

A presentation on the technology of Photocatalytic Oxidation (PCO) and UVAIRx's, Patent Pending Photovoltaic Reactor (PVRx)





Photocatalytic Oxidation (PCO) occurs when UV light (from sunlight, UV bulbs or UV LEDs) energizes titanium dioxide (TiO_2) and triggers two chemical reactions that lead to the near instantaneous formation of hydroxyl radicals and super oxide ions. These highly reactive chemical agents then instantly interact at the treated surface and are released into the air to accelerate the environmentally beneficial decomposition viruses, bacteria, fungi (including mold) and VOCs (volatile organic compounds) through oxidation and to reduce/neutralize inorganic pollutants. This process all happens in billionths of a second and continues to scrub the air and surfaces as long as light, titanium dioxide and air flow are present.





Design Criteria for PCO Reaction Equipment varies greatly from manufacturer to manufacturer. While the elements for PCO reaction remain the same, there are a number of design criteria capable of creating a significant difference in their operating characteristics. 1) Air is required, however the air pressure, velocity and turbulence significantly affect performance. 2) Light is required, however light frequency and intensity play a big role in the reaction output. And 3) Titanium dioxide is required, but comes in a variety of structures and can be mixed with other agents (doping), to achieve a desired reaction. Applying the TiO₂ to the reactors surface and the material makeup of the reactor itself play a critical role in the performance characteristics of the design.





A Natural Bi-product of PCO is ozone. Ozone occurs naturally in nature. You've probably heard the ongoing debate regarding the thinning of the ozone layer and the potential hazards to mankind. PCO reaction does produce ozone and depending on the designer's objective, it can be controlled. UV light is made up of two wavelengths, 185 nanometer wavelength and 254 nanometer wavelength. The 185nm wavelength creates ozone during the reaction while the 254nm wavelength neutralizes ozone during the reaction. The UVAIRx Photovoltaic Reactor (PVRx) leverages the 254nm wavelength, a careful balancing act in efficiency of the reaction, to managing ozone levels – even reducing it below OSHA's minimum allowable limit of (0.10-ppm).





The UVAIRx, Photovoltaic Reactor Design (PVRx) is unique in its ability to control and maximize the reaction of air, light and titanium dioxide. The patent pending design of the PVRx Core is groundbreaking! UVAIRx has spent five (5) years identifying the optimum combination of air, light and TiO₂ achieving a reaction maximizing the environmentally beneficial decomposition of all organic pollutants and VOCs. The patent pending, PVRx Core from UVAIRx not only treats the air passing through the reactor, but emits charged groups of reactive ions into the environment to further eliminate pollutants on surfaces and in crevices other designs simply can't.





The Ux105 Photovoltaic Reactor (PVRx) (shown) draws air from the open bottom and pushes it unrestricted through the PVRx Core out the top. This laminar flow design maximizes the effects of the three elements required for PCO reaction. Airborne VOC's and pathogens are eliminated while passing through the PVRx unit, while groups of ions are exhausted into the environment to further eliminate pathogens on surfaces and hiding in crevices.



Air



Titanium Dioxide



Photovoltaic Reaction





UVAIRx – PVRx Products are Being Used in a variety of markets and for a variety of applications. UVAIRx – PVRx Core units are perfect for medical and hospital rooms, entertainment and shopping centers, hotel-motel rooms, cruise lines, educational and day-care facilities, veterinary and animal shelters, first responder vehicles and controlled environmental agriculture facilities. UVAIRx conditions, only to find relief from units have found their way into homes where occupants suffer from a variety of conditions, only to find relief from the **UVAIRx** Difference.



Air



Light



Titanium Dioxide



Photovoltaic Reaction





Independent Market Testing Results



Efficacy Data Report

The following data is a summary of efficacy test results primarily using a "before and after swab test" protocol conducted by several UVAIRx customers in their selected locations. Lyle Labs and Mall of the Emirates was completely independent testing. The swabs were used to collect multiple surface samples within the test locations and sent, by the customer, to EnviroScreening Lab, Bradenton FL. for analysis. Lyle Labs did their own analysis, as did Mall of the Emirates. All of these lab test results and company summary reports, as summarized within this report, are on file and available upon request.

The purpose of these tests was to prove that the UVAIRx technology effectively and safely killed pathogens found in these "real world---uncontrolled" locations----as opposed to controlled laboratory conditions (with the one exception of the MRSA test conducted by Lyle Labs).

A complete description of the test protocol used in these tests can be found on slide 23 of this presentation.



Pilot Test Results Summary

Bacteria CFU's Killed – Controlled Result	s ¹ 97.3%	
Bacteria CFU's Killed – Uncontrolled Resu	lts ² 91.8%	
Mold CFU's Killed	<mark>95.8%</mark>	

Pathogen effective kill rate

6 Pilot test locations













¹Controlled Results – no human or environmental interruptions were introduced into the test area ²Uncontrolled Results – where human or environmental interruptions were introduced

Confidential Information

January 29, 2018







August 29, 2017 Pilot Test Results – YMCA in Rye, New York

3 Test Locations	Day Care Area Pole	Baby Chair	Bike Seat Spin Room	Controlled Results Total
CFUs Present Before Test	61	32	142	235
CFUs Found After Test	0	0	0	0
CFUs Destroyed	61	32	142	235
Effective Kill Rate	100%	100%	100%	100%



Lyle Labs Pilot Test



May 2015 Pilot Test Results – Lyle Labs in New York, NY

Rodac Surface Plates	Staphylococcus Aureus	MRSA	Pseudomonas	Controlled Results Total
CFUs Present Before Test	120	75	31	<mark>226</mark>
CFUs Found After Test	0	0	1	1
CFUs Destroyed	120	75	30	225
Effective Kill Rate	100%	100%	97%	100%



Rocky Vista University Pilot Test



October 28, 2015 Pilot Test Results – Rocky Vista University Clinic

3 Test Locations	Office	Nurse Station	Patient Room	Controlled Results Total
CFUs Present Before Test	301	316	75	692
CFUs Found After Test	25	0	0	25
CFUs Destroyed	276	316	75	667
Effective Kill Rate	92%	100%	100%	96%



EMS Darien Pilot Test



March 17, 2017 Pilot Test Results – EMS Ambulance in Darien, CT

3 Test Locations	Steering Wheel	Top Rail Right Side Window	First In Bag	Controlled Results Total	
CFUs Present Before Test	2	39	19	60	
CFUs Found After Test	0	5	1	6	
CFUs Destroyed	2	34	18	54	
Effective Kill Rate	100%	87%	95%	90%	20
					-



Denver MOLD Pilot Test



October 20, 2016 Pilot Test Results – Denver Cannabis Grow House

4 Test Locations ¹	Baby Veg Grow Room	Hydroponic Grow Room	Cure Room	Dark Room	Controlled Results Total
CFUs Present Before Test	13	3	401	44	461
CFUs Found After Test	0	0	0	25	25
CFUs Destroyed	13	3	401	19	436
Effective Kill Rate	100%	100%	100%	43%	95%
					¹ Mold Only Test
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Rifle MOLD Pilot Test



November 27, 2016 Pilot Test Results – Cannabis Grow House in Rifle, CO

3 Test Locations ¹	Grow Room	Grow Room 2	Tertiary Room Doorframe	Controlled Results Total
CFUs Present Before Test	361	175	132	668
CFUs Found After Test	0	22	0	22
CFUs Destroyed	361	153	132	<mark>646</mark>
Effective Kill Rate	100%	87%	100%	97%



Mall of the Emirates Pilot Test





June 29, 2017 Pilot Test Results¹ – Mall of the Emirates, Dubai

Volatile Organic Compounds (VOC) Formaldehyde respirable Suspended Particulate Matter (RSPM) Ozone (O3) Ammonia (NH3) Carbon Monoxide (CO)

¹ Indoor air quality assessment

Confidential Information



Installation Pilot Summary

Gen 1.0 Units ¹ have been installed in the following pilot locations	Sample of Units > 1,000
Animal Health (kennels/vet practices)	82
Xenon Beauty College	16
Rocky Vista University Medical School	8
Doctor/Dental Office	8
Fisher House (Denver, VA)	4
Greenhouse Growers	24
Nursery Schools / Day Cares	16
Private Residences	192
YMCA	3
Distributors	52
	¹ Model #Ux105-5
Confidential Information	January 29, 2018



Pathogen Kill List

Pathogen Name	Reduction
Norovirus (Norwalk Virus)	99.6%
MRSA	99.9%
S. aureus	99.8%
C. diff	99.8%
Listeria	97.3%
GAS	97.4%
P. aeruginosa	99.9%
S. pneumonia	99.9%
Anthrax	97.6%

Independent clinical tests¹ validate PCO technology's effectiveness to kill pathogens

¹Peer reviewed testing and studies performed by third party independent labs and universities of PCO technology, which is the technology used in UVAIRx products.



PATHOGEN CHART

	MEDICAL IND	OUSTRY PATHOGEN C	HART	
Astrodec Im U.E.A.				
Test	ing of Advanced Photocatalytic Oxidation Tec	hnology by independent Laborato	ries, Universities & Facil	lities
Pathogen	Descriptive Examples	Results	Time Tested	Test Method
Norovirus	Norwalk virus	99.6% reduction	24 hours *	Stainless, carpet & cloth
	Lab Name: In vitro - Radil, LLC; FDA & EPA appr	oved - Dr. Leila Riley, DVML*		
	In vivo shelter test: Aurora Animal Hospital, Dr	r. Nicole Bartley, DVM; State of Cold	orado Expert Witness for V	/eterinary Medicine; 3 month, double blind study.
Coronavirus	COVID-19	99.6% reduction	24 hours *	Stainless, carpet & cloth
	Lab Name: In vitro - Radil, LLC; FDA & EPA appr	oved - Dr. Leila Riley, DVML*, Lab N	ame: in vitro - Kansas Stat	e University, FDA & EPA approved, Drs. Ortega and Marsden, et al.
	in vivo shelter test: Aurora Animal Hospital, Dr	r. Nicole Bartley, DVM; State of Colo	orado Expert Witness for \	/eterinary Medicine; 3 month, double blind study.
Methicillan-resistant	MRSA	99.9% reduction	24 hours	On stainless coupons
Staphylococcus aureus	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al. Also Lyle	a Labs Certified
Staphylococcus aureus	S. aureus	99.8% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Clostridium difficile	C. diff	99.8% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Listeria monocytogenes	Listeria	97.3% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Group A streptococci	GAS	97.4% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Pseudomonas aeruginosa	P. aeruginosa	99.9% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Streptococcus pneumonia	S. pneumonia	99.9% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Bacillus anthracis	Anthrax	97.6% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
H1N1	Swine flu	99.9% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA & EPA approved, Drs. Ortega an	d Marsden, et al.	
H5N1	Bird flu	99.9% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA & EPA approved, Drs. Ortega an	d Marsden, et al.	
Stachybotrys chartarum	Fungus and Spores	99.4% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Candida albicans	Molds and Spores	99.5% reduction		On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
Volatile Organic Compounds	Over 60 VOCs	Average of 91% reduction	24 hours	VOC in enclosure
	Lab Name : In vitro - Avomeen Analytical Servi	ces, Ann Arbor, MI, FDA, cGMP, DEA	, ACIL.	
	Lab Name: In vitro - NREL, FDA& EPA approved	d, Dr. D. Tompkins, et al., summary	of testing on PCO technol	ogy.
Volatile Inorganic Compounds	Ammonia/ Nox/ H ₂ S/ Sox/ O ₃	Average of 89% reduction	24 hours	VIC in enclosure
	Lab Name: in vitro - NREL, FDA& EPA approved	d, Dr. D. Tompkins, et al., summary	of testing on PCO technol	Dgy_
Odors	Alkanes, Acetone, Alcohols, Keton	e Average of 87% reduction	12 hours *	Gas in enclosure
	Lab Name: In vitro - North Carolina State Unive	ersity, EPA & FDA approved, Dr. J. Po	eral, et al., testing on PCC) technology_"
	In vivo testing: C&W Engineering, Ocala, FL - Sh	nowed petodors reduced by 72%. U	lsed 10 person test panel	with two 500 ft ³ test chambers.
Basidiospores	Allergens, Fungus, Ringworm	99.4% reduction	24 hours	On stainless coupons
	Lab Name: In vitro - Kansas State University, F	DA& EPA approved, Drs. Ortega an	d Marsden, et al.	
	In vivo shelter test: Aurora Animal Hospital, Dr	r. Nicole Bartley, DVM; State of Colo	orado Expert Witness for V	/eterinary Medicine; 3 month, double blind study.
Allergens	Pet dander, dust mite antigens	Average of 91% reduction	70 minutes	In solution
	Lab Name: In vitro - University of Florida, EPA &	& FDA approved, Dr. D. Goswami; M	lie University, Japan, N. Ni	ishikawa, et al.; testing on PCO technology.
				Copyright UVAIRs, Inc. August 2012
Inactivation of pathogens used advance	d photocatalytic oxidation techniques employed	d in UVAIRx products, which use pate	ented techniques. Much te	sting used products labeled either PHI® or RCI. All tests were done
using standard and accepted test metho	ds employed by the fully accredited test laborato	ories. Doctors (PhD) Marsden, Orteg	a, Goswami, Riley, Peral a	nd Tompkins are all internationally recognized for their
work with photocatalysis. Dr. Marsden is	s an internationally acclaimed expert in food saf	fety and Dr. Riley, DVM, as an expert	in veterinary medicine.	

* ALL UVAIRX UNITS ARE ETL, UL, CSA, CE, FCC, RoHAS, & ARB (CARB) APPROVED * UNITS ARE 12 VDC & ENERGY STAR COMPLIANT *



TESTIMONIALS

Dr. Eileen McGinty, McGinty Dental Group, Denver, Colorado

"It's a comfort to know that my waiting room and treatment areas provide a safe, protective environment against the transmission of viruses and other pathogens for my visiting patients thanks to UVAIRx, Inc."

Dr. Bill Smith, Denver, Colorado

"I had developed severe allergies over an extended period of time, causing serious congestion, a runny nose and eyes, and drainage. I was using two boxes of Kleenex a day! Plus I could not sleep at night. Within two days of installing the UVAIRx unit my congestion disappeared, the runny nose and eyes was gone and I was only using a couple of Kleenex tissues a day. Best of all, I was sleeping through the night!"

Roy Merrill, FAAMA, Director, Rocky Vista University Health Center

"We installed UVAIRx products in the closed air handling system that services our Cadaver room. Since UVAIRx was installed the formaldehyde odor, which is a powerful smell causing a significant challenge to students and instructors, has been reduced to near zero. The Clinic was swab tested before and after with remarkable results. The benefits are greater learning/health on the part of our students----thank you UVAIRx."



TESTIMONIALS

Aurora Animal Shelter Finds New Effective Tool in Battle Against URI &

Ringworm

After battling round-after-round of Upper Respiratory Infection (URI) in their cat kennels, the Aurora Animal Shelter agreed to test some new technology from UVAIRx to see if they could reduce the condition. "I'm really impressed with this system," relays Aurora Animal Care Division Manager Pamela Alford. "So much so that, as a Board Member of Freedom Service Dogs, I suggested a controlled test for canine kennel cough at their facility."

Kristin Rice, Executive Director, Adopt-A-Dog

"At Adopt-A-Dog, the health of the animals in our care is paramount to preserving their quality of life. The UVAIRx machine improved our ability to maintain a healthy environment for sick dogs entering our shelter by reducing the spread of contagious disease. We are so happy to have the UVAIRx machine as part of our isolation room where it stopped a Ringworm outbreak allowing us to continue provide the highest level of care for our shelter dogs."



Swab Test Procedure

- 1. Test locations are mutually selected by UVAIRx and the Customer.
- 2. UVAIRx optimizes placement and then installs units, but does not turn them on.
- 3. "Before Swab" samples are taken in mutually agreed upon areas within the selected location. All swab samples taken are witnessed, logged and placed in a glass test tube by both UVAIRx and Customer.
- 4. All "Before Swabs" are placed in a box and given to the Customer for safe keeping, then the UVAIRx machines are turned on
- 5. Several days later, the "After Swabs" are taken in same location where the "Before Swabs" were sampled.
- 6. "Before" and "After" swabs are logged and packed into a pre-paid shipping box addressed then given to the Customer to ship to the independent lab.
- 7. One week later lab test results are sent to UVAIRx and the Customer.
- 8. UVAIRx team prepares a detailed report describing test results.

Note: The test location is not a controlled environment, as found in a laboratory – it's a "real-world environment" subject to numerous changes in temperature, humidity, air quality and human intervention.



To identify a UVAIRx Distributor in your area or to get further information on the UVAIRx difference, contact us at:

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