NEW

SANYO

Product Information

Commercial Air Purifying System

VW-VF8A

Reference Exhibit

SANYO EVOLUTION PROJECT

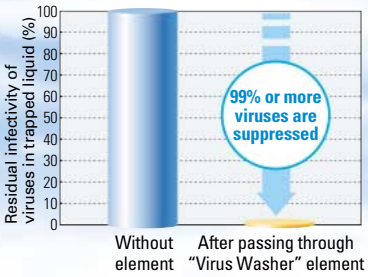
virus washer
α電解水除菌システム 搭載

VW-VF8A

As part of the company's drive to realize its new "Think GAIA" vision, SANYO Electric has developed the new VW-VF8A Air Purifying System for commercial applications. It is equipped with a "Virus Washer" system using electrolyzed water to suppress infectivity from air-borne viruses present in large spaces. With this and other innovative products, SANYO strives to provide people living in the 21st century with a safer environment as well as ideal solutions for a healthy and comfortable lifestyle.

Adopting electrolyzed water to suppress infectivity from air-borne viruses in a room.

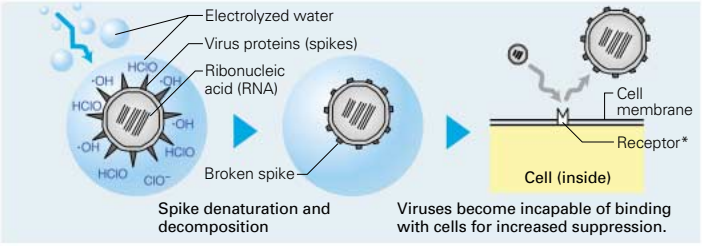
The VW-VF8A can block infectivity from air-borne viruses by feeding electrolyzed water into its newly developed bacteria-eliminating element and forcing room air to pass through the element and circulate. The results of a verification test revealed that electrolyzed water was effective in suppressing 99% infectivity or more from viruses (joint research project with the Gunma Prefectural Institute of Public Health and Environmental Sciences).



* Test method: Air containing viruses is passed through the electrolyzed water bacteria-eliminating element to trap viruses. The TCID50 method is then used to measure the culture cell infectivity of viruses.
* Testing organization: Gunma Prefectural Institute of Public Health and Environmental Sciences.

Virus suppression mechanism of electrolyzed water.

Hypochlorous acid within electrolyzed water breaks down virus surface proteins (spikes) to suppress activity of viruses.



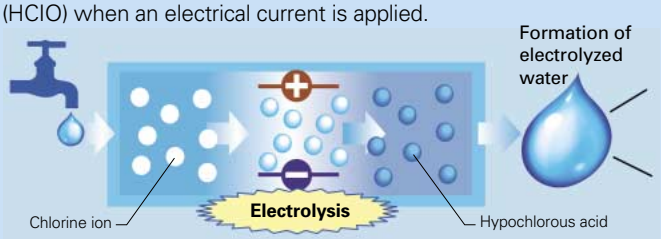
* Receptor needed for virus infectivity

Suitable for large spaces such as schools and hospitals.

The VW-VF8A can produce up to 480m³/hour (8m³/min.), more than enough to provide clean air for large spaces in which many people gather, such as schools, hospitals and other public facilities. It offers powerful virus removal by providing approximately 2.7 times per hour the air circulation for a classroom measuring approximately 180m³.

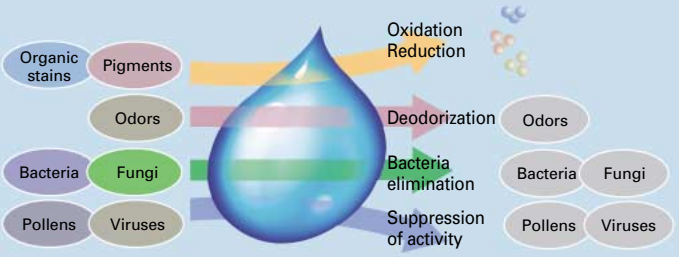
What is electrolyzed water?

Electrolyzed water is produced through electrolysis that uses chlorine ions within tap water. These ions form hypochlorous acid (HClO) when an electrical current is applied.



Efficacy of electrolyzed water

Hydroxy radicals are formed from hypochlorous acid within electrolyzed water, which can remove bacteria and fungi*, and get rid of organic stains, odors and pigments through oxidation reduction.



* Testing organization: Japan Food Research Laboratories; Test method: Flat agar culture plate method; Bacteria-elimination method: Electrolysis

Specifications

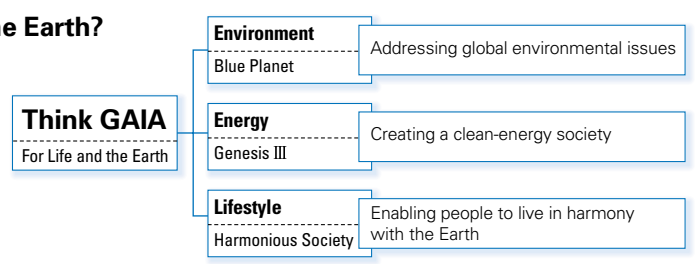
Model	VW-VF8A
Installation method	Floor type
Air volume	Rapid: 8m³/min; Strong: 7m³/min.; Low: 5m³/min.
Operation sound	Rapid: 45dB; Strong: 42dB; Low: 38dB
Dimensions	615 (H) x 1,085 (W) x 230 (D)mm
Weight	Product mass: 37kg Mass during operation: 41kg (when feed tank is full)

Note: Consumable supplies must be replaced regularly.

SANYO NEW VISION
Think GAIA

What can SANYO do for Life and the Earth? Our answer: Think GAIA.

How do we ensure that children of the future will have a beautiful planet to live on? For SANYO, the answer is to treat the Earth as a single living organism, and create the products we truly need to continue living in harmony with this precious planet. This is the conviction that inspires SANYO's new vision: "Think GAIA." It is a threefold approach, consisting of action on the environmental, energy and lifestyle fronts. In each of these fields, SANYO redefines conventional ideas and takes a radically new perspective, taking advantage of its unique technological resources to propose global solutions for Life and the Earth.



Under the new vision "Think GAIA," SANYO is implementing three programs.

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MS-L GmbH Laborgeräte
Münchäckerweg 46-48
D-69168 Wiesloch bei Heidelberg

Tel: 06222 / 93 56-60 * Fax: 06222 / 93 56-66
www.MS-l.de * info@MS-L.de

SANYO

SANYO Sales & Marketing Corporation

Test Report

– Evaluation Test of the Influenza Virus A Removal Capability of the Space Cleaning System with Virus Washer –

Kitasato Institute
Kitasato Institute Medical Center Hospital
Research Center for Medical Environment

Title:	Evaluation test of the virus removal capability for the Space Cleaning System with virus washer, using influenza virus A as the test index
Purpose:	Evaluate the virus removal capability of the Space Cleaning System with electrolyzed water treatment mechanism, developed by Sanyo Electric Co., Ltd. The test was performed in an enclosed space using a test tent, and evaluated the removal of influenza virus A.

Test contractor

Name:	Sanyo Electric Co., Ltd. Commercial Solutions Group / Commercial Solutions Company Commercial Airconditioners Control BU / Packaged Airconditioners Development BU
Location:	1-1-1 Sakata, Oizumi-machi, Oura-gun, Gunma-ken

Test agency

Name:	Kitasato Institute Kitasato Institute Medical Center Hospital – Research Center for Medical Environment
Location:	5-9-1 Shirogane, Minato-ku, Tokyo

Test facility

Name:	Kitasato Institute – Kitasato Institute Medical Center Hospital, Infection Testing Laboratory (formerly the Canine Laboratory), Biomedical Building 1F

Test director:	Noritada Kobayashi
Test staff:	Noritada Kobayashi
	Takayuki Uematsu
	Masataka Otsuka
Director of testing:	Tatsuo Suzuki

Test period:	December 15, 2005 – March 6, 2006 (including virus cultivation time)

Date that test report was created:	March 6, 2006
Date that final test report was created:	March 8, 2006
Date that final test report was approved:	March 10, 2006

Methodology:

1. Materials

1.1 Test machine
Name: Space Cleaning System
Code No.: VW-VF8A
Remarks: Air purification machine with virus washer
(α electrolyzed water air purification system)

1.2 Virus strain used
Name: Influenza virus A
Strain: PR8

1.3 Cells strain used
Name: MDCK cells
Strain: RCB0995
Remarks: Canine (female Cocker Spaniel) kidney epithelial cells

Results:

Following are the results from the virus removal tests of the Space Cleaning System with virus washer, using influenza virus A as the index.

a. When tap water was used

The infectious strengths of the recovered influenza virus A (IFVA) in the test tent when the Space Cleaning System was operated using tap water were the following.
0 minutes after virus spray ended: $10^{4.43 - 4.55}$ $TCID_{50}$/mL
10 minutes after virus spray ended: $10^{3.91 - 4.11}$ $TCID_{50}$/mL
20 minutes after virus spray ended: $10^{3.39 - 3.43}$ $TCID_{50}$/mL
30 minutes after virus spray ended: $10^{2.58 - 2.65}$ $TCID_{50}$/mL
40 minutes after virus spray ended: $10^{<2.17 - <2.41}$ $TCID_{50}$/mL
50 minutes after virus spray ended: $10^{<1.27 - <1.42}$ $TCID_{50}$/mL

b. When ultrapure water was used (test control)

The infectious strengths of the recovered IFVA in the test tent when the Space Cleaning System was operated using ultrapure water instead of tap water were the following.
0 minutes after virus spray ended: $10^{4.58 - 4.62}$ TCID50/mL
10 minutes after virus spray ended: $10^{4.30 - 4.40}$ TCID50/mL
20 minutes after virus spray ended: $10^{4.20 - 4.28}$ TCID50/mL
30 minutes after virus spray ended: $10^{3.95 - 4.00}$ TCID50/mL
40 minutes after virus spray ended: $10^{3.51 - 3.61}$ TCID50/mL
50 minutes after virus spray ended: $10^{<3.11 - <3.16}$ TCID50/mL

c. Decrease in virus infectious strength

Using as the base the average infectious strength of the recovered viruses when ultrapure water was used, the decreases in the IFVA infectious strength were found from the average infectious strength of the recovered viruses when tap water was used. The decreases in IFVA infectious strength after electrolyzed water treatment were the following.
Immediately after virus spray ended: 22.97%
10 minutes after virus spray ended: 51.40%
20 minutes after virus spray ended: 85.09%
30 minutes after virus spray ended: 95.63%
40 minutes after virus spray ended: 94.50% or greater
50 minutes after virus spray ended: 98.28% or greater

Observations:

This evaluation test of the virus removal capability for the Space Cleaning System with virus washer (α electrolyzed water air purification system) was conducted using influenza virus A (IFVA, strain PR8). The air purification machine used in the test was a system developed by Sanyo Electric, and is intended to reduce the infectious strength of airborne viruses by passing them through an element onto which hypochlorous acid (α electrolyzed water) is dripped. The hypochlorous acid is generated from the chlorine ions resulting from electrolysis of tap water.
When the test was conducted using IFVA, which are approximately 1/50 the size of ordinary bacteria, the infectious strength of the IFVA in the test tent decreased with longer operating times of the Space Cleaning System (when tap water was used). These effects became significant when the system had operated for 30 minutes or longer. When ultrapure water (the test control) was used, the infectious strength of the IFVA also decreased with longer operating times of the Space Cleaning System in the same way. However the change was more gradual than when tap water was used. While a decrease in the IFVA infectious strength was also seen when ultrapure water was used, this decrease is thought to be the result of the natural precipitation of airborne viruses caused by moisture in the test tent, rather than the result of the Space Cleaning System operation. With consideration for the natural precipitation of airborne viruses caused by moisture in the test tent, the infectious strength of the recovered viruses with ultrapure water was used as the base in order to find the decrease in the infectious strength of the recovered viruses with tap water. The results showed a decrease in infectious strength of 94% or more when the Space Cleaning System had operated for 30 minutes or longer. When the Space Cleaning System had operated for 50 minutes or longer, and with consideration of the natural precipitation of viruses, a decrease in infectious strength of 98% or more was confirmed.
The above results indicate that the Space Cleaning System with virus washer (α electrolyzed water air purification system) which was used in this test is capable of removing viruses after sufficient electrolyzed water treatment.

Conclusion:

At this performance test of the Space Cleaning System, using the influenza virus as the test index, the Space Cleaning System with virus washer (α electrolyzed water air purification system) which was used in this test was shown to be fully capable of removing viruses.

Reference documents:

Virus Test Studies, primary article, 1973 (National Institute of Infectious Diseases Alumni Association)
Virus Test Studies, sub article, 1973 (National Institute of Infectious Diseases Alumni Association)
Virus Testing Protocols, 1995 (Medical View Co., Ltd.)

Date that test report was created:	March 6, 2006
Test report created by:	Noritada Kobayashi 小林憲忠
Date that final test report was created:	March 8, 2006
Final test report created by:	Noritada Kobayashi 小林憲忠
Date that final test report was approved:	March 10, 2006
Director of testing:	Tatsuo Suzuki 鈴木達夫

Virus Removal Capability of the Space Cleaning System with Virus Washer with Respect to Influenza Virus A

Time *1 (min)	Infectious strength of recovered viruses (log) $TCID_{50}$/mL		Decrease in virus infectious strength *3 (%)
	Tap water *2	Ultra pure water (test control) *2	
	Average ± Standard deviation	Average ± Standard deviation	
0	4.49 ± 0.06	4.60 ± 0.02	22.97%
10	4.04 ± 0.11	4.35 ± 0.05	51.40%
20	3.42 ± 0.03	4.25 ± 0.04	85.09%
30	2.61 ± 0.04	3.97 ± 0.03	95.63%
40	<2.28 ± 0.12	3.54 ± 0.06	94.50%
50	<1.36 ± 0.08	<3.13 ± 0.03	98.28%

The Space Cleaning System with virus washer was installed in a temporary test tent (Approx. 9.1 m^2) in the Infection Testing Laboratory on the first floor of the Biomedical Building at the Kitasato Institute Medical Center Hospital. A nebulizer was used to spray influenza virus A into the tent for 30 minutes, and then an impinger was used to collect the viruses from the air inside the tent for 10 minutes at each of the designated intervals. The virus infectious strength in the collected fluid was then calculated by the TCID method.

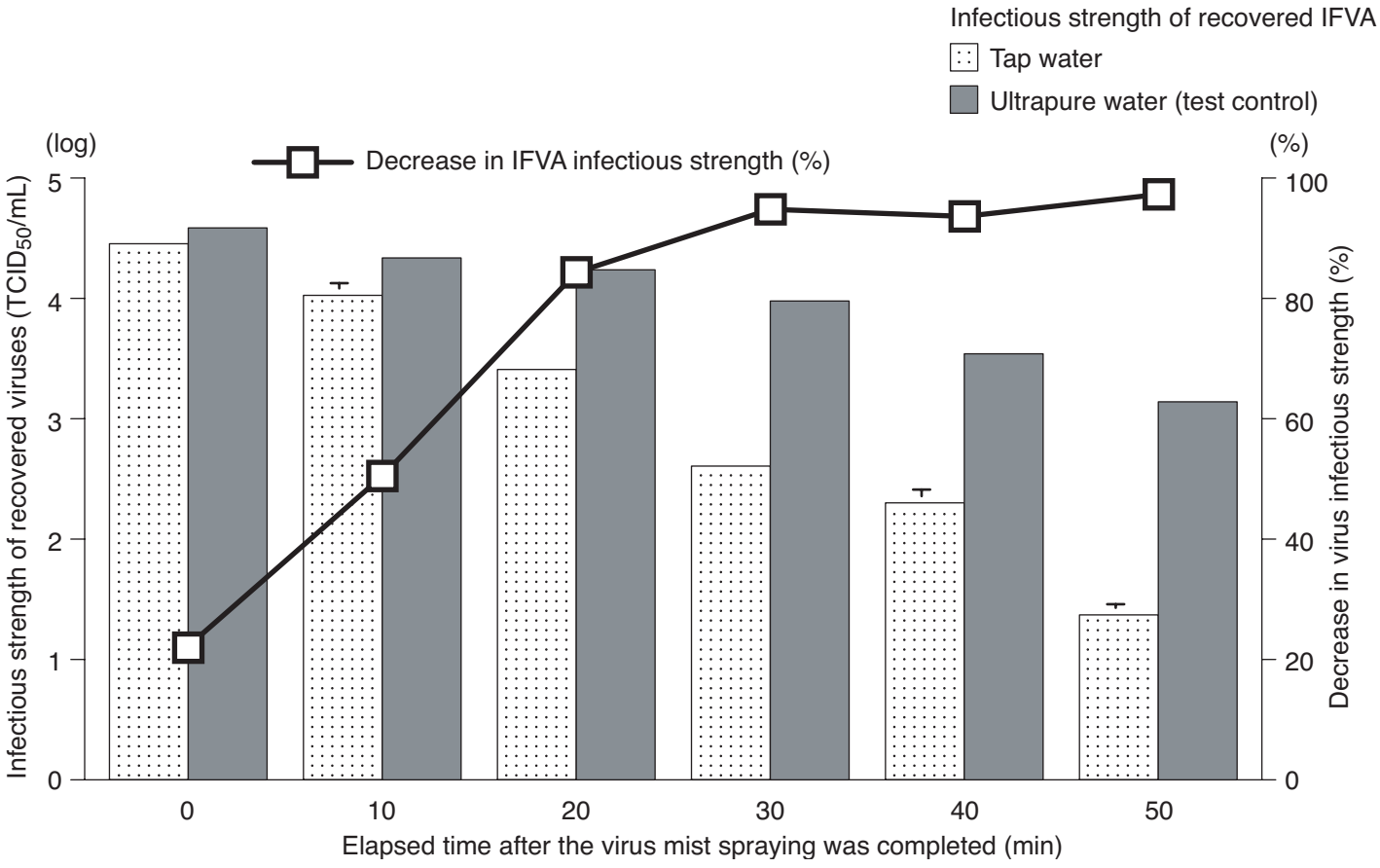
*1: The time is the elapsed time after the virus mist spraying was completed.

*2: This indicates the type of water which was used in the Space Cleaning System with virus washer. The conductivity level of the ultrapure water used was 15 MΩ or higher.

*3: Using as the base the infectious strength of the recovered viruses when ultrapure water was used, the decrease in the infectious strength was calculated from the infectious strength of the recovered viruses when tap water was used, by means of the following formula.

$$\text{Decrease in infectious strength (\%)} = \frac{\left(\begin{array}{c}\text{Infectious strength of viruses recovered}\\ \text{when ultrapure water was used}\end{array}\right) - \left(\begin{array}{c}\text{Infectious strength of viruses recovered}\\ \text{when tap water was used}\end{array}\right)}{\text{Infectious strength of viruses recovered when ultrapure water was used}} \times 100$$

Changes in the Infectious Strength of Influenza Virus A Over Time Resulting from Use of the Space Cleaning System with Virus Washer



NEWS RELEASE

SANYO Electric Co., Ltd.
Tottori University

SANYO's Proprietary Electrolyzed Water Technology Proven Effective in Suppressing Avian Influenza Viruses

Tokyo, Japan--- May, 15, 2006---SANYO Electric Co., Ltd., (SANYO) a leading provider of environment and energy related products and services, announced today that its proprietary electrolyzed water technology effectively suppresses avian influenza viruses. This result was achieved by collaborative research with Tottori University, Japan (team led by Professor Kouichi Otsuki of the Faculty of Agriculture). It was shown that SANYO's proprietary electrolyzed water technology, 'Disinfectant Element' system and 'Disinfectant Electrolyzed Mist' system was highly effective in suppressing more than 99% of airborne avian influenza viruses.

Since December 2003, infection of the highly pathogenic avian influenza virus (H5 type) in poultry and humans has been identified in many countries, especially those in Southeast Asia and Europe, taking more than 100 human lives (WHO, April 2006). Research on the avian influenza viruses has been drawing substantial attention around the world.

"SANYO is proud of the work we have done in developing this technology which possibly could lead to the prevention of a major world threat. We will continue to research the practical uses of this technology in homes, schools and other public places." said Tomoyo Nonaka, Chairman of SANYO. She added "SANYO is committed to providing solutions for a sustainable lifestyle, based on our 'Think GAIA' vision."

Results of new tests with electrolyzed water

Experiments were conducted to study the efficacy of SANYO's proprietary 'disinfectant element' system and 'disinfectant electrolyzed mist' system (containing only 10-mg/l concentration of free residual chlorine). SANYO applied a diluted amount of electrolyzed water formed from conventional tap water by the electrolyze process. The results confirmed that 99% of airborne avian influenza viruses were suppressed when passed only one time through the 'disinfectant element' system or sprayed with the 'disinfectant electrolyzed mist'.

The electrolyzed water is simple to form from tap water and has a low concentration of free residual chlorine compared to chlorine based disinfectant (containing a 500-1,000mg/l concentration of free residual chlorine). Thus, SANYO's proprietary technology the 'disinfectant element' system and 'disinfectant electrolyzed mist' system suppresses avian influenza viruses and is safe and considerate of the environment as well as being practical for applied developments.

About Research Team of Tottori University

The research team, led by Professor Otsuki, has long been conducting studies on the avian influenza viruses, making vital contribution to the field. In fiscal 2005, the team received the Award of Recognition for Scientific Technologies from the Ministry of Education, Culture, Sports, Science and Technology for its finding, which demonstrated that a highly pathogenic virus can arise from a less virulent strain through mutation.

About SANYO's 'Think GAIA' vision

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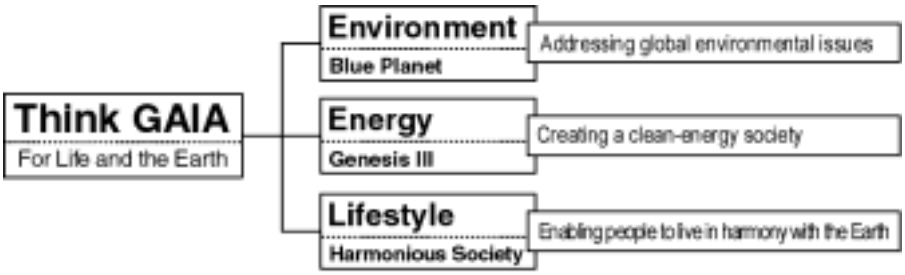

Under the new vision "Think GAIA", SANYO will realize the three programs.

Press Contact:

Ryan Watson
SANYO Electric Co., Ltd.
Media Relations Unit
Tel: +81-3-3837-6206
Fax: +81-3-3837-6381
E-mail: ryan.watson@sanyo.co.jp