pulse Mode delivery frequency: ≅ 70–80%

Claimed Mfgr's H_2 mL/min (mg/min) confirmed: Yes

H_2HUBB Hydrogen Flow Rate Assessment

- H_2HUBB's hydrogen gas flow rate test results confirm the manufacturer's claims regarding the Nord Inhale 2.0's gas production capabilities. Specifically, at standard atmospheric pressure (SATP), the device produces 661 mL/min of hydrogen gas, aligning with the manufacturer's stated output. These findings not only validate the device's specifications under real-use conditions but also reflect consistent performance. Additionally, our analysis of the Pulse Mode feature shows that it enhances per-breath hydrogen delivery to 44–60.5 mL/sec in 70–80% of breaths, effectively doubling—and in some instances tripling—the inhaled hydrogen concentration. When used with a nasal cannula, this corresponds to an average inhaled hydrogen concentration of approximately 4.0–8.8% per enhanced inhalation. These results exceed **H_2HUBB's minimum performance standards** and qualify the Nord Inhale 2.0 as a **Level 4 hydrogen inhalation device** within our performance ranking system.

INTERNAL BREAKDOWN AND PERFORMANCE:

Manufacturer's Rated Electrical Values:

- Type of device/electrolytic cell
  - Pure H_2: PEM/SPE membrane
- Applied volts:
  - 12 volts
- Total Amps:
  - 27 amps
- Total watts:
  - 324 watts

Confirmed Electrical Values

- Cell Configuration:
  - Four cells in series
- Electrolysis volts at cell:
  - 6.72 volts (DC)
  - 1.68 volts (DC) per cell
- Electrolysis amps at cell:
  - 23.46 amps (DC) per cell
  - 93.84 effective amps (DC)
- Electrolysis watts at cell:
  - 157.65 watts

H_2 Production: (Based on measured amperage @SATP)

- Total Theoretical Max H_2 production (@ 100% cell efficiency)
  - Total: 714.21 mL/min (58.88 mg/min)
- Measured H_2 production
  - 661 mL/min (54.46 mg/min)
- Electrolytic cell efficiency
  - 93%

Product Assessment

Functionality:

- **Power input/Power cord:**
  - Located on the back of the system; supplies power to the device.
- **LED Digital Display and Control Panel**
  - Displays the session duration
  - Shows the combined hydrogen and oxygen gas production in mL/min
- **Output Flow:**
  - Allows the user to select hydrogen/oxygen gas production settings: 150, 300, 450, 600, 750, or 900 mL/min
- **Power Start/Stop Button:**
  - Initiates electrolysis for hydrogen inhalation
  - Pressing the button while the device is running will stop gas production
- **Timer:**
  - Adjusts session time in 1-hour increments, up to 6 hours
- **Pulse Mode:**
  - Delivers a small additional quantity of hydrogen gas during each inhalation
- **Sleep Mode:**
  - Dims the digital display to reduce ambient light during use
- **Reservoir (1.0 L or 0.26 gal):**
  - Requires 1.0 liter of distilled water
- **H_2 Port (1x):**
  - Outputs hydrogen gas for single-user inhalation
- **O_2 Vent (1x):**
  - Vents oxygen gas produced during electrolysis
- **Pulse Port (1x):**
  - Releases stored hydrogen gas to support enhanced inhalation during Pulse Mode
- **Drain Port:**
  - Allows the user to empty the distilled water reservoir using a special drain 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 H_2 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 Nord Inhale 2.0 Hydrogen Inhalation Device has been confirmed through our testing as a well-engineered system for hydrogen inhalation. The manufacturer rates the device to deliver 600 mL/min of 99.9% pure hydrogen gas under standard operating conditions. Our testing verified these claims, demonstrating that the device consistently achieves the specified hydrogen output, with measured results aligning with the rated flow rate. Additionally, our evaluation confirmed the functionality of the device's Pulse Mode, which enhances per-breath hydrogen delivery and effectively increases inhaled hydrogen concentration in alignment with the manufacturer's intended design.

Hydrogen gas output flow rates are a critical performance parameter for inhalation devices. At H_2HUBB, the minimum standard for hydrogen generators or inhalation units (whether pure hydrogen, oxyhydrogen, or H_2 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, H_2HUBB establishes 120 mL/min of H_2 as the baseline requirement for hydrogen inhalation devices to ensure effectiveness. The Nord Inhale 2.0 H_2 inhalation device significantly exceeds this minimum standard, delivering performance well within the therapeutic range.

The Nord Inhale 2.0 is equipped with an advanced PEM/SPE electrolytic cell system configured in a quad-cell arrangement, engineered to consistently produce high-purity hydrogen gas (>99.9%). During our testing, the system's electrical values were recorded at 6.72V and 23.46A at full production capacity, indicating that each cell operates at 1.68V drawing 23.46 amps. Based on these values, our measured hydrogen output of approximately 661 mL/min (54.46 mg/min) not only confirms but exceeds the manufacturer's stated output of 600 mL/min, aligning well with our findings. Theoretical calculations based on the measured electrical input suggest a maximum hydrogen gas output of approximately 714.21 mL/min at SATP, assuming 100% cell efficiency. This indicates the system operates at an impressive 93% efficiency, which is exceptional for a PEM/SPE-based hydrogen inhalation device. Our verified output of 661 mL/min under SATP conditions represents a 10.17% increase over the manufacturer's claim, demonstrating that the device performs slightly above expectations. This suggests the manufacturer has taken a conservative approach in its specifications, opting to under-promise and over-deliver—an approach that deserves commendation. Based on current scientific research and resting breathing rates, we conclude that the Nord Inhale 2.0's hydrogen flow rate is more than adequate to deliver therapeutic levels of hydrogen gas, achieving an inhaled H_2 concentration of approximately 4.0–4.4% for the average adult using a nasal cannula. **According to our flow-rate test results, the product will be featured on our website as a Level 4 hydrogen inhalation device.** You can view the meaning of this ranking **here**.

The device features a function known as Pulse Mode, designed to introduce a small quantity of additional hydrogen gas into the nasal cavity with each inhalation. To activate this function, the user must press the Pulse Mode button. Once activated, the system attempts to synchronize with the user's inhalation pattern and delivers approximately 11–22 mL of hydrogen gas per breath, depending on the duration of the inhalation (calculated as: 661 mL/min ÷ 60 sec × 1–2 sec = 11.0–22.0 mL). It is claimed that the Pulse Mode function can double the inhaled hydrogen for individuals using the device during inhalation. Based on our confirmed flow rate measurement of approximately 661 mL/min (or 54.47 mg/min) at SATP, the system provides a continuous hydrogen delivery of 11.0 mL/sec, corresponding to an inhaled concentration of approximately 4.0–4.4% for an average adult male at rest. Theoretically, if Pulse Mode enables a momentary doubling of the hydrogen volume per inhalation—raising the delivery to 22–44 mL/sec—the system could achieve a peak inhalation concentration of up to 8.8%. This would equate to an inhaled hydrogen flow rate of up to 1322 mL/min, although this is only momentarily achievable.

The system includes a H_2 gas reservoir that stores hydrogen during exhalation and releases it when either:

- the reservoir pressure reaches 5.68 psi (0.4 kg/cm²), or
- a negative pressure (indicative of inhalation) is detected at the nasal cannula tip.

Based on discussions with the manufacturer and our own measurements, the device continues to deliver the standard 661 mL/min of hydrogen continuously, and releases the stored gas only under the conditions noted above. We conducted timing tests and observed that the reservoir typically releases its contents every 4.5 to 5 seconds.

Using the measured flow rate:

- 661 mL/min ÷ 60 sec = 11.0 mL/sec
- 11.0 mL/sec × 4.5–5 sec = 49.5–55.0 mL

This aligns well with our gas displacement measurements, which showed a released volume of ≥ 40 mL per cycle.

To understand the practical impact, it's important to consider standard respiratory physiology:

- Tidal volume: ~250–500 mL
- Ventilation rate: ~4–6 L/min
- Inhalation/exhalation ratio: 1:2 (about 1–2 sec inhalation, 2–3 sec exhalation)
- Breathing rate: ~12–16 breaths/min (1 breath every 3–5 sec)

Given this, most inhalations occur every 3–3.5 seconds. At that interval, the device stores:

- 11.0 mL/sec × 3–3.5 sec = 33–38.5 mL of additional hydrogen

When this stored hydrogen is added to the standard 11–22 mL delivered during inhalation, the total per-breath delivery increases to:

- 44–60.5 mL of hydrogen

Our tests found that the device does not release stored hydrogen with every inhalation, but does so approximately 70–80% of the time. For example, over 10 breaths:

- 7–8 inhalations include an additional 33–38.5 mL of hydrogen
- 2–3 inhalations receive only the standard 11.0 mL

Using 7 breaths at 44 mL (standard + stored) and 3 breaths at 11 mL:

- (7 × 44) + (3 × 11) = 308 + 33 = 341 mL of hydrogen delivered over 10 breaths

Assuming an average of 13 breaths per minute:

- Total H_2 per minute = (341 ÷ 10) × 13 = 443.3 mL/min
- Equivalent mL/sec = 443.3 ÷ 60 = 7.39 mL/sec
- Increase over baseline (11 mL/sec × 1/3 inhalation time = 3.67 mL/sec) = 7.39 ÷ 3.67 ≈ 2.0x

Alternatively, using a maximum case (8 breaths with stored gas at 60.5 mL and 2 without):

- (8 × 60.5) + (2 × 11) = 484 + 22 = 506 mL over 10 breaths
- Total H_2 per min = (506 ÷ 10) × 13 = 657.8 mL/min
- 657.8 ÷ 60 = 10.96 mL/sec
- 10.96 ÷ 3.67 ≈ 3x increase over baseline

Thus, in ideal conditions, the system may effectively triple the inhaled hydrogen flow rate at times.

While Pulse Mode appears capable of significantly enhancing hydrogen inhalation volumes, its performance is dependent on several variables:

- User breathing patterns
- Pressure sensor sensitivity
- Reservoir refill timing

Despite variability in delivery and the fact that stored hydrogen is not released with every breath, the Pulse Mode feature demonstrates a promising advancement in hydrogen inhalation technology. Based on our testing, measured performance, and the supporting physiological variables, Pulse Mode appears capable of doubling—and in some instances tripling—the inhaled hydrogen concentration per inhalation.

While the feature could still benefit from refinement to improve timing precision and consistency, H_2HUBB is convinced of the efficacy of Pulse Mode in its current implementation to at least double the inhaled H_2 concentration. This feature represents a significant innovation that sets the Nord Inhale 2.0 apart from other hydrogen inhalation systems currently available on the global H_2 market..

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 Nord Inhale 2.0 device exceeded H_2HUBB'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.

Approved by:

Tywon Hubbard

CEO, H_2HUBB LLC