Manufacturer Official Test Report

Health And Hydrogen

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Product:

Name: HAH 3000 Hydrogen inhalation machine

Machine Size: 235*253*360mm

Mfgr rated H_2 Output: 2000 ml/min

Type: Pure H_2 Inhalation Device (99.9%/3N)

- PEM/SPE
- O_2 port supplied as well.

Tester: Jianbin Zhu

Testing start date: 6/23/24

Completion date: 6/24/24

PERFORMANCE:

H_2 ml/min Confirmation Test : HAH 3000

METHODOLOGY:

- Distilled Water (used for testing): 6.0 pH
- Water Temperature: 65~70F/ 18~25C
- Reservoir Vol Size: 2.8 L/2800 ml (2.11 gals)
- H_2 output: 2000 ml/min or 165 mg/min (@ SATP)
- H_2 Flow Test: ml/min

  Test methodology: The water displacement method (The basic principle involves collecting the gas in an inverted graduated cylinder or gas collection bottle submerged in water. The gas displaces the water, allowing for the measurement of its volume.)

  All measurements converted to SATP where applicable

H2 Flow Rate Test Results at SATP:

- Device H_2 ml/min (mg/min) avg: = 2000 ml/min (165 mg/min)
- Device O_2 ml/min (mg/min) avg: =1000 ml/min
- Device Total H_2/O_2 ml/min (mg/min) avg: =3000 ml/min
- Claimed Mfgr's H_2 ml/min (mg/min) confirmed: Yes

In this report, we are exclusively presenting the test results for the 3000 ml/min H_2/O_2 setting, which is essential to meet our standards. If clients wish to examine the results for the lower gas output settings tested, please feel free to contact us.

INTERNAL BREAKDOWN AND PERFORMANCE:

Manufacturer's Rated Electrical Values:

- Type of device/electrolytic cell

  Pure H_2: PEM/SPE membrane
- Applied volts:

  24 volts
- Total Amps:

  34 amps
- Total watts:

  816 watt

Confirmed Electrical Values (@ 1X: 8 electrolytic cells in series configuration)

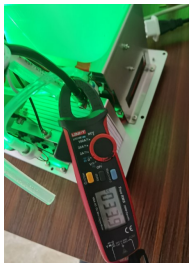
- Cell Configuration

  1 electrolytic cell

  8 cells in series with each stack

- Electrolysis amps:

  33.9 amps (DC)



  271.2 effective amps (DC) = 33.9*8

- Electrolysis volts:

  13.98 volts (DC) = 1.747*8

  1.747 volts (DC) per cell

- Electrolysis watts:

  ≈474 watts (33.9×13.98)

H2 Production: (Based on measured amperage @SATP)

- Total Theoretical Max H2 production (@ 100% cell efficiency)

  2063.83 ml/min (185.51 mg/min)

- Measured H2 production(according to the video)

  2020 ml/min (181.34 mg/min)

- Electrolytic cell efficiency

  97.87%

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.

- **LED Digital Display and control panel**

  Displays the session time-frame

  Displays the combined hydrogen gas and oxygen gas production in ml/min

  Flow Control:

Allows the user to change the combined hydrogen/oxygen gas production in ml/min (1000, 2000, 3000)

Power/ON OFF

Turns on the display

Times setting

Increases the session time by 30mins, 1hour, 2hours, 4hours and 8hours

Initiates electrolysis for hydrogen/oxygen gas inhalation.

Day/Night Mode

Allows you to switch between day and night modes:

Day Mode: Constant lighting with voice prompts.

Night Mode: Lighting off and muted.

Gas display window:

Shows the hydrogen/oxygen gas flow

- **Reservoir (2.8L or 0.74 gals)**

  Requires 2.5L liters of distilled water.

- **H_2 ports (1X)**

  Delivers the H2 gas production for H2 inhalation.

- **O_2 port (1X)**

  Delivers the O2 gas production for H2/O2 inhalation.

- **Drain port**

  Allows you to drain the distilled water reservoir directly under the bottom.

Reliability:

- New: Yes

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

- 3 months: N/A
- 6 months: N/A
- 1 year: N/A
- Reliability Summary: N/A

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 (1X)

Prevents hydrogen gas build-up in case of leaks and may also aid in preventing overheating

Internal gas separator (2X)

The apparatus helps to improve H2 gas purity.

Internal deionization resin filters (1X)

Improves gas purity and reduces ions (mineral, metal, etc.)

Heat Vents (5X)

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:

HAH 3000 Hydrogen Inhalation Machine is a well-engineered hydrogen inhalation device based on our testing. The unit is rated by the manufacturer to supply 2000 ml/min of pure hydrogen gas (99.9%) at 100% production capacity. In addition, the system is claimed to provide 1000 ml/min of pure O_2, which we also confirmed.

Hydrogen gas output flow rates are a critical performance parameter for inhalation devices. The minimum standard for hydrogen generators or inhalation units (pure H_2 , mixed with air, etc.) is 120 ml/min of H_2 (120 ml/min ≈ 2% H_2 at resting breathing rates (4-6 L/min)). This is based on preliminary observations and/or studies demonstrating that 1~1.3% (vol/vol) of H_2 may offer therapeutic potential. For these reasons, 120 ml/min of H_2 is our minimum standard for hydrogen generators and the HAH 3000 device easily surpasses this standard.

We confirmed the system electrical values at 13.98V/33.9 A at the device's 100% production capacity measured at each electrolytic cell. That means each individual cell (8X) within both cells will draw 33.9 amps at 1.747V. Given these measured electrical values, our measurement of ≈2063 ml/min not only confirms the flow rate but surpasses the manufacturer's claims of 2000 ml/min. The total H_2 gas output for the device based on the theoretical maximum (100% cell efficiency) would be ≈ 3094.5 ml/min at SATP. Therefore, it appears that the H_2 inhalation system electrolytic cell is operating at a cell efficiency of 97.87%. This means that the O_2 production of the system was calculated to be≈ 1031.5 ml/min (@ SATP). Our findings confirmed the claims that the device can provide≈3000l/min of oxyhydrogen (H_2/O_2). The measured oxyhydrogen production of the system based on our analysis was ≈ 3030 ml/min. This represents a 1% increase in hydrogen production compared to the advertised claim.