



# SICK BUILDING SYNDROME

*AND WHAT YOU CAN DO ABOUT IT*

A REPORT BY CALUTECH, INC.

*Plus an introduction to Snapcat*



## **Sick Building Syndrome Defined**

Sick building syndrome (sometimes referred to as SBS) becomes evident when occupants of a home or building experience health problems which have an unknown cause. SBS usually occurs when much time is spent in a home or building. In many cases the actual cause of the problem cannot be identified. The health problems may be evident with occupants who spend much time in a certain room or area of the structure, or may be a problem throughout the entire structure.

In most cases problems become known when a building is operated or maintained in a manner that is inconsistent with its design. Indoor air problems can begin because of poor building design or poor maintenance of the building. In other cases we've found problems can result because of activities happening within the structure that can have an environmental effect and make matters worse.

Most indoor air pollution starts inside the building. For example, upholstery, copy machines which generate ozone, insect and rodent control agents, wood products like shelves or desks, carpeting which can give off formaldehyde, cleaning chemicals and adhesives may emit volatile organic compounds (VOCs). Even fragrances and air fresheners. Fireplaces and space heaters can also contaminate the air we breathe. Research shows that some VOCs can cause chronic and acute health effects at high concentrations, and some are known carcinogens, like cigarette smoke. Low to moderate levels of VOCs can cause reactions in some people which can lead to adverse health effects over time.

About 40 years ago building construction was changed to help save energy. Structures were made to be airtight. Ventilation was reduced in a way that outdoor air would not be used as much. Having less ventilation in these older buildings has been found to be a primary cause for sick building syndrome where health and primary comfort was surpassed in an attempt to save more money on energy.

Although outdoor air was reduced, it is still a cause of SBS. When the outside air enters a building polluted air from vehicle exhausts, chimneys and smoke stacks, plumbing vents, and factory byproducts can enter the building through poorly designed air intakes, leaky windows or doors, and other structural openings.

Biological contaminants are another well known cause of indoor air problems. These contaminants include bacteria, viruses, mold and allergens such as pollen and dander. These contaminants breed in moist areas, often fed by condensation on evaporator coils in building cooling systems and stagnant water in vaporizers and humidifiers. Another popular place for bacterial growth is water condensation pans and building ventilation ducts. Humid areas, or buildings with powerful humidifiers, can have problems within ceiling tiles, drywall, carpeting and wood products.

## **Sick Building Syndrome (continued)**

Biological contaminants cause people to come down with high fever, chills and allergic reactions. It is also common to have respiratory problems such as congestion, cough, and chest tightness. Legionella, which has caused people to come down with Legionnaire's Disease because of these contaminants, has also been found to cause people to come down with Pontiac Fever. Imagine that? All these health problems because of the buildings where we work and live.

Sick building syndrome, at the workplace, is known to reduce employee productivity and reliability. Employees are often found to use more sick days in a sick building. Often when employees work in a sick environment they feel a sense of relief after leaving work. Many times the problem is evident when employees continually complain of ongoing headaches, nausea, coughing, dry skin (or itchy skin), problems concentrating on their work, eye and nose irritation, dry throat, fatigue, and increases sensitivity to odors.

The World Health Organization estimates that 30% of all buildings worldwide which are new, or recently remodeled, are also victims of sick building syndrome. In some cases these problems go away over time, but often they do not.

Although many of us have these types of problems, they are not always caused by poor indoor air quality. Sometimes it's our own personal health issues such as bad allergies or other health problems. When the problems usually occur when at home or work there's a good possibility the building has problems.

Original standards for building ventilation, set in the early 1900s, called for 15cfm (cubic feet per minute) of outside air exchange for each occupant, but as previously mentioned, back in 1973 when energy became a big concern, this standard was changed to 5cfm. In many cases the reduction in outdoor air ventilation rates were found to be inadequate to maintain the health and comfort of building occupants. Poor ventilation is believed to be another cause of sick building syndrome. If the ventilation system does not effectively distribute air to occupants in a building, the building has poor ventilation which contributes to the problem. The EPA recommends design of ventilation systems in accordance with the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) ventilation standard number 62-1989. The standard suggests a ventilation system provide a minimum of 15 cfm of outdoor air per person (20 cfm/person in office spaces). As much as 60 cfm per occupant may be required in some areas (such as smoking lounges, casinos, and bars) depending on the activities that normally occur in that area. After having a building examined for indoor air quality issues the actual cause often remains unknown. In many cases this is because the problem is in an area that is not accessible, and therefore never found.

# **WHAT YOU CAN DO ABOUT SICK BUILDING SYNDROME**

Removal of the pollutant source is the most effective way to solve an indoor air quality issue, when it can be done and when the cause is known. Regular maintenance of HVAC systems; replacing water-stained drywall, panels, wood, ceiling tiles and carpets is an important start to improving the quality of indoor air. A ban on tobacco use is a major plus. Venting emissions to the outdoors will also improve indoor air quality.

If you're having remodeling done in the near future or even now it is always a good idea to leave the completed remodeling job unoccupied for a good period of time to allow gaseous pollutants to fade away over time.

Restrooms, copy machine and print rooms should always be ventilated to the outside whenever possible. Increasing ventilation and air distribution can be a cost effective way to reduce indoor air pollution. Routine maintenance of HVAC systems should always be a priority. Air filters should always be cleaned/replaced at regular intervals. Other contaminants such as paints, adhesives, solvents, and pesticides should be stored, and used, in well ventilated areas only.

Air purification and filtration is also helpful with source control and ventilation but can have limitations if the proper systems are not used. Standard air filters found in furnace and A/C air handlers are inexpensive but do not do a great job at filtering out small particles. A high performance replacement filter is always recommended, such as the 3M Filtrete, a filter we know to be superior in performance from our own testing. Mechanical filters do not remove gaseous pollutants such as volatile organic compounds. Ozone can be effective to a certain extent, but it can also cause many health problems and is not considered a solution by any means. Ionic style air purifiers are near worthless when it comes to a major change in indoor air quality. In some cases they can actually make the interior dirtier since pollutants the ions attach themselves to can later begin sticking to walls, furniture, and everything else. Germicidal systems provide a very cost effective, and very dependable, solution to indoor air quality issues. Even better, the use of photocatalysis, combined with germicidal UV light is superior to all other forms mentioned above. This method is known as green chemistry. A non-toxic and completely dependable way to reduce indoor air pollutants, if not eliminate them.

*By following the suggestions in the previous pages of this report and using the latest technology in air purification the problem of sick building syndrome can be greatly reduced. Indoor air quality can be greatly improved, and this chain reaction effect can improve the health, and comfort, of the occupants.*

# **Germicidal Ultraviolet Irradiation Combined With Green Chemistry**

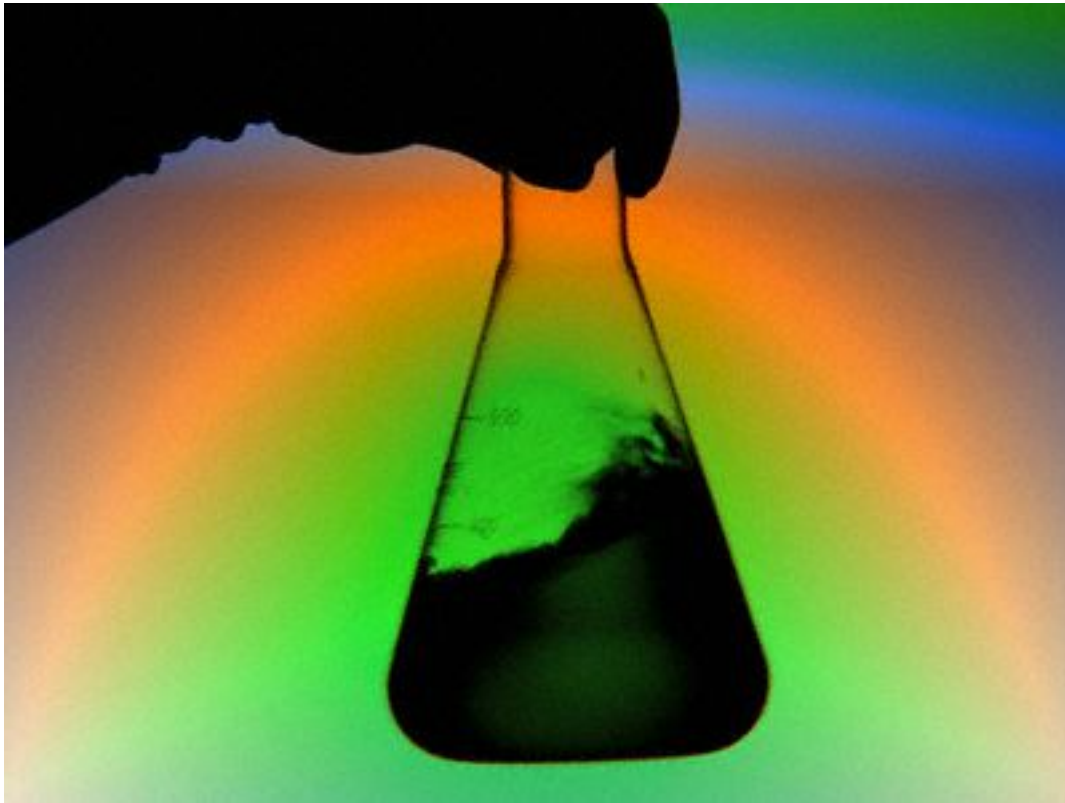


**Creating the ultimate solution to indoor air  
quality problems, and indoor pollutants.**

*Welcome to Advanced Technology*

# An Introduction to Snapcat

Snapcat is a revolutionary air purification method designed for use in conjunction with CaluTech UV air products. This U.S. Patent Pending product is based on the most advanced nano-technology known as Photocatalysis. Similar to Photosynthesis of plants, Photocatalyst can harness our UV light energy to breakdown toxic pollutants into harmless substances such as water vapors and carbon dioxide. This method of air purification can reduce allergies and respiratory illness caused by mold spores, pollen, pet dander, mildew, garbage, spoiled food, diaper pails, fire damage, and even toxic chemicals. Snapcat will deodorize and break down odors caused by pets, urine, feces, organic compounds and even tobacco smoke. The air purification method is so powerful it can even convert carbon monoxide gas into harmless carbon dioxide.



*Snapcat features Titanium Dioxide*

*(TiO<sub>2</sub>)*

# How Snapcat Gets the Job Done

We spend 90 percent of our time indoors. Exposure to indoor air pollutants can cause chronic respiratory diseases, such as asthma or bronchitis. Indoor air pollutants are found everywhere, even inside walls and right on the floor in carpeting, furniture and wood flooring. Common with furniture and carpets is a dangerous pollutant known as formaldehyde, which causes skin irritation, dry eyes and nausea.

Snapcat is based on a nano-TiO<sub>2</sub> photocatalyst solution, a premium coating which is placed on the Snapcat snap-on strips. These strips, when exposed to our UV light, generate hydroxyl radicals which are known to be among the most powerful oxidizers in the world. Some research suggests they are as much as 400 times more powerful than chlorine, but without the dangerous chemicals, and without any human health related issues.

Once Snapcat is exposed to our UV light, in combination with moisture in the air, active oxygen is formed. As the Snapcat begins generating oxygen it begins to intelligently break down odors, air pollutants, allergens, volatile organic compounds and harmful toxins which we would otherwise breathe in everyday. This process is known as Photocatalytic Oxidation.

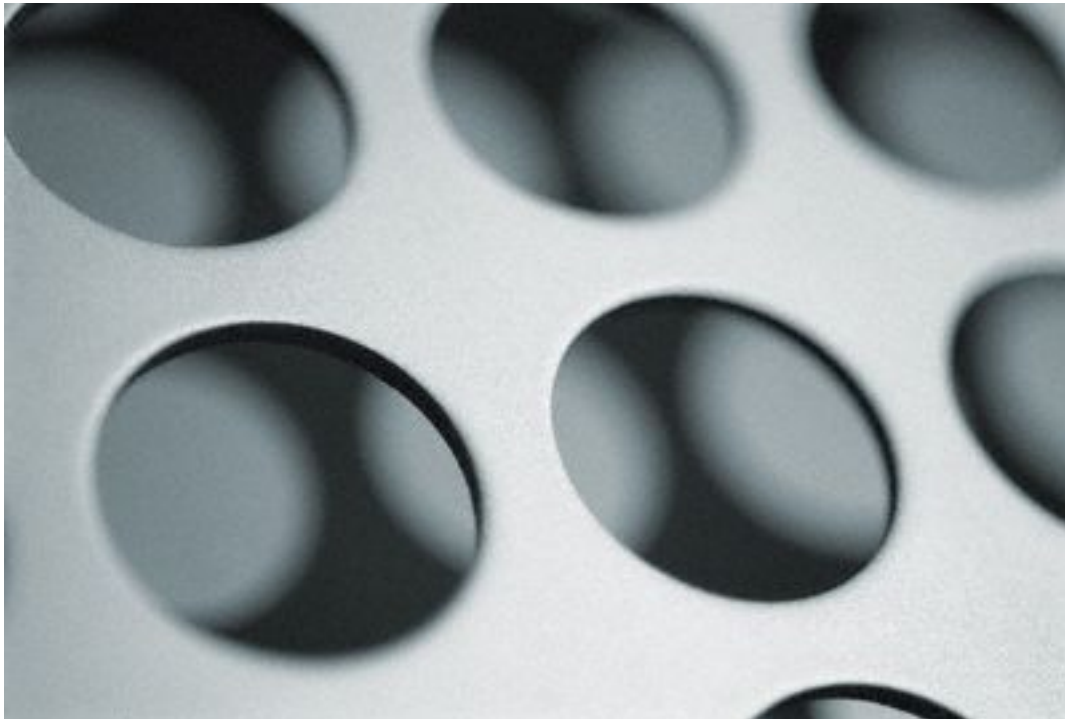


*Now you can breathe with confidence!*

## How Snapcat's Oxygen Generator Purifies

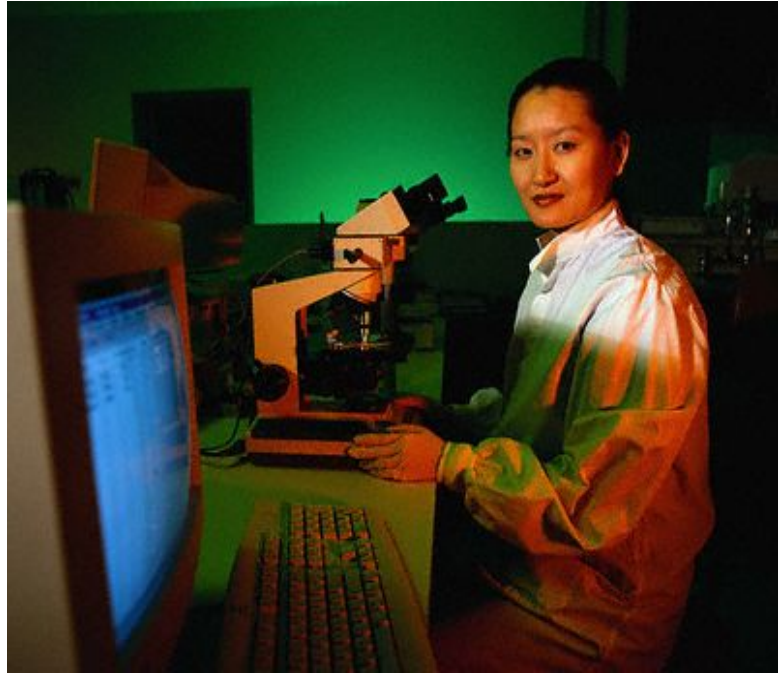
As previously mentioned, Snapcat is activated when our UV light source (any of our UV air purification models) shines on the surface of the Snapcat lamp strips. When organic pollutants like smoke, smog, allergents, etc. come in contact with the Active Oxygen they are oxidized and broken down into harmless carbon dioxide and water vapor. Snapcat protects you from absorbing any pollutants that may otherwise accumulate in an enclosed area.

When we spend more time indoors the enclosed space begins to trap various toxic organic chemicals and foul odors, which are often caused by building materials commonly found indoors as well as stored chemicals like paints and even decaying matter. This causes irritation and can quickly lead to long term illness. Inside our homes and at work we control the indoor temperature, and even the humidity. With this indoor environmental mix we actually create ideal breeding grounds for many molds, bacteria, and viruses as well as microorganisms. With our high powered UV light products much of this can be reduced and controlled, and with the addition of Snapcat we can now effectively reduce and destroy these problems that are also caused by volatile organic compounds. Combining our high output UV light energy with Photocatalysis via Snapcat gives you the most powerful air cleaning system available.





Standard off the shelf air purifiers and air cleaners are not nearly as effective. Their effectiveness is dependant upon how much air they can move, and how fast they can move it, as well as the size of the room and the amount of air they can treat at one time. Snapcat together with CaluTech UV is more of an invisible air purification AND



sterilization system that continuously maintains a pure environment without creating any dangerous byproducts. Through research we continually improve the methods available for air purification and thrive to create the most powerful systems in the world, air purification that really works.

*The most advanced air purification technology, and now you can add it.*

Snapcat has so much oxidizing power it exceeds HEPA filtration, Electrostatic air filters, Ozone generators, Ionic air purifiers / ionizers, and room air purifiers. Snapcat is excellent when it comes to the decomposition of small and medium particles, as small as 0.1 micron. Snapcat destroys dust mites and neutralizes gases. Wipes out odors and pet dander. Eliminates VOCs / volatile organic compounds. Destroys mold and fights viruses. The advantages are endless.

Snapcat is a design protected by the United States Patent & Trademark Office

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