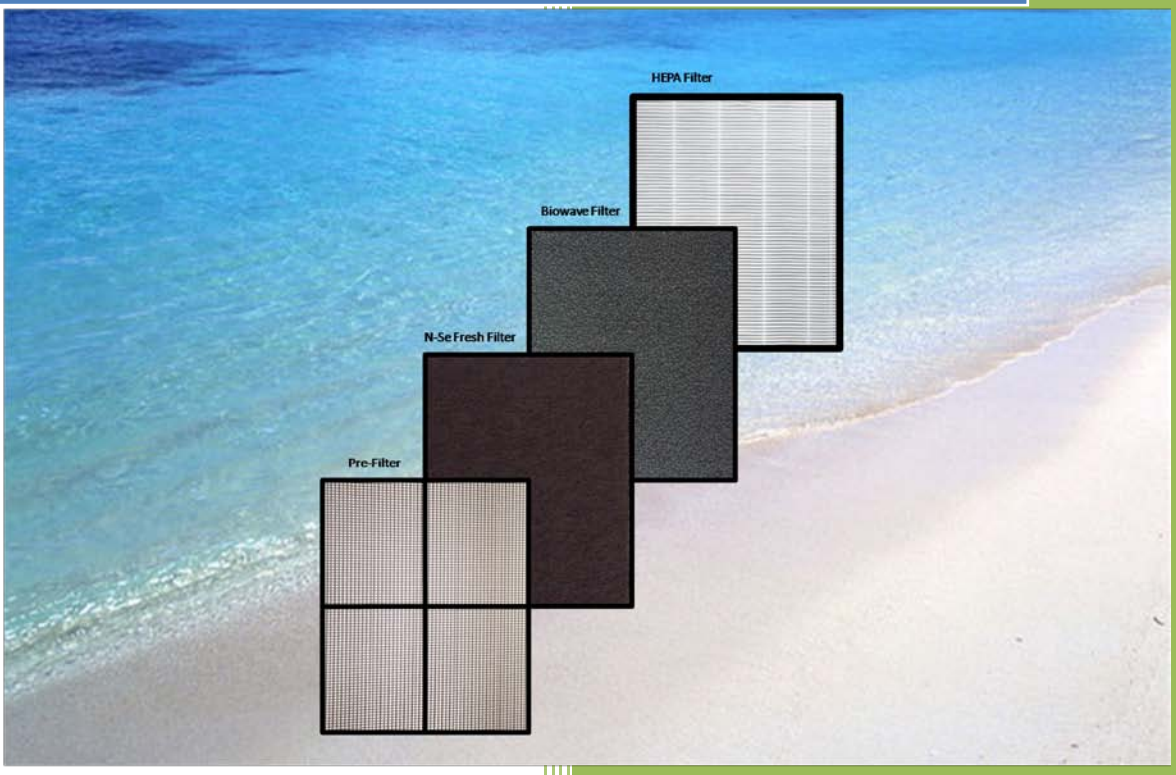
SHEPROS®

Safety, Heath & Environment Product Solutions

High Performance Air Purification for Particulate Matter, Odors, VOCs, Germs, Photochemical Smog and Ionizing Radiation

SHEPROS AIR FILTRATION



THE HIGH PERFORMANCE AIR FILTERS

SHEPROS Sdn. Bhd.

An Alliance of SHEPROS International (USA) LLC.

An Introduction to Indoor Air Quality (IAQ)

What Causes Indoor Air Problems?

Indoor pollution sources that release gases or particles into the air are the primary cause of indoor air quality problems in homes. Inadequate ventilation can increase indoor pollutant levels by not bringing in enough outdoor air to dilute emissions from indoor sources and by not carrying indoor air pollutants out of the home. High temperature and humidity levels can also increase concentrations of some pollutants.

Indoor Air Pollution and Health

Health effects from indoor air pollutants may be experienced soon after exposure or, possibly, years later.

Immediate effects

Immediate effects may show up after a single exposure or repeated exposures. These include irritation of the eyes, nose, and throat, headaches, dizziness, and fatigue. Such immediate effects are usually short-term and treatable. Sometimes the treatment is simply eliminating the person's exposure to the source of the pollution, if it can be identified. Symptoms of some diseases, including asthma, hypersensitivity pneumonitis, and humidifier fever, may also show up soon after exposure to some indoor air pollutants.

The likelihood of immediate reactions to indoor air pollutants depends on several factors. Age and preexisting medical conditions are two important influences. In other cases, whether a person reacts to a pollutant depends on individual sensitivity, which varies tremendously from person to person. Some people can become sensitized to biological pollutants after repeated exposures, and it appears that some people can become sensitized to chemical pollutants as well.

Certain immediate effects are similar to those from colds or other viral diseases, so it is often difficult to determine if the symptoms are a result of exposure to indoor air pollution. For this reason, it is important to pay attention to the time and place symptoms occur. If the symptoms fade or go away when a person is away from home, for example, an effort should be made to identify indoor air sources that may be possible causes. Some effects may be made worse by an inadequate supply of outdoor air or from the heating, cooling, or humidity conditions prevalent in the home.

Long-term effects

Other health effects may show up either years after exposure has occurred or only after long or repeated periods of exposure. These effects, which include some respiratory diseases, heart disease,

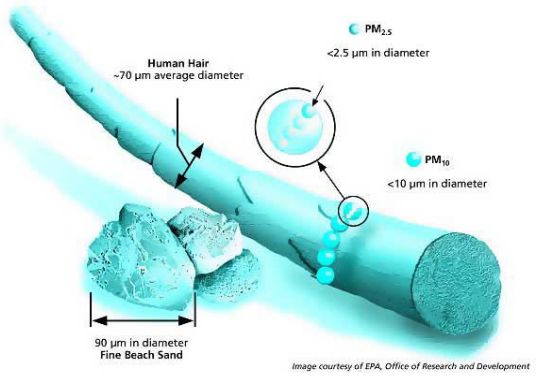
and cancer, can be severely debilitating or fatal. It is prudent to try to improve the indoor air quality in your home even if symptoms are not noticeable.

While pollutants commonly found in indoor air are responsible for many harmful effects, there is considerable uncertainty about what concentrations or periods of exposure are necessary to produce specific health problems. People also react very differently to exposure to indoor air pollutants. Further research is needed to better understand which health effects occur after exposure to the average pollutant concentrations found in homes and which occurs from the higher concentrations that occur for short periods of time.

Basic Information on Pollutants and Sources of Indoor Air Pollution

Particulate Matter

Particle pollution (also called particulate matter or PM) is the term for a mixture of solid particles and liquid droplets found in the air. Some particles, such as dust, dirt, soot, or smoke, are large or dark enough to be seen with the naked eye. Others are so small that they can only be detected using an electron microscope.



Particle pollution includes "inhalable coarse particles," with diameters larger than 2.5 micrometers and smaller than 10 micrometers and "fine particles," with diameters that are 2.5 micrometers and smaller. How small is 2.5 micrometers? Think about a single hair from your head. The average human hair is about 70 micrometers in diameter – making it 30 times larger than the largest fine particle. These particles come in many sizes and shapes and can be made up of hundreds of different chemicals. Some particles, known as *primary particles* are emitted directly from a source, such as construction sites, unpaved roads, fields, smokestacks or fires. Others form in complicated reactions in the atmosphere of chemicals such as sulfur dioxides and nitrogen oxides that are emitted from power plants, industries and automobiles. These particles, known as *secondary particles*, make up most of the fine particle pollution.

Particle pollution - especially fine particles - contains microscopic solids or liquid droplets that are so small that they can get deep into the lungs and cause serious health problems. Numerous scientific studies have linked particle pollution exposure to a variety of problems, including:

- increased respiratory symptoms, such as irritation of the airways, coughing, or difficulty breathing, for example;
- decreased lung function;
- aggravated asthma;
- development of chronic bronchitis;

- irregular heartbeat;
- nonfatal heart attacks; and
- premature death in people with heart or lung disease.

People with heart or lung diseases, children and older adults are the most likely to be affected by particle pollution exposure. However, even if you are healthy, you may experience temporary symptoms from exposure to elevated levels of particle pollution.

Volatile Organic Compounds (VOCs)

Volatile organic compounds (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors (up to ten times higher) than outdoors. VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions.

Organic chemicals are widely used as ingredients in household products. Paints, varnishes, and wax all contain organic solvents, as do many cleaning, disinfecting, cosmetic, degreasing, and hobby products. Fuels are made up of organic chemicals. All of these products can release organic compounds while you are using them, and, to some degree, when they are stored.

Household Cleaners *Glues and Adhesives* *Paints*

Odors

An odor is commonly referred to as a smell. It is caused by one or more volatilized chemical compounds, generally at a very low concentration, that humans or other animals perceive by the sense of olfaction. Odors are also commonly called scents, which can refer to both pleasant and unpleasant odors. The terms fragrance and aroma are used primarily by the food and cosmetic industry to describe a pleasant odor, and are sometimes used to refer to perfumes. In contrast, malodor, stench, reek, and stink are used specifically to describe unpleasant odors.



Cigarette Smoke | Body Odor | Cooking Odor

Biological Pollutants

These biological chemicals can arise from a host of means, but there are two common classes: (a) moisture induced growth of mold colonies and (b) natural substances released into the air such as animal dander and plant pollen. Moisture buildup inside buildings may arise from water penetrating compromised areas of the building envelope or skin, from plumbing leaks, from condensation due to improper ventilation, or from ground moisture penetrating a building part. The primary hazard of mold growth, as it relates to indoor air quality, comes from the allergenic properties of the spore cell wall. More serious than most allergenic properties is the ability of mold to trigger episodes in persons that already have asthma, a serious respiratory disease.

Legionellosis or Legionnaire's Disease is caused by a waterborne bacterium *Legionella* that grows best in slow-moving or still, warm water. The primary route of exposure is aerosolization, most commonly from evaporative cooling towers or showerheads. A common source of Legionella in commercial buildings is from poorly placed or maintained evaporative cooling towers, which often release aerosolized water that may enter nearby ventilation intakes. Outbreaks in medical facilities and nursing homes, where patients are immuno-suppressed and immuno-weak, are the most commonly reported cases of Legionellosis. More than one case has involved outdoor fountains in public attractions. The presence of Legionella in commercial building water supplies is highly under-reported, as healthy people require heavy exposure to acquire infection.

Photochemical Smog

Photochemical smog (or just smog for short) is a term used to describe air pollution that is a result of the interaction of sunlight with certain chemicals in the atmosphere. It is the chemical reaction of sunlight, nitrogen oxides and volatile organic compounds in the atmosphere, which leaves airborne particles and ground-level ozone. One of the primary components of photochemical smog is ozone. While ozone in the stratosphere protects earth from harmful UV radiation, ozone on the ground is hazardous to human health. Ground-level ozone is formed when vehicle emissions containing nitrogen oxides (primarily from vehicle exhaust) and volatile organic compounds (from paints, solvents, and fuel evaporation) interact in the presence of sunlight. Therefore, some of the sunniest cities are also some of the most polluted.

This noxious mixture of air pollutants can include the following:

Aldehydes - *Example: formaldehyde and acetaldehyde*

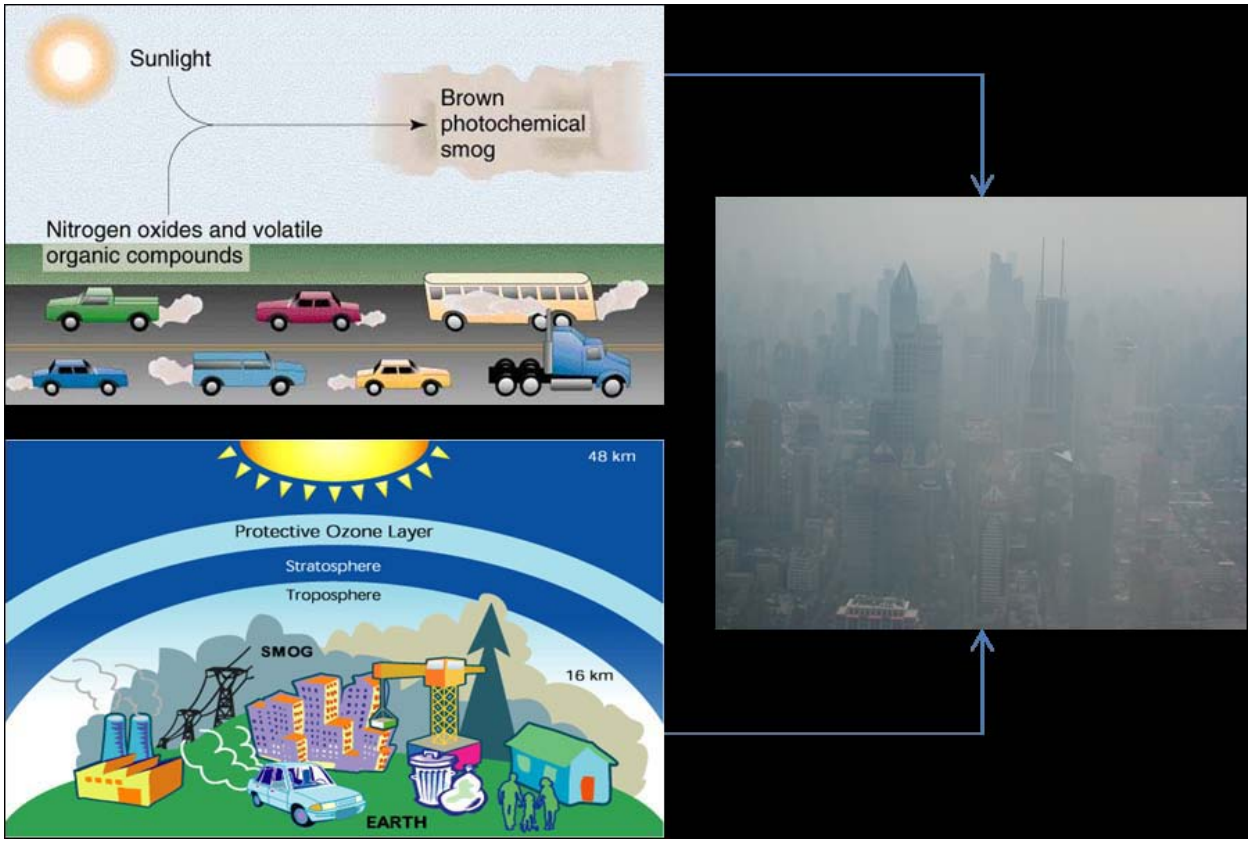
Nitrogen oxides - *Example: nitrogen dioxide*

Peroxyacyl nitrates - *Powerful respiratory and eye irritants*

Tropospheric ozone - *Greenhouse gas and initiates the chemical removal of methane and other hydrocarbons from the atmosphere.*

Volatile organic compounds - *Organic chemicals that have a high vapor pressure at ordinary, room-temperature conditions*

All of these chemicals are usually highly reactive and oxidizing. Photochemical smog is therefore considered to be a problem of modern industrialization. It is present in all modern cities, but it is more common in cities with sunny, warm, dry climates and a large number of motor vehicles. Because it travels with the wind, it can affect sparsely populated areas as well.



Photochemical Smog Formation

Ionizing Radiation

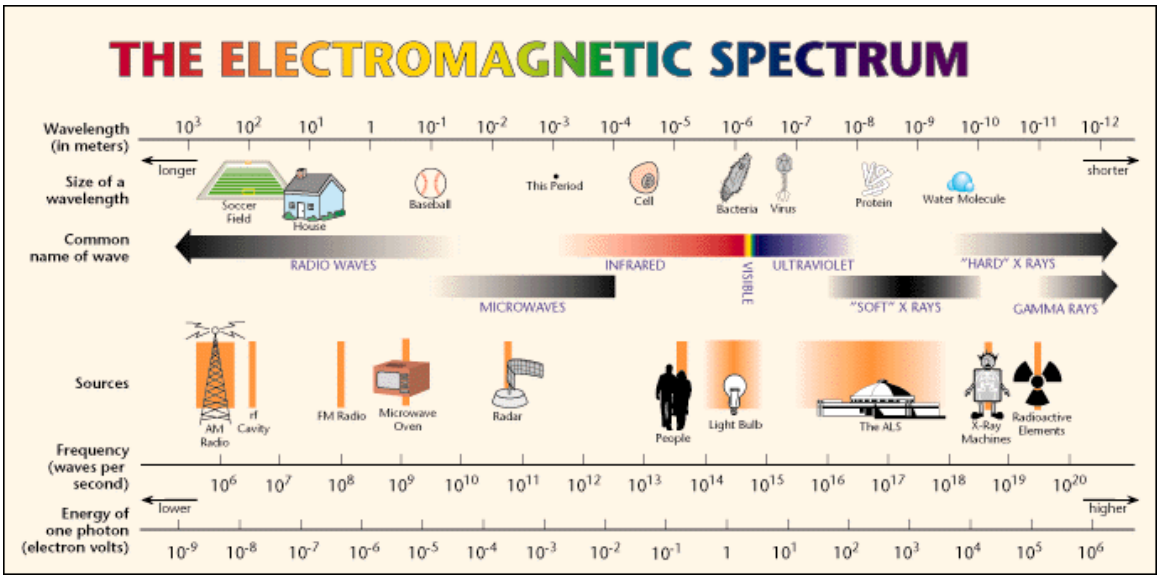
Higher frequency ultraviolet radiation begins to have enough energy to break chemical bonds. X-ray and gamma ray radiation, which are at the upper end of magnetic radiation have very high frequency --in the range of 100 billion Hertz--and very short wavelengths--1 million millionth of a meter. Radiation in this range has extremely high energy. It has enough energy to strip off electrons or, in the case of very high-energy radiation, break up the nucleus of atoms.

Ionization is the process in which a charged portion of a molecule (usually an electron) is given enough energy to break away from the atom. This process results in the formation of two charged particles or ions: the molecule with a net positive charge, and the free electron with a negative charge.

Each ionization releases approximately 33 electron volts (eV) of energy. Material surrounding the atom absorbs the energy. Compared to other types of radiation that may be absorbed, ionizing radiation deposits a large amount of energy into a small area. In fact, the 33 eV from one ionization is more than enough energy to disrupt the chemical bond between two carbon atoms. All ionizing radiation is capable, directly or indirectly, of removing electrons from most molecules.

There are three main kinds of ionizing radiation:

- alpha particles, which include two protons and two neutrons
- beta particles, which are essentially electrons
- gamma rays and x-rays, which are pure energy (photons).



Types and Sources of Radiation

Indoor Air Quality in China

Why Does Air Quality Really Matter To The Chinese?

- The US EPA estimates that people spend more than 90% of their time indoors. However, indoor air is typically 5-10 times worse than the outdoor air and concentration of individual air pollutants indoors can easily be 100 times higher than outside.

- Asthma rates have doubled since 1980, with indoor air estimated to have a 50% impact.

- Children are more susceptible because their immune systems are not yet fully developed and they breathe in 50 percent more air per pound of body weight than adults.

- Air pollution causes premature births, low birth weight babies, and depresses lung function. It has also been blamed for China's rising rates of cancer. Lung cancer is now the leading cause of death in China, and has risen 18.5 percent to 34 per 100,000 people in just the last five years.

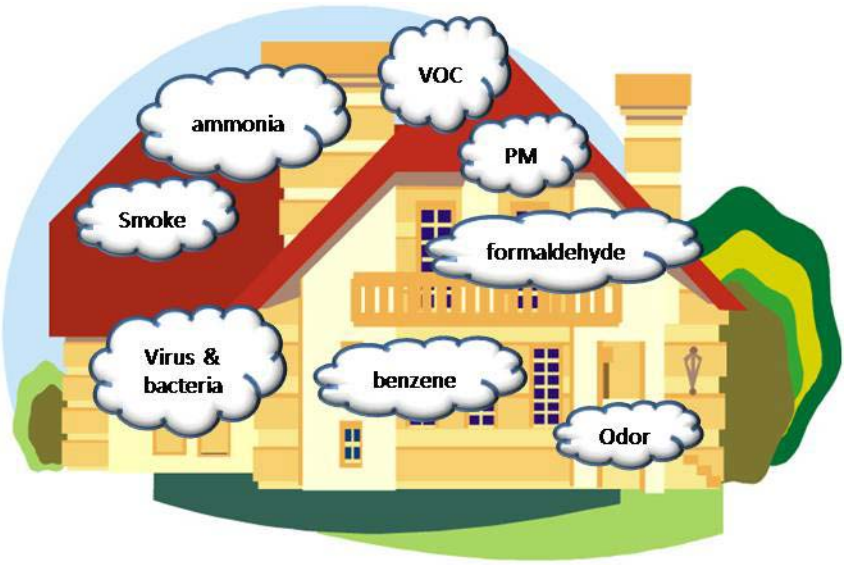
- It is estimated that 26 percent of all deaths in China are caused by respiratory illnesses (compared with 2 or 3 percent in the U.S.). The World Bank and the WHO attribute about 300,000 premature deaths due to indoor air pollution a year in China.

What are the issues around indoor air in China?

The average air quality in terms of particulate level in China, is often three to four times worse than the WHO standard of 150,000 particles per liter of air (2.5 microns or smaller). For this reason, most of people try to limit significant exposure outdoors and prefer to stay indoors. Ironically, indoor air is often as bad as or worse than outdoor air. This is because today's homes are built to be highly efficient, tightly sealed envelopes that continuously circulate the same air. Without proper ventilation and filtration, pollutants build up in the air that we breathe.

At the same time, there are sources of indoor air pollution unique to China. The prevalence of new buildings and furnishings, high use of particle board, and lower awareness of healthy construction makes formaldehyde and other VOCs a significant issue. While the US has passed a domestic bill regulating the amount of formaldehyde emissions in composite wood products, there is no similar regulation for Chinese products. In addition, Chinese's homes do have other pollution sources from household cleaning agents, mold, cooking, dust mites, pet dander and etc. Together, this leads to a level of indoor air quality that poses an unacceptable level of risk to their health and comfort.

Typical Indoor Air Pollution in China



China's Most Polluted Cities of 2013

Greenpeace China has produced a ranking of 74 Chinese cities by level of PM2.5 air pollution. The figures were taken from official data published by the Ministry of Environmental Protection for the year of 2013. Of the 74 cities in the report, none of them met the World Health Organization's recommendations for particulate matter of 2.5 micrometers or less (PM2.5). Only five met the Chinese government's less stringent standards for PM2.5 levels.

In 2012, the Chinese Ministry of Environmental Protection established an annual standard of 35 micrograms per cubic meter for PM2.5. The WHO recommends a maximum of 10 micrograms per cubic meter, and the U.S. Environmental Protection Agency standard is 12. By any measure, China's air is excessively polluted.

A few of the key findings from the Greenpeace are as below:

- Almost 92% of these cities have average annual PM2.5 air pollution concentrations that fail to reach the national standard (which is 35 micrograms per cubic meter).
- Of the top 10 worse polluted cities in the ranking, seven are located in Hebei Province, the province that surrounds Beijing. Beijing sits outside the top 10, at number 13.
- Air pollution in cities located within the Yangtze River Delta region (including Shanghai) is also becoming increasingly serious.
- Many cities in the central and western provinces are seeing air pollution levels twice the national standard.

Annual average PM2.5 concentrations of 74 cities in China for 2013:

Ranking	City	Province	Annual average PM2.5 level (micrograms per cubic meter)	Average of the maximum daily PM2.5 level (micrograms per cubic meter)
1	Xingtai	Hebei	155.2	688
2	Shijiazhuang	Hebei	148.5	676
3	Baoding	Hebei	127.9	675
4	Handan	Hebei	127.8	662
5	Hengshui	Hebei	120.6	712
6	Tangshan	Hebei	114.2	497
7	Jinan	Shandong	114.0	490
8	Langfang	Hebei	113.8	772
9	Xi'an	Shaanxi	104.2	598
10	Zhengzhou	Henan	102.4	422
11	Tianjin	Tianjin	95.6	394
12	Cangzhou	Hebei	93.6	380
13	Beijing	Beijing	90.1	646
14	Wuhan	Hubei	88.7	339
15	Chengdu	Sichuan	86.3	374
16	Urumqi	Xinjiang	85.2	387
17	Hefei	Anhui	84.9	383
18	Taizhou	Jiangsu	80.9	474
19	Huai'an	Jiangsu	80.8	513
20	Changsha	Hunan	79.1	325
21	Wuxi	Jiangsu	75.8	391
22	Harbin	Heilongjiang	75.7	756
23	Changzhou	Jiangsu	75.6	322

24	Nanjing	Jiangsu	75.3	312
25	Xuzhou	Jiangsu	74.9	304
26	Taiyuan	Shanxi	74.2	416
27	Huzhou	Zhejiang	73.5	414
28	Shenyang	Liaoning	72.7	464
29	Zhenjiang	Jiangsu	71.6	263
30	Yangzhou	Jiangsu	71.1	312
31	Suqian	Jiangsu	70.7	502
32	Nantong	Jiangsu	70.2	248
33	Changchun	Jilin	69.2	425
34	Nanchang	Jiangxi	69.1	255
35	Jinhua	Zhejiang	69.0	473
36	Lianyungang	Jiangsu	68.0	407
37	Maryland	Gansu	67.1	259
38	Suzhou	Jiangsu	67.1	384
39	Yancheng	Jiangsu	67.0	455
40	Jiaxing	Zhejiang	66.9	417
41	Quzhou	Zhejiang	66.5	406
42	Shaoxing	Zhejiang	66.4	426
43	Hangzhou	Zhejiang	66.1	361
44	Qinhuangdao	Hebei	65.2	335
45	Chongqing	Chongqing	63.9	187
46	Xining	Qinghai	63.2	319
47	Qingdao	Shandong	61.7	280
48	Shanghai	Shanghai	60.7	421
49	Hohhot	Inner Mongolia	59.1	216
50	Wenzhou	Zhejiang	56.5	248
51	Zhaoqing	Guangdong	54.7	174

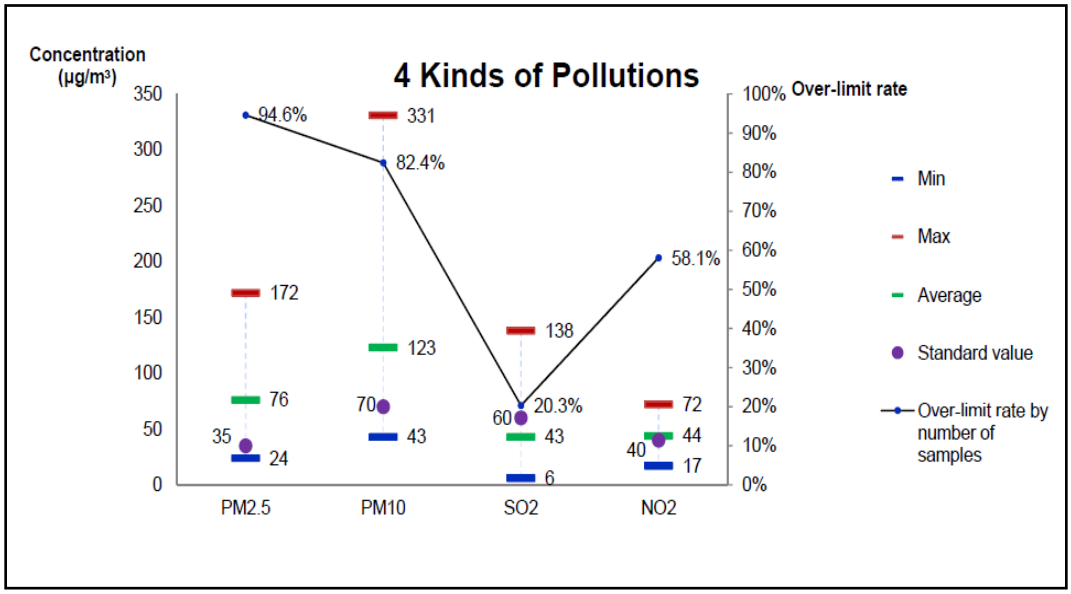
52	Nanning	Guangxi	54.7	199
53	Taizhou	Zhejiang	53.0	284
54	Foshan	Guangdong	52.3	160
55	Guangzhou	Guangdong	52.2	159
56	Chengde	Hebei	51.5	407
57	Dalian	Liaoning	50.7	224
58	Ningbo	Zhejiang	50.4	416
59	Guiyang	Guizhou	49.4	229
60	Jiangmen	Guangdong	48.4	158
61	Lishui	Zhejiang	47.9	196
62	Zhongshan	Guangdong	47.6	146
63	Dongguan	Guangdong	46.0	165
64	Yinchuan	Ningxia	43.7	164
65	Zhangjiakou	Hebei	43.1	471
66	Shenzhen	Guangdong	39.7	131
67	Zhuhai	Guangdong	37.9	157
68	Huizhou	Guangdong	37.2	121
69	Kunming	Yunnan	35.5	123
70	Fuzhou	Fujian	33.2	112
71	Zhoushan	Zhejiang	32.1	353
72	Xiamen	Fujian	31.3	89
73	Lhasa	Tibet	26.0	101
74	Haikou	Hainan	25.6	130

Average PM2.5 level (micrograms per cubic meter) indicator:

Excellent: 0-50 *Good: 51-100* *Mild pollution: 101-150*

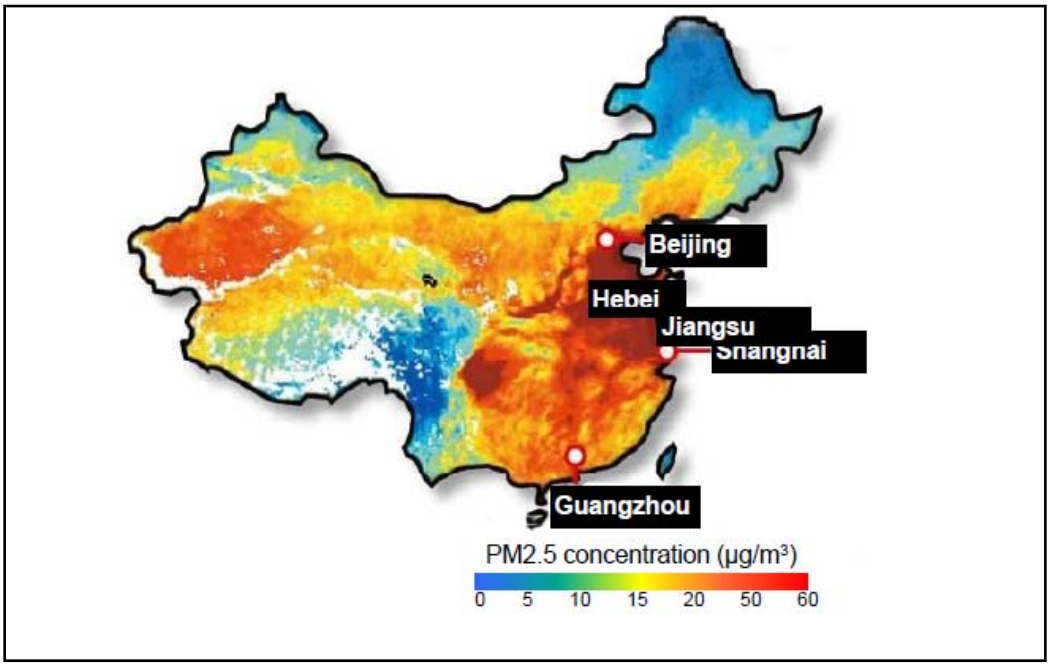
Moderate pollution: 151-250 *Heavy pollution: 250-300* *Serious pollution: 301-500*

PM2.5 and PM10 are the main pollutants in 70 out of 74 monitored cities in China

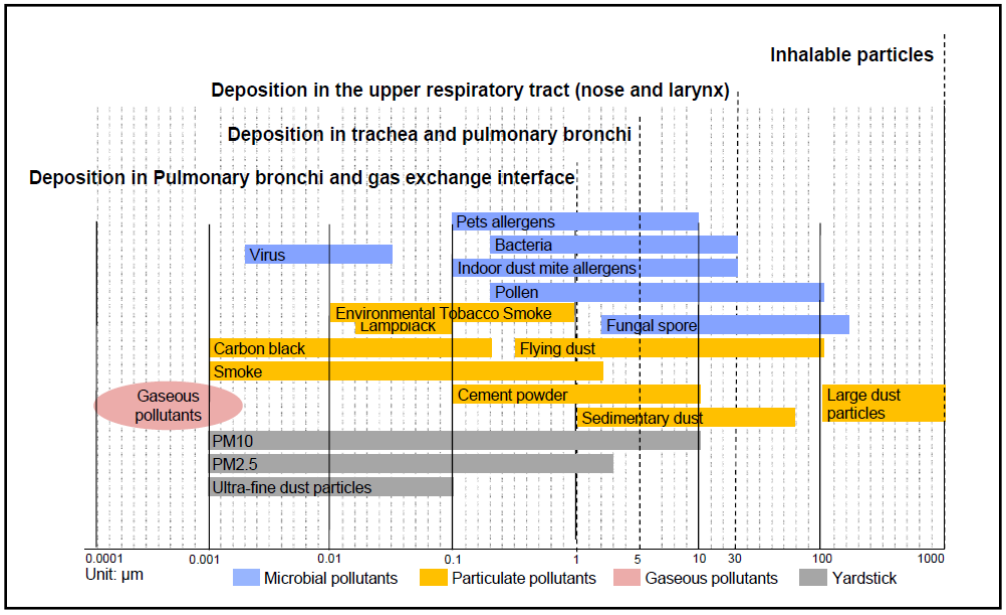


*Notes: * 74 cities includes 23 capital cities, 4 municipalities, and some cities in Hebei province, Yangtze River Delta, Pearl River Delta, etc. China had about 500 air quality observation points in 74 cities in 2012.*
Source: The Environmental Quality of the first half year of 2013, issued by Ministry of Environmental Protection of China.

The PM2.5 pollution from the combination of industrial and automobile gas discharges in the cities of the northern and the eastern coastal areas of China.

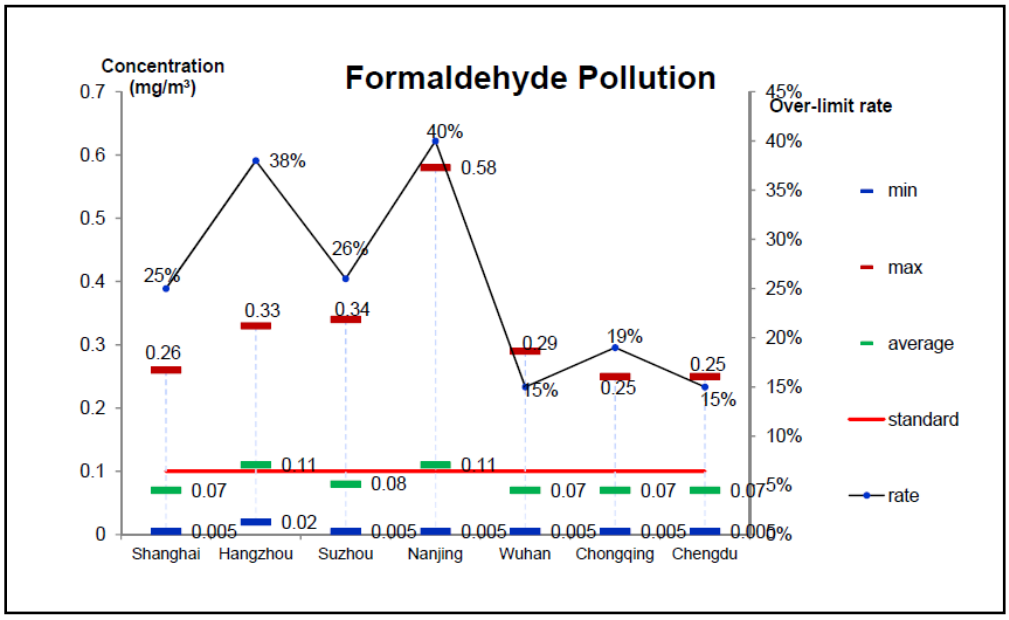


Potential indoor air pollutants come from various sources



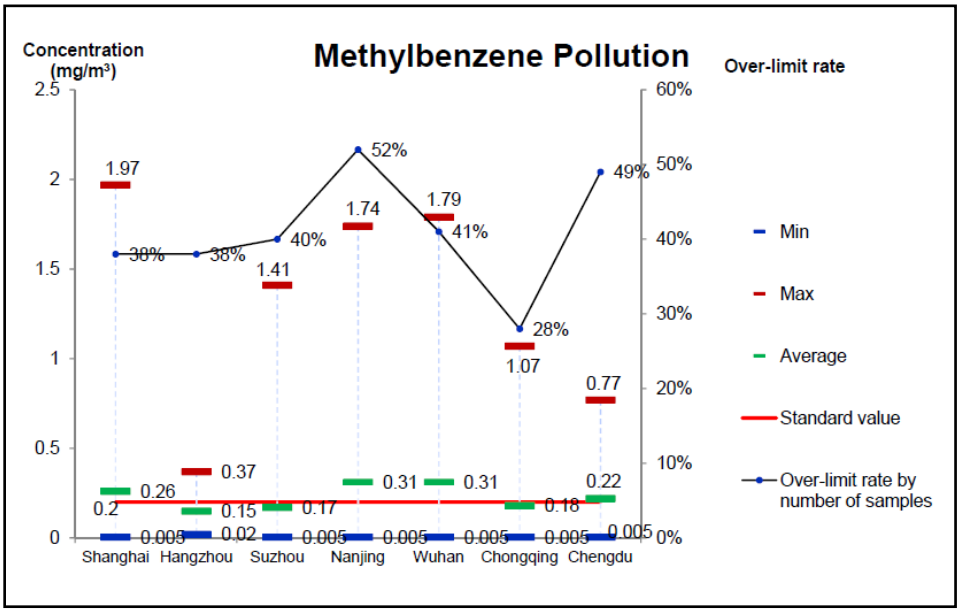
• *Averagely, adults stay indoors for about 15~20 hours per day, and inhale around 32 kg air.*

The average concentration value of formaldehyde of cities in China that exceeded the national standard based on the sample data of 590 families.



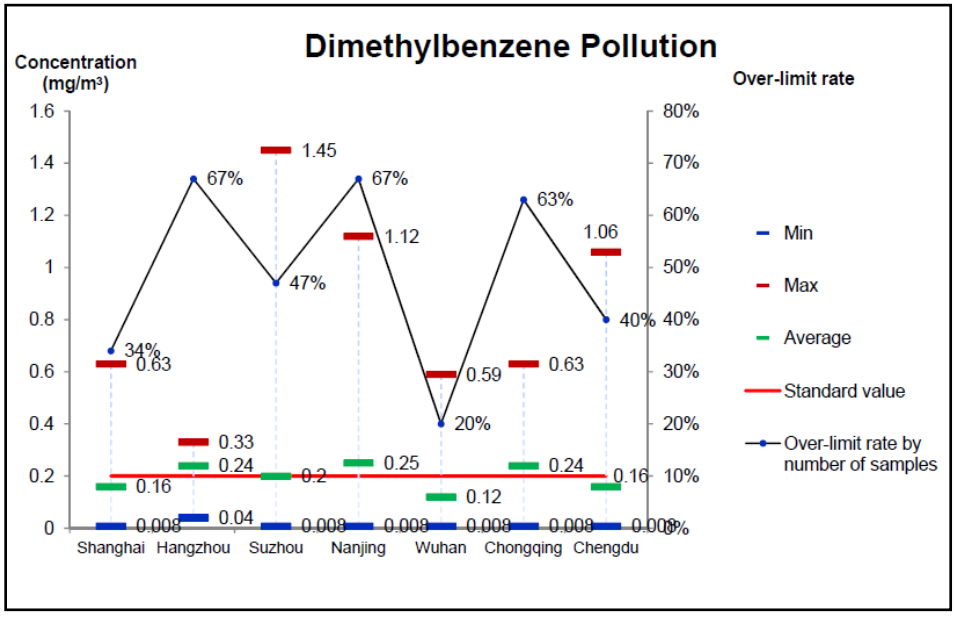
Source: Formaldehyde and Benzene concentration Inspection Report-2011, written by Indoor Environment and the Health Branch of China Environmental Science Institute.

The average concentration value of methylbenzene of cities in China that exceeded the national standard based on the sample data of 590 families.



Source: Formaldehyde and Benzene concentration Inspection Report-2011, written by Indoor Environment and the Health Branch of China Environmental Science Institute.

The average concentration value of dimethylbenzene of cities in China that exceeded the national standard based on the sample data of 590 families.



Source: Formaldehyde and Benzene concentration Inspection Report-2011, written by Indoor Environment and the Health Branch of China Environmental Science Institute.

Air Purification in Homes

Air purification is necessary for healthy living and to protect us from a number of allergies and diseases. The susceptibility of illness increases to a great extent when the air in the surroundings is polluted. It has been found in numerous studies that the air present in homes is much more polluted than that present in external environment. This may turn out to be quite harmful for people who are suffering from illnesses such as asthma, as they will not be safe from pollution even in the shelter of their own homes.

To promote the well-being of oneself and of all other members of the house, it is necessary to have clean and high quality air. For that, it is essential to install an air purification system at home. Basically, the function of an air purifier is to promote health, prevent illnesses and diseases among people and improve the condition of those individuals who are already suffering from breathing difficulties or related illnesses. Breathing in a fresh and hygienic environment is a blessing, which apart from advancing one's health also has a positive effect on the individual's peace of mind. The remedy to this problem is to use a device that ensures clean air, free of germs, bacteria, volatile gases, pet dander, smog, radon gas and many more. Only an air purifier is the solution for this general problem.

The Development and Obstacles of Air Purifiers Industry in China

As an emerging field, the development of the air purifiers industry is mainly driven by the driving factors as below:

- Concerns on outdoor and indoor air qualities:
    - Air quality in outdoors and indoors has continued to deteriorate in recent years. The average concentration of PM2.5 in China's monitored cities was 0.085 mg/m3 in 2011, and increased to 0.172 mg/m3 in the first half of 2013.
- The widespread media coverage of the negative effects of poor air quality to people's health:
    - The statistics from National Environmental Protection Administration showed that 8,572 deaths in Shanghai, Guangzhou Xian and Beijing in 2012 were caused by PM2.5 pollution.
    - It was also reported that in 2011, Harbin Hematological Malignance Research Institute received and treated over 1800 cancer patients, 46.7% of who suffered from indoor environmental pollution
- The income level of Chinese in cities is increased with more people able to afford health related investment:
    - The National Bureau of Statistic of China reported in 2009, the average disposable income of urban residents was 17.726 Yuan and increased to 26,959 Yuan in 2012.

The air purifiers industry faces the challenges of insufficient regulations and supervision from the Chinese government are as below:

- The industry standards of air filter products' quality and detection systems are not unified. Different companies may use dissimilar detection standards, which may result in consumer confusion and unhealthy development.

- Deceptive and exaggerated advertising of air filter products' performance are misleading customers and once exposed, a crisis of mistrust may spread among customers. The recent exposure of misleading advertisement by 22 of the biggest air purifier brands by Shanghai Consumer Protection Committee is a good example.

Air Purifiers Market in China

The demand for air purifiers in China has been on the rise for the past few years. Apart from industrial units and buildings, air purifier installations are becoming popular in shopping complexes, malls and even homes. With rising inclination towards severe health conditions like asthma and lung cancer, Chinese consumers are increasingly adopting air purifiers. Significant rise in per capita disposable income of Chinese consumers has also played a crucial role in driving air purifier sales. As a result, the demand for air purifiers from residential sector is expected to increase over the coming years in the country.

According to data, the total sales into traditional channels of purifiers in China reach 3.5 billion Yuan in 2013. And North China and East China account for more than 80% of the total sales. Moreover, more than 40% of the total sales in 2013 have been recorded in November and December, because air pollution is more serious in winter. Shanghai suffered very serious hazy weather last December, which contributed to boost the sales of air purifiers close to the total sales of other 11 months.

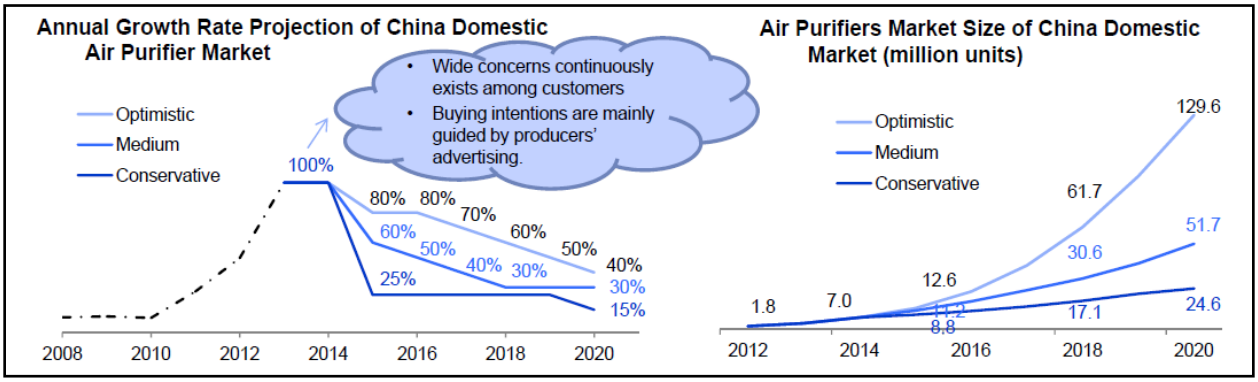
A market which will continue to grow

" Air purifiers may become necessities for every family in China in the future, The number of enterprises that manufacture air purifiers is two times more than two years ago," said by *Chengang*, deputy secretary-general of CHEAA. Chinese household air purifier ownership rate is under 1% at present, far below the rate of America (17%) and Japan (28%). In general, China's air purifier market has huge potential.

Based on data from Jingdong, about 9 million people bought healthcare electric appliances on Jingdong in 2013, up almost 100% than one year ago. The sales of air purifiers reach 1 billion Yuan on Jingdong, up 420% than the year earlier. Furthermore, Jingdong expects that its sales of air purifiers in 2014 will reach 3 billion Yuan.

According to the recently published report by TechSci Research "China Air Purifiers Market Forecast & Opportunities, 2019", the Chinese air purifiers market is projected to register revenue growth at a CAGR of around 33.55% during 2014-19. The report reveals that High Efficiency Particulate Air (HEPA) based air purifiers are expected to continue dominating the Chinese market over the coming years.

Three scenarios of China's domestic household air purifier market



Optimistic:

- The ongoing degradation of air quality in China would still result in widespread panic among customers.
- The market would not be limited by the production capacity as the industry would attract more players.

Medium:

- It is estimated that the development roadmap would be similar to water filter. The growth rate of water filter in 2012 and 2013 is about 40 to 60%, and it is projected to grow at a compound annual grow rate of 30% in the next five years.
- The market would not be limited by the production capacity as the industry would attract more players.

Conservative:

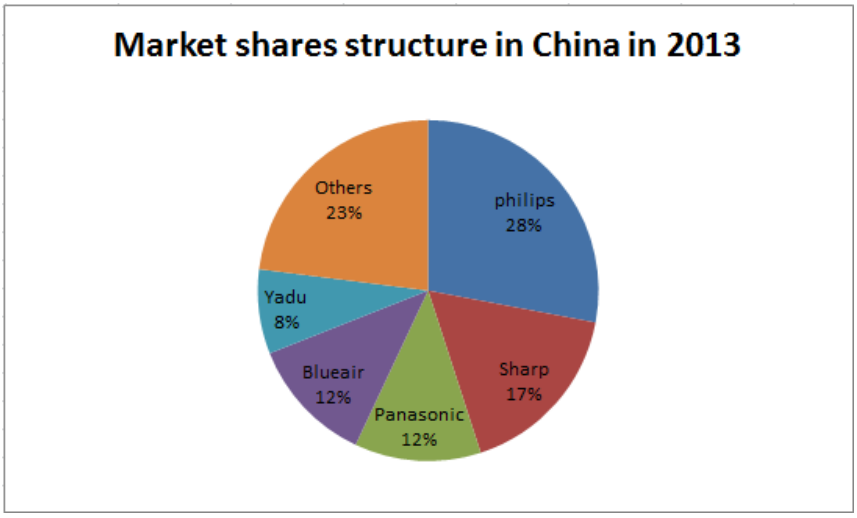
- The industry regulations are projected to be unified after 2014, and the industry would experience a restructuring.
- With a 2-year learning curve, customers will be more informed and rational in making purchasing decisions.
- The development roadmap would be better than other white domestic appliances, whose compound annual grow rate is 10-15%.
- The market would be limited by the production capacity which is estimated to be around 20 million units.

Penetration rate* by 2020: Optimistic = 187%; Medium scenario = 95%; Conservative scenario = 56%

*Notes: * Penetration rate= total market capacity/ 200 million urban households.*
Source: PIM research and analysis.

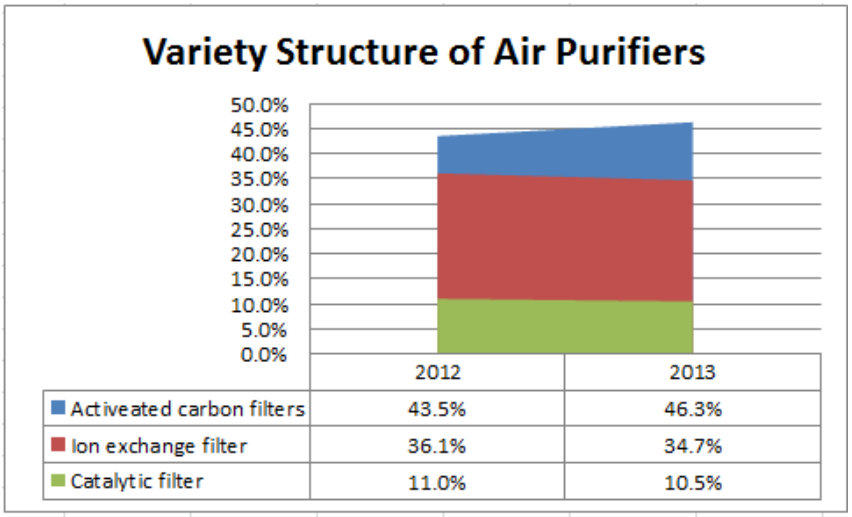
Market researches show a clear domination of foreign brand in Chinese market

The most popular brands include Philips, Sharp and Daikin and the average price is around 2,000 to 3,000 Yuan, according to an Alibaba spokesperson.



Yadu is the only local brand among the brands in the pie chart above. Although there are much more domestic brands than foreign brands in the market, domestic brands only grab a market share of 20% altogether.

On the other hand, the structure of different kinds of air purifiers in China between 2012 and 2013 is shown as follows:



	2012	2013
Activeated carbon filters	43.5%	46.3%
Ion exchange filter	36.1%	34.7%
Catalytic filter	11.0%	10.5%

Philips

Philips grabs a market share of 23.4% according to ZOL website. Philips enjoys a high reputation at household appliance market as well as other famous foreign brands. People usually buy Philip's air purifiers because of quality guarantee. Because China's air purifier market is growing rapidly, Philips even moves out headquarter of its research department to China.

SKG

SKG is a Chinese brand just established in November 2007 and underwent incredible fast growth over the past 6 years. According to ZOL website, SKG now grabs a market share of 12.4%. SKG focus on small household appliance, and the company's strategy is to sell their products all over the world through C2B business mode. Up to now, SKG has set up branch offices in more than 30 countries.

Yadu

Based on data from ZOL website, Yadu grabs a market share of 5.9%. Yadu used to be the leading local brand in the air purifier market. The company has been studying in indoor environment technology for more than 26 years. But its market shares are decreasing recent years because of its poor management. In general, market research show that Yadu performed less well than its competitors.

Sales Channels

Currently, there are three main sales channels of China's air purifier market**:** traditional sales channel**,** E-business channel and **"**gift channel**".**

Famous foreign brands like Philips and Sharp not only enter electronics and appliance specialist retailers like *Guomei* and *Suning*, but also enter big online shop platforms like TMall and *Jingdong*. On the other hand, local brands like TCL, *Geli* and *Meidi* fall behind in the competition of E-business channel. These local brands still use agent channel as their main sales channel.

"The total sales of air purifier market in China is 1.5 billion Yuan, so it is too small to afford the costs of chain stores channel like brand outlets", said by *Chenxin*, the sales director of one local air purifier brand.

It turns out that E-business channel is most effective. According to data from Taobao, the sales of air purifiers between 25 Jan and 31 Jan in 2014 boost by 575.7% from the same period last year.

On the other hand, a band just ordered 100,000 air purifiers from TCL though "gift channel". The bank plans to present these air purifiers as gifts to their customers.

Technologies Evaluation and Comparison

Among the current technologies, there is no single technology that can solve all of the air pollution.

The Pros and Cons of air purification technologies

Technologies	Pros	Cons
HEPA	High filtration efficiency on PM, could reach up to 99.97% (for particles with diameter >=0. 3μm).	Short lifetime (around 3 -12 months). High flow resistance: 20-80 Pa. Ineffective for removing viruses, VOC's and foul odors.
Activated Carbon	Effectively capture viruses and adsorb VOC's foul odors and formaldehyde.	Short lifetime (around 3 -6 months). Easy to reach saturation levels. Slow purification speed.
Photocatalyst	Removes formaldehyde, VOC's and viruses efficiently. Fast purification speed.	Ultraviolet radiation is a must, secondary pollution.
Plasma	Remove PM, VOC's and viruses efficiently. Low power consumption. Fast purification speed.	Easy to generate ozone, cause secondary pollution.
Electrostatic precipitator	Remove PM, viruses, foul smell. Long lifetime, no need to replace.	Easy to generate ozone and cause secondary pollution. Ineffective for removing formaldehyde. Extra power consumption.
Anion	Remove dust, VOC's and deactivate viruses.	Low purification efficiency. Slow purification speed. Extra power consumption.
ULPA*	High filtration efficiency on PM, could reach 99.999% (for particles with diameter ≥ 0.1μm).	Short lifetime (around 3 - 6 months). High wind resistance: 200-300 Pa.

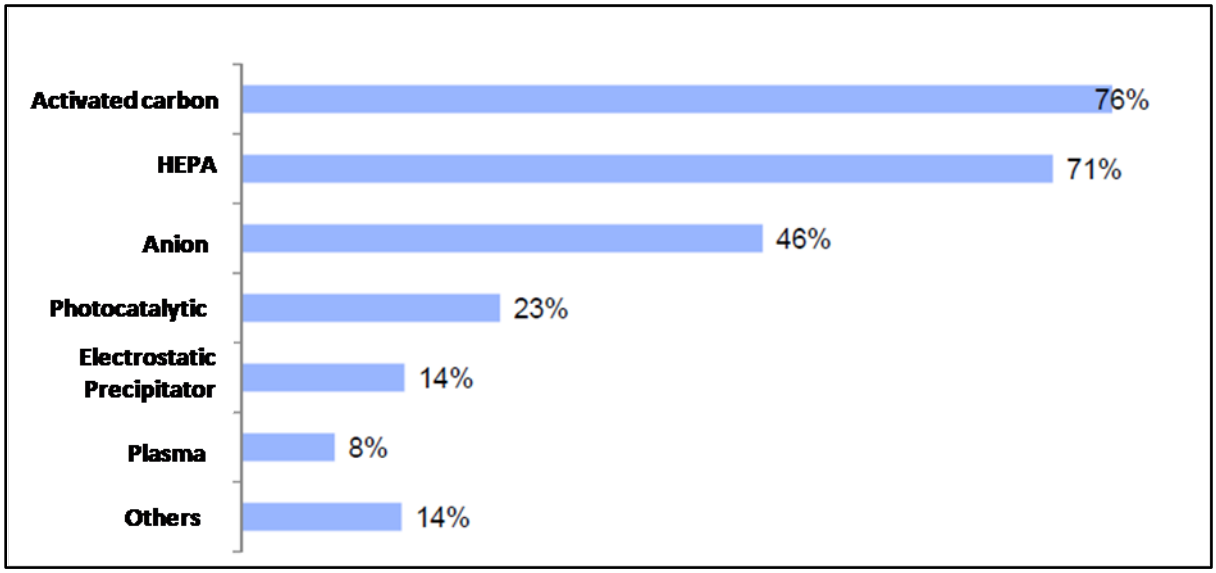
*Notes: * Because of its high wind resistance, ULPAs are currently used for industrial applications.*

Comparison of technology performance in air purification

	PM	Formaldehyde	TVOC	Bacteria	Odor
HEPA	●	○	○	◑	○
Activated carbon	◕	◕	◕	◕	◕
Plasma	◑	◕	◕	◕	◑
Photocatalytic	○	◕	◕	●	◑
Anion	◕	◕	◕	◕	◑
Electrostatic precipitator	◕	◔	◔	◑	◑

**Harvey ball refers to removing efficiency* ● → ○ *= High efficiency → Low efficiency*

Typical air purification technologies used in air purifier



Of the 500 sample household air purifiers in the market, almost all of them have the combined technologies of HEPA, activated carbon and anion.

The Trend of Technologies Development

- Technologies development trends: Filtration and adsorption technologies would still dominate the market

    - These two technologies are very safe as they will not create harmful byproducts. However, anion, plasma, ozone, electrostatic precipitator and photocatalytic may release ozone which is harmful to human health.

    - These two technologies have relative high efficiency for removing the major pollutants – PM and formaldehyde.

- Problems for the mainstream technologies

    - The life span is very limited and frequent replacement is needed. For HEPA, it is around 3 to 12 months, and for activated carbon is about 3 to 6 months.

    - The replacement periods are different. For multiple layers of filters, replacement is not convenient.

    - Interviews with employees of Testing Center for Air Purification showed that the current technology for removing formaldehyde is not very satisfactory. For example, activated carbon could only remove less than 80% of formaldehyde within 2 hours.

- Technologies that meet the following requirements are undoubtedly needed:

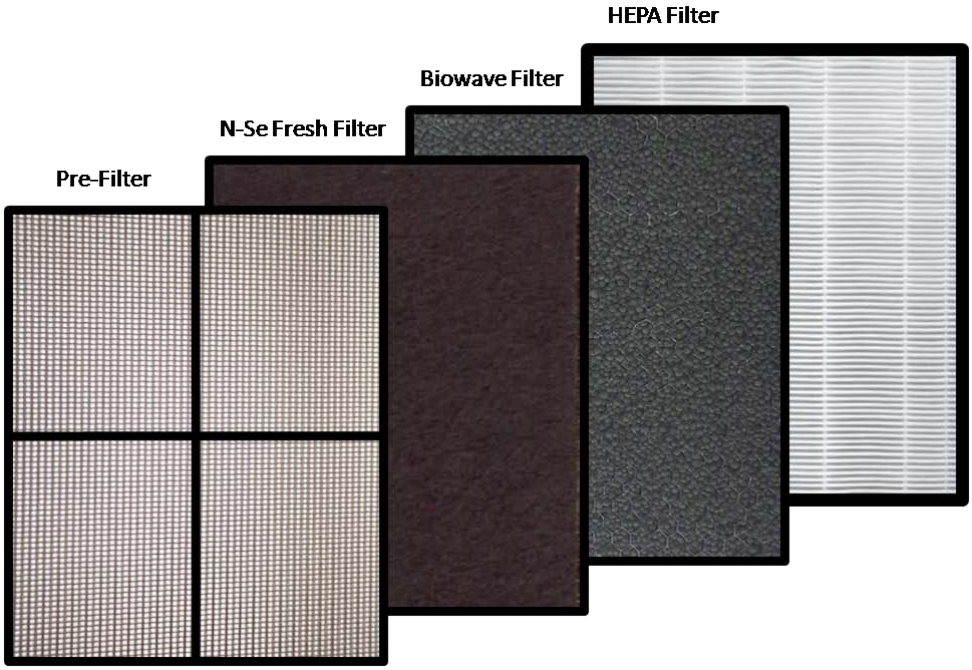
    - Longer life span, ideally 1 to 2 years

    - Integrated all-in-one technology. One layer filter with multiple functions of removing PM, formaldehyde, TVOC, foul odors and etc.

    - Higher efficiency for removing formaldehyde, ideally ≥ 99.9%.

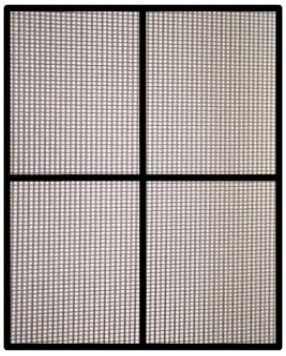
Understanding SHEPROS's Air Purification Technologies

The best performing air purifier features more than one filtration technology. The combination of Pre-Filter, BIOWAVE Filter, N-Se Fresh Filter and HEPA Filter are the key to optimal results. No other air purifier combines these 4 leading Passive Technologies.



PRE- FILTER

The pre-filter is used to keep large particles and debris from entering the air purifier. This would include hair, dust, pet fur, and other larger particles. Without a pre-filter these larger particles would clog HEPA or other filters faster and causes them to be less effective. The pre-filter keeps the inside of the air purifier cleaner and functioning better. The addition of a pre-filter helps minimize cleaning. The pre-filter is reusable and can be vacuumed or rinsed and then put back to work.



N-Se FRESH FILTER

Axena Technologies, with Brown University, has developed a revolutionary decontamination filtration technology that can lead to improved indoor air quality (IAQ). The application of this novel technology in air purification is very efficient for the removal of pathogens, volatile organic compounds (VOCs) and radon contaminants. Normal air filtration systems are at risk for air pathogens growth and are unable to remove VOCs and radon contaminants. These pathogenic microorganisms grow and gain strength on filters and system surfaces, ultimately becoming air-borne and adversely affecting human health and well-being. Killing pathogenic microorganisms and removing VOCs and radon contaminants lead to cleaner indoor air and improved human quality-of-life.

N-Se Fresh Filter is made of 100% activated carbon fabric impregnated with nano selenium filter. It adsorbs a large volume of organic or inorganic molecules from various gases and acts as a high purity filter, a method of separation or as a protective layer. It has a **micro-porous** structure which results in rapid adsorption kinetics and the capability to adsorb to a higher level of purity. Unlike activated carbon filter, N-Se Fresh Filter is suitable for use in applications where there is a high humidity as its adsorption capacity is less adversely affected by moisture.

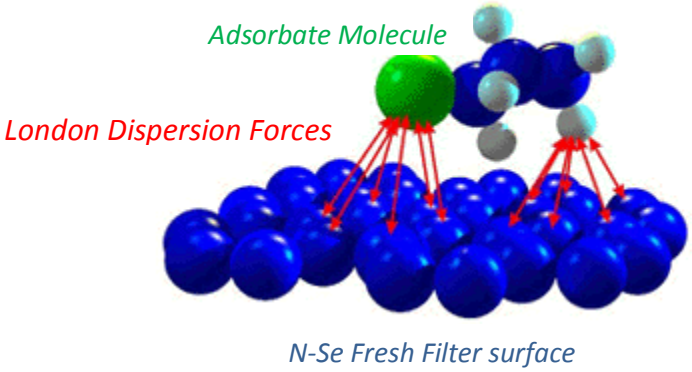
N-Se Fresh Filter – Woven Cloth

What makes molecules adsorb on N-Se Fresh Filter?

Due to its micro-porous structure**,** N-Se Fresh Filter has an extremely large surface area for physical adsorption. To put its capabilities into perspective, just 1 gram of N-Se Fresh Filter cloth has the surface area of over half the size of a football pitch. In simple terms, physical adsorption occurs because all the pore walls within the N-Se Fresh Filter cloth have strong electrostatic forces to attract other gas molecules to adhere to.

N-Se Fresh Filter adsorption is caused by London Dispersion Forces, a type of Van der Waals Force which exists between molecules. The force acts in a similar way to gravitational forces between planets.

London Dispersion Forces are extremely short ranged and therefore sensitive to the distance between the N-Se Fresh Filter surface and the adsorbate molecule. They are also additives, meaning the adsorption force is the sum of all interactions between all the atoms. The short range and additive nature of these forces results in N-Se Fresh Filter having one of the strongest physical adsorption forces of any material known to mankind.



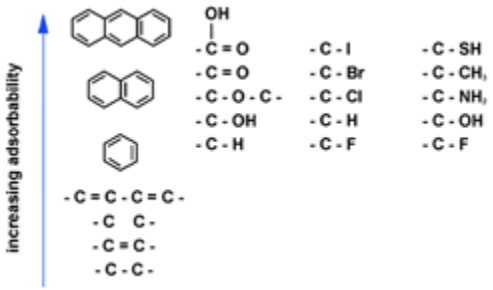
Gas Phase Adsorption - This is a condensation process where the adsorption forces condense the molecules from the bulk phase within the pores of the N-Se Fresh Filter. The driving force for adsorption is the ratio of the partial pressure and the vapor pressure of the compound.

What compounds are adsorbed?

All compounds are absorbable to some extent. In practice, N-Se Fresh Filter is used for the adsorption of mainly organic compounds along with some larger molecular weight inorganic compounds such as iodine and mercury.

In general, the absorbability of a compound increases with:

- increasing molecular weight;
- a higher number of functional groups such as double bonds or halogen compounds;
- increasing polarisability of the molecule. This is related to the electron clouds within the molecule.



How does N-Se Fresh Filter kill air pathogens?

Selenium nano-particles naturally adhere to filter fibers introducing antibacterial properties to the material. This allows for a permanent surface coating that resists biofilm and cellular growth of bacteria and fungi. Most importantly, a nano-selenium coated surface will not leach out into the environment, making the product environmentally friendly. Airborne pathogens die as they come into contact with the antibacterial agents.

Selenium breaks the characteristic sulfur-carbon bond in thiols and proteins. This removes the microbes' protection for oxidative stress (Reactive Oxygen Species), chlorine compounds, osmotic stress, pH fluctuations, and reduced sulfur fluctuations. Thiols are provided by the microbes' intracellular cytoplasm and the protein in the cell walls and fungi cell membranes. Thus, the bacteria themselves actually bring the activating agents to begin the catalytic process resulting in their death.

Nano-selenium depletes thiols

During the natural metabolism of oxygen, oxygen ions and peroxides known as Reactive Oxygen Species (ROS) are formed. Although they play a necessary role in cell signaling, these molecules are highly reactive and need to be closely regulated to prevent damage to cell structures, DNA, nucleotides, proteins, enzymes and more. The most important intracellular redox buffer is the thiol glutathione, which has the primary role of regulating ROS, but also provides protection from chlorine compounds, acts as a reserve form of reduced sulfur, and maintains the levels of potassium ions. The regulation of potassium ions by glutathione protects the cell from damaging pH fluctuations as well as osmotic stress, which can induce cell shock when low glutathione levels causes potassium ions and water to leak out of the cell. Glutathione is one of the most abundant thiols in bacteria and fungi.

Nano-selenium particles draw out glutathione, among other low molecular weight thiols, and destroy them by breaking the characteristic sulfur-carbon bond. Even under reducing conditions such as that in the cytosol, selenium is able to oxidize thiols and break the sulfur bonds. The cell membranes are particularly vulnerable to this effect due to its proximity to the nano-selenium particles. The depletion of glutathione and its protective functions has the following effects:

- Natural and self-produced ROS damage the cells' systems and structures.
- Osmotic stress from the internal loss of potassium ions and water, which can induce cell shock.
- Prevent microbial growth in low pH environments.
- Prevent microbial growth in low reduced sulfur environments.

Nano-selenium breaks zinc proteins

Selenium also breaks the zinc-sulfur bonds in metallothionein and zinc finger proteins, which interferes with the transcription of genetic information from DNA to mRNA. The resulting imbalance of zinc and selenium causes genomic instability and thus disrupts cell replication. Cells that replicate quickly, such as

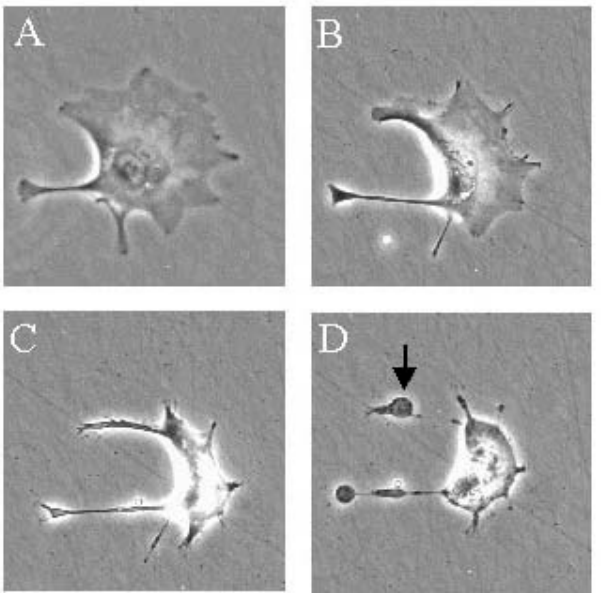
bacteria and fungi, are more susceptible to the negative effects of genomic instability than mammalian cells that replicate slowly.

Nano-selenium also causes apoptosis in fungi

Apoptosis, or programmed cell death, is a normal component of the development and health of multicellular organisms. Cells die in response to a variety of stimuli and during apoptosis they do so in a controlled, regulated fashion. Apoptosis is a process in which cells play an active role in their own death.

In fungi, the depletion of thiols has additional adverse effects and ultimately induces apoptosis. The loss of ROS regulation ruptures the outer membrane of the mitochondria, which is basically the source of chemical energy - adenosine triphosphate (ATP) - for cells. The mitochondria is most vulnerable because it is the main generator of ROS and therefore accumulates oxidative damage faster. With the collapse of the mitochondrial membrane, not only are metabolism and respiration affected, but a release of pro-apoptotic proteins begins the process of apoptosis.

Apoptosis Process



A. *The cell begins to shrink as the rigid proteins (microfilaments and microtubules) within it break down. In the cell nucleus, chromatin (combination of DNA and proteins) in the nucleus also condenses.*
B. *As the cell continues to shrink, rounding and a "horse-shoe" appearance often occurs.*
C. *The nuclear envelope (membrane of the nucleus) breaks down and begins to split into separate bodies.*
D. *The cell breaks apart into separate bodies.*

BIOWAVE FILTER

Normal air filtration systems are not highly efficient in removing VOCs, odors, smoke and ionizing radiation contaminants. These pollutants are becoming the major pollution in indoor air quality and adversely affecting human health and well-being.

SHEPROS with vast experience in air purification technologies, has developed a novel revolutionary molecular sieve adsorbent called BIOWAVE Filtration Media. BIOWAVE Filtration Media is crystalline solids structures made of silicon, aluminum and oxygen that form a framework with cavities and channels inside where cations, water and/or small molecules may reside. BIOWAVE's porous crystalline structure provides nano-pores or "cages" which have high affinity to adsorb air pollutants. The application of this technology in HVAC products and air purifiers is very efficient for the removal of volatile organic compounds (VOCs) odors, photochemical smog and ionizing radiation particles.

Biowave Media

BIOWAVE Filtration Media has several properties, which explain their superior performance in a wide range of applications:

Increased surface area

The material is designed with large surface area to enhance filtration performance. Aided by strong ionic forces (electrostatic fields) caused by the presence of cations such as sodium, calcium and potassium, and by the enormous internal surface area up to 1000 m^2 / g, molecular sieves will absorb a considerable

amount of pollutants. If the pollutants to be adsorbed are polar compounds, they can be adsorbed with high loading even at very low concentrations of the pollutants.

Enhanced adsorption

Adsorption is the physical process of binding a thin film of gas molecules to a large surface area. BIOWAVE Filtration Media exhibits high rapid reaction and adsorption kinetics. Therefore, BIOWAVE Filtration Media filters are very effective when short contact time, high air flow speeds or small bed depths are required.

Flexible material

The material's flexibility offers superior handling in filter and product manufacture. It can come in powder or pellet form and makes lamination or bonding to other materials possible.

Chemical air purifiers (gas phase purifiers)

It can be used as an adsorbent to capture molecular sized pollutants, odors and non-particulates such as cooking gas, out gassed paint and building material vapors, and vehicle exhaust gas. Gas molecules are 0.001 micron and smaller and cannot be removed by even the best HEPA filter alone.

Chemisorption

Chemisorption is a sub-class of adsorption, driven by a chemical reaction occurring at the exposed surface. A new chemical species is generated at the adsorbent surface (e.g. corrosion, metallic oxidation). The strong interaction between the adsorbate and the substrate surface creates new types of electronic bonds - ionic or covalent, depending on the reactive chemical species involved.

BIOWAVE Filtration Media uses chemisorption to remove low molecular weight gasses, including formaldehyde, hydrogen sulfide, carbon monoxide and ammonia where activated carbon doesn't perform efficiently.

Environmental advantages

- Regenerable (high thermal stability)
- Non toxic and non-corrosive
- No waste or disposal problems

Specification

Color	Diameter	Pores Volume	Pores Diameter	pH	Thermal Stability
Reddish brown	1 to 5 mm	Up to 40%	0.29 – 0.70 nm	6 - 8	250 - 500°C

HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTER

Conventional air filters with a MERV of 1 – 7 are usually used to trap large particles that are too big to pass through the filter, but allow smaller contaminants such as harmful airborne bacteria, molds, pollen, chemical residue and dust mites to pass. These filters are not reliable to filter airborne microbial contaminants in air purification systems.

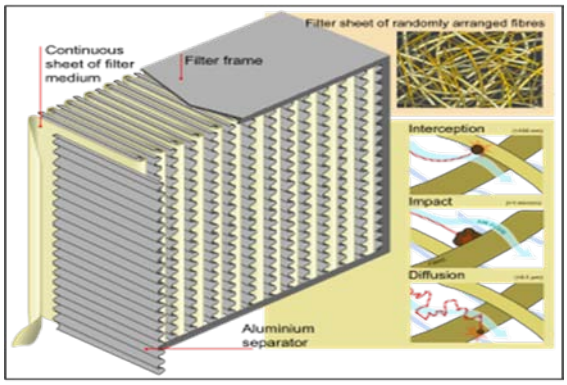
HEPA filters are perhaps the best-known technology for reducing exposure to airborne microbial contamination in air purification systems. A HEPA filter is a type of air filter that satisfies certain standards of efficiency such as those set by the United States Department of Energy (DOE). By government standards, an HEPA air filter must remove 99.97% of all contaminants and particles greater than 0.3 microns from the air that passes through. Once trapped, contaminates and particles are not able to flow back into circulation.

Mechanism of HEPA Filter

The HEPA filter is composed of a mat of randomly arranged fibers. The fibers are typically composed of fiberglass and possess diameters between 0.5 and 2.0 micrometers. Key factors affecting function are fiber diameter, filter thickness, and face velocity. The air space between HEPA filter fibers is much greater than 0.3 µm. The HEPA filter is designed to target much smaller pollutants and particles. These particles are trapped and stick to fibers through a combination of the following three mechanisms:

1. **Interception** - where particles following a line of flow in the air stream come within one radius of a fiber and adhere to it.
2. **Impaction** - where larger particles are unable to avoid fibers by following the curving contours of the air stream and are forced to embed in one of them directly; this effect increases with diminishing fiber separation and higher air flow velocity.
3. **Diffusion** - an enhancing mechanism that is a result of the collision with gas molecules by the smallest particles, especially those below 0.1 µm in diameter, which are thereby impeded and delayed in their path through the filter; this behavior is similar to Brownian motion and raises the probability that a particle will be stopped by either of the two mechanisms above; it becomes dominant at lower air flow velocities.

Diffusion predominates below the 0.1 µm diameter particle size. Impaction and interception predominate above 0.4 µm. In between, near the most penetrating particle size (MPPS) 0.3 µm, both diffusion and interception are comparatively inefficient. Because this is the weakest point in the filter's performance, the HEPA specifications use the retention of these particles to classify the filter.



HEPA-Filter with functional description.

What will a HEPA filter remove?

Airborne particles like Pet Allergens (0.3 to 100 microns), Dust and Dust Mite Allergens (10-40 microns), Pollens (10-100 microns), Plant Spores (10-70 microns), Airborne Fungi Spores (0.5 to 5 microns), Airborne Mold Spores (2-20 microns), and larger particles of tobacco smoke (0.003 to 0.04 microns).

What won't a HEPA filter remove?

Pure HEPA Filters do not remove most odors, chemicals, or gases as these particles are too small to be trapped by HEPA filters. They also are less effective against particles smaller than 0.01 micrometers such as tobacco smoke (0.003 to 0.04 microns). The HEPA filter will not remove most VOCs (Volatile Organic Compounds) such as paints, varnishes, cleaning supplies, glues, and adhesives, nor microorganisms such as Viruses, Antigens, Pathogens, and Bacteria. Note: some of these substances may become trapped in the HEPA filter, but removal is not guaranteed. In the case of microorganisms, the particle(s) may become trapped but will not necessarily be killed.

COMPARISON OF TEST RESULTS OF SHEPROS's FILTRATION WITH OTHER AIR PURIFIERS

This report is drafted based on the information of "Circular on Comparison Test Results of Air Purifiers" from http://www.315.sh.cn/news/20130521/20130521001.html and "Comparison Test Results from CPC Are Not As the Ads Say" from http://sh.people.com.cn/n/2013/0520/c176737-18698041.html which are highly influential medias in Shanghai, China. The Medias are exposing how manufacturers take the opportunity to introduce air purifier products with misleading advertisement claims of performances of their products such as "PM2.5 removal rate of 99.99%", and "formaldehyde removal rate of 99%", etc. In order to find the truth about the advertisement claims, The Shanghai CPC (the Consumer Protection Committee) has bought 22 prevailing air purifiers (19 sets are bought from retail shops, and 3 sets are bought from online stores), among which 17 sets are domestic while 5 sets are imported, with the prices from RMB 1488 to 9300. All these products are high-end models of individual brands.

Shanghai CPC entrusted the Shanghai Environmental Products Quality Supervision & Test Center to conduct test on the performance indicators commonly concerned by the consumers such as PM2.5 removal rate, formaldehyde removal rate, and energy efficiency, etc. in accordance with GB 4706.45—2008 Household and Similar Electrical Appliances - Safety - Particular Requirements for Air-cleaning Appliances, GB/T 18801-2008 Air Cleaner, GB/T 18883 – 2002 Indoor Air Quality Standard and other standards.

SHEPROS's filtration performance results from Shanghai Environmental Products Quality Supervision & Test Center

Test Item	**GB 21551-2008** **Minimum Requirement** **(Household Appliances for air purification)**	**SHEPROS's Results** **Based on GB/T 18883-2002**
Formaldehyde	≥ 25% (1 hour)	86% (1 hour)
Benzene	≥ 25% (1 hour)	85% (1 hour)
Ammonia	≥ 25% (1 hour)	69% (1 hour)
TVOC		>99% (1 hour)
PM 2.5	≥ 40% (1 hour)	>99% (30 minutes)
Staphylococcus Bacteria		99.95% (1 hour)

Comparison Test Results of Air Purifiers

(Applicable Area, Price and PM 2.5)

No.	Manufacturer/import dealer	Brand	Spec. & model	Reference applicable area (m^2)	Reference retail market price (RMB)	Respirable particulate matter with particle diameter ≤2.5 (PM2.5) removal rate (%)
1	SHEPROS Sdn. Bhd.	SHEPROS		48		>99
2	Amway (China) Co., Ltd.	Amway	101076CH	48	9300	>99
3	Shenzhen Dingxin Technology Co., Ltd.	Blueair	503	48	6174	>99
4	SHARP Electronics Sales (China) Co., Ltd.	SHARP	KJF420AA	42	3499	99
5	Electrolux (China) Electric Appliance Co., Ltd.	Electrolux	Z9123	33	2075	98
6	DAIKIN Air Conditioning (China) Co., Ltd.	DAIKIN	KC70KMYZ-R (KJFK336A)	31	2899	97
7	Heng Mau International Trading (Shanghai) Co., Ltd.	HONEYWELL	18400	30	5217	97
8	Philips (China) Investment Co., Ltd.	PHILIPS	AC4074	27	4399	96
9	Shanghai LOCK&LOCK Trade Co., Ltd.	LOCK&LOCK	ELA-230C	27	1580	96
10	Samsung (China) Investment Co., Ltd.	SAMSUNG	AC-347HPAWQ	27	6600	96
11	Broad Air Quality Tech Co., Ltd.	Broad	TA400	26	5880	96
12	CTK Technology (Shenzhen) Co., Ltd.	CADO	AP-C300-GD	24	5129	95
13	LG Electronics (China) Co., Ltd.	LG	PH-U450WN	26	5298	95
14	Panasonic Ecology System Guangdong Co., Ltd.	Panasonic	F-VXH50C	25	4740	94
15	De'Longhi Trading (Shanghai) Co., Ltd.	De'Longhi	AC230	21	3914	93
16	PLASTON Precision Injection Molding (Jiaxing) Co., Ltd.	AIO-O-SWISS	AOS2071	25	5894	93
17	Beijing Lierpu Electric Appliance Co., Ltd.	FMART	APL100	18	4799	91
18	Northeurope Home Appliance (Tianjin) Co., Ltd.	Giabo	PAC2300	18	3280	90
19	Beijing Yadu Air Cleaning Technology Co., Ltd.	Yadu	KJF2901	18	4000	89
20	Gree Electric Appliances, Inc.	Gree	KJG155A	17	2799	88
21	KingClean Electric Co., Ltd.	LEXY	KJ701-3	17	4999	87
22	Shanghai Yuanshan Electronic Industry Co., Ltd.	Sunpentown	YS-360ACC	13	1488	79
23	GD Midea Environment Appliances MFG. Co. Ltd.	Midea	KJ40FR-NG1	12	3980	78

Comparison Test Results of Air Purifiers

(Formaldehyde Removal Rate)

No.	Manufacturer/import dealer	Brand	Spec. & model	Formaldehyde removal rate (%)
1	Shenzhen Dingxin Technology Co., Ltd.	Blueair	503	97
2	SHEPROS Sdn. Bhd.	SHEPROS		86
3	KingClean Electric Co., Ltd.	LEXY	KJ701-3	78
4	Amway (China) Co., Ltd.	Amway	101076CH	76
5	Panasonic Ecology System Guangdong Co., Ltd.	Panasonic	F-VXH50C	70
6	SHARP Electronics Sales (China) Co., Ltd.	SHARP	KJF420AA	61
7	DAIKIN Air Conditioning (China) Co., Ltd.	DAIKIN	KC70KMYZ-R (KJFK336A)	56
8	Philips (China) Investment Co., Ltd.	PHILIPS	AC4074	53
9	Gree Electric Appliances, Inc.	Gree	KJG155A	50
10	Samsung (China) Investment Co., Ltd.	SAMSUNG	AC-347HPAWQ	50
11	GD Midea Environment Appliances MFG. Co. Ltd.	Midea	KJ40FR-NG1	46
12	Beijing Yadu Air Cleaning Technology Co., Ltd.	Yadu	KJF2901	36
13	CTK Technology (Shenzhen) Co., Ltd.	CADO	AP-C300-GD	29
14	PLASTON Precision Injection Molding (Jiaxing) Co., Ltd.	AIO-O-SWISS	AOS2071	28
15	Northeurope Home Appliance (Tianjin) Co., Ltd.	Giabo	PAC2300	26
16	LG Electronics (China) Co., Ltd.	LG	PH-U450WN	19
17	Heng Mau International Trading (Shanghai) Co., Ltd.	HONEYWELL	18400	17
18	De'Longhi Trading (Shanghai) Co., Ltd.	De'Longhi	AC230	16
19	Electrolux (China) Electric Appliance Co., Ltd.	Electrolux	Z9123	16
20	Beijing Lierpu Electric Appliance Co., Ltd.	FMART	APL100	12
21	Shanghai Yuanshan Electronic Industry Co., Ltd.	Sunpentown	YS-360ACC	10
22	Broad Air Quality Tech Co., Ltd.	Broad	TA400	9
23	Shanghai LOCK&LOCK Trade Co., Ltd.	LOCK&LOCK	ELA-230C	8

Comparison Test Results of Air Purifiers

(Clean Air Delivery Rate))

No.	Manufacturer/import dealer	Brand	Spec. & model	Clean air delivery rate (CADR) (m^3/h)
1	Amway (China) Co., Ltd.	Amway	101076CH	481
2	Shenzhen Dingxin Technology Co., Ltd.	Blueair	503	479
3	SHEPROS Sdn. Bhd.	SHEPROS		453
4	SHARP Electronics Sales (China) Co., Ltd.	SHARP	KJF420AA	416
5	Electrolux (China) Electric Appliance Co., Ltd.	Electrolux	Z9123	329
6	DAIKIN Air Conditioning (China) Co., Ltd.	DAIKIN	KC70KMYZ-R (KJFK336A)	307
7	Heng Mau International Trading (Shanghai) Co., Ltd.	HONEYWELL	18400	303
8	Philips (China) Investment Co., Ltd.	PHILIPS	AC4074	274
9	Samsung (China) Investment Co., Ltd.	SAMSUNG	AC-347HPAWQ	272
10	Shanghai LOCK&LOCK Trade Co., Ltd.	LOCK&LOCK	ELA-230C	269
11	LG Electronics (China) Co., Ltd.	LG	PH-U450WN	259
12	Broad Air Quality Tech Co., Ltd.	Broad	TA400	257
13	Panasonic Ecology System Guangdong Co., Ltd.	Panasonic	F-VXH50C	254
14	PLASTON Precision Injection Molding (Jiaxing) Co., Ltd.	AIO-O-SWISS	AOS2071	245
15	CTK Technology (Shenzhen) Co., Ltd.	CADO	AP-C300-GD	244
16	De'Longhi Trading (Shanghai) Co., Ltd.	De’Longhi	AC230	212
17	Beijing Yadu Air Cleaning Technology Co., Ltd.	Yadu	KJF2901	184
18	Northeurope Home Appliance (Tianjin) Co., Ltd.	Giabo	PAC2300	181
19	Beijing Lierpu Electric Appliance Co., Ltd.	FMART	APL100	177
20	Gree Electric Appliances, Inc.	Gree	KJG155A	172
21	KingClean Electric Co., Ltd.	LEXY	KJ701-3	171
22	Shanghai Yuanshan Electronic Industry Co., Ltd.	Sunpentown	YS-360ACC	130
23	GD Midea Environment Appliances MFG. Co. Ltd.	Midea	KJ40FR-NG1	119

2012090235U (2012)沪质监认字071号

报告编号 2014I20-35-885916

检 测 报 告

产品名称：空气净化器

型号规格：/

委托单位：Shepros Sdn.Bhd；希普乐有限公司

检测类别：委托检测

上海市环境保护产品质量监督检验总站

AMMONIA

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885916　　共 3 页　第 1 页

产品名称	空气净化器		型号规格	/	
			商　标	/	
任务来源	企业委托		检测类别	委托检测	
委托单位名称	Shepros Sdn.Bhd；希普乐有限公司				
生产企业名称	/				
产品等级	/	批号(编号)/生产日期	/	样品数量	1台
委托日期	2014 年 10 月 29 日	检验地点	上海市宜山路 716 号 6 号楼		
到样日期	2014 年 10 月 29 日	委托单编号	DZ0000420		
样品状态描述	主机运行正常。				
检测项目和检测依据	检测项目：氨净化效率； GB/T 18801-2008 空气净化器； GB/T 18883-2002 室内空气质量标准； 及委托方要求。				
检测日期	2014 年 10 月 29 日至 2014 年 11 月 17 日。				
检测结论	按照上述检测依据检测，数据详见本报告检测结果汇总页。 （检测报告专用章） 签发日期：2014年11月17日				
委托单位通讯资料	地　址	/			
	邮　编	/	电　话	/	
备　注	本栏空白。				

主检：　　审核：　　批准：

AMMONIA

声　明

a) 本报告无本质检机构检测报告专用章无效；

b) 本报告无主检、审核、批准签名无效；

c) 本报告涂改无效；

d) 复制报告未重新加盖本机构检测专用章无效；

e) 本报告提供的结果仅对本次被测的样品有效；

f) 未经本质检机构书面批准，不得复制本检测报告（全文复制除外）。

质检机构联络信息

地址：上海市宜山路716号　　电话：021-64706968

邮编：200233　　传真：021-64706968

E-mail：ep@simt.com.cn

AMMONIA

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885916

检测结果汇总				
序号	检测项目	单位	技术要求	检测结果
1	氨净化效率	%	检测在 30m³ 测试舱内进行，氨初始浓度控制在（2.0±0.4）mg/m³ 范围内，检测时间为 1 小时。	69
本栏空白				
备注	1、检测时测试舱内温度为（23~27）℃，湿度为（40~60）%RH。 2、检测时氨起始浓度为 2.2mg/m³，1 小时自然衰减 7%。 3、实验中的污染物净化效率计算公式为： [（气态污染物初始浓度-气态污染物终止浓度）÷气态污染物初始浓度]×100%。 4、测试时机器内使用的是 3 号网。			

检测结果内容结束。

AMMONIA

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885916

检测情况说明	
样品状态和检测过程描述	1、检测时样品正常，无异常情况发生。 2、检测时仪器工作正常，无异常情况发生。 3、检测用样品照片： 
实验室状态描述	实验室温度：（23~27）℃； 实验室湿度：（45~60）%RH。
检测用主要仪器	大气采样器（BSH2810）；紫外可见分光光度计（0761080800006）等。
备　注	本栏空白。

AMMONIA

2012090235U (2012)沪质监认字071号

报告编号 2014I20-35-885917

检 测 报 告

产品名称：空气净化器

型号规格：/

委托单位：Shepros Sdn.Bhd；希普乐有限公司

检测类别：委托检测

上海市环境保护产品质量监督检验总站

BENZENE

声　明

a) 本报告无本质检机构检测报告专用章无效；

b) 本报告无主检、审核、批准签名无效；

c) 本报告涂改无效；

d) 复制报告未重新加盖本机构检测专用章无效；

e) 本报告提供的结果仅对本次被测的样品有效；

f) 未经本质检机构书面批准，不得复制本检测报告（全文复制除外）。

质检机构联络信息

地址：上海市宜山路716号　　电话：021-64706968

邮编：200233　　传真：021-64706968

E-mail：ep@simt.com.cn

BENZENE

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885917　　共 3 页 第 1 页

产品名称	空气净化器		型号规格	/	
			商　标	/	
任务来源	企业委托		检测类别	委托检测	
委托单位名称	Shepros Sdn.Bhd；希普乐有限公司				
生产企业名称	/				
产品等级	/	批号(编号)/生产日期	/	样品数量	1台
委托日期	2014 年 10 月 29 日	检验地点	上海市宜山路 716 号 6 号楼		
到样日期	2014 年 10 月 29 日	委托单编号	DZ0000420		
样品状态描述	主机运行正常。				
检测项目和检测依据	检测项目：苯净化效率； GB/T 18801-2008 空气净化器； GB/T 18883-2002 室内空气质量标准； 及委托方要求。				
检测日期	2014 年 10 月 29 日至 2014 年 11 月 17 日。				
检测结论	按照上述检测依据检测，数据详见本报告检测结果汇总页。 （检测报告专用章） 签发日期：2014年11月17日				
委托单位通讯资料	地　址	/			
	邮　编	/	电　话	/	
备　注	本栏空白。				

主检：　　审核：　　批准：

BENZENE

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885917

检测结果汇总				
序号	检测项目	单位	技术要求	检测结果
1	苯净化效率	%	检测在 30m^3 测试舱内进行，苯浓度控制在 2.0± 0.4（mg/m^3）范围内，检测时间为 1 小时。	85
本栏空白				
备注	1、检测时测试舱内温度为（23~27）℃，湿度为（40~60）%RH。 2、苯净化效率检测时，初始浓度为 1.1mg/m^3，1 小时自然衰减率为 6%。 3、实验中的污染物净化效率计算公式为： [（气态污染物初始浓度-气态污染物终止浓度）÷气态污染物初始浓度]×100%。 4、测试时机器内使用的是 4 号网。			

检测结果内容结束。

BENZENE

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885917

检测情况说明	
样品状态和检测过程描述	1、检测时样品正常，无异常情况发生。 2、检测时仪器工作正常，无异常情况发生。 3、检测用样品照片： 
实验室状态描述	实验室温度：（23~27）℃； 实验室湿度：（45~60）%RH。
检测用主要仪器	大气采样器（BSH2810）；气相色谱仪（US10351046）等。
备　注	本栏空白。

BENZENE

2012090235U (2012)沪质监认字071号

报告编号 2014I20-35-885914

检 测 报 告

产品名称：空气净化器

型号规格：/

委托单位：Shepros Sdn.Bhd；希普乐有限公司

检测类别：委托检测

上海市环境保护产品质量监督检验总站

FORMALDEHYDE

声　明

a) 本报告无本质检机构检测报告专用章无效；

b) 本报告无主检、审核、批准签名无效；

c) 本报告涂改无效；

d) 复制报告未重新加盖本机构检测专用章无效；

e) 本报告提供的结果仅对本次被测的样品有效；

f) 未经本质检机构书面批准，不得复制本检测报告（全文复制除外）。

质检机构联络信息

地址：上海市宜山路716号　　电话：021-64706968

邮编：200233　　传真：021-64706968

E-mail：ep@simt.com.cn

FORMALDEHYDE

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885914　　共 3 页 第 1 页

产品名称	空气净化器		型号规格	/	
			商　标	/	
任务来源	企业委托		检测类别	委托检测	
委托单位名称	Shepros Sdn.Bhd：希普乐有限公司				
生产企业名称	/				
产品等级	/	批号(编号)/生产日期	/	样品数量	1台
委托日期	2014 年 10 月 29 日	检验地点	上海市宜山路 716 号 6 号楼		
到样日期	2014 年 10 月 29 日	委托单编号	DZ0000420		
样品状态描述	主机运行正常。				
检测项目和检测依据	检测项目：甲醛净化效率。 GB/T 18801-2008 空气净化器； GB/T 18883-2002 室内空气质量标准； 及委托方要求。				
检测日期	2014 年 10 月 29 日至 2014 年 11 月 17 日。				
检测结论	按照上述检测依据检测，数据详见本报告检测结果汇总页。 （检测报告专用章） 签发日期：2014年11月17日				
委托单位通讯资料	地　址	/			
	邮　编	/	电　话	/	
备　注	本栏空白。				

主检：　　审核：　　批准：

FORMALDEHYDE

上海市环境保护产品质量监督检验总站

检 测 报 告

检测结果汇总				
序号	检测项目	单位	技术要求	检测结果
1	甲醛净化效率	%	检测在 30m³ 测试舱内进行，甲醛初始浓度控制在（1.0±0.2）mg/m³ 范围内，检测时间为 1 小时。	86
本栏空白				
备注	1、检测时测试舱内温度为（23~27）℃，湿度为（40~60）%RH。 2、检测时甲醛起始浓度为 1.1mg/m³，1 小时自然衰减 7%。 3、实验中的污染物净化效率计算公式为： [（气态污染物初始浓度-气态污染物终止浓度）÷气态污染物初始浓度]×100%。 4、测试时机器内使用的是 1 号网。			

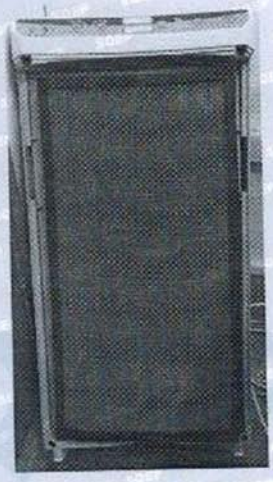
检测结果内容结束。

FORMALDEHYDE

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885914　　共 3 页　第 3 页

检测情况说明	
样品状态和检测过程描述	1、检测时样品正常，无异常情况发生。 2、检测时仪器工作正常，无异常情况发生。 3、检测用样品照片： 
实验室状态描述	实验室温度：（23~27）℃； 实验室湿度：（45~60）%RH。
检测用主要仪器	大气采样器（BSH2810）；紫外可见分光光度计（0761080800006）等。
备　注	本栏空白。

FORMALDEHYDE

2012090235U (2012)沪质监认字071号

报告编号 2014I20-35-885918

检 测 报 告

产品名称：空气净化器

型号规格：/

委托单位：Shepros Sdn.Bhd；希普乐有限公司

检测类别：委托检测

上海市环境保护产品质量监督检验总站

PM 2.5

声　明

a) 本报告无本质检机构检测报告专用章无效；

b) 本报告无主检、审核、批准签名无效；

c) 本报告涂改无效；

d) 复制报告未重新加盖本机构检测专用章无效；

e) 本报告提供的结果仅对本次被测的样品有效；

f) 未经本质检机构书面批准，不得复制本检测报告（全文复制除外）。

质检机构联络信息

地址：上海市宜山路716号　　电话：021-64706968

邮编：200233　　传真：021-64706968

E-mail：ep@simt.com.cn

PM 2.5

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885918　　共 3 页　第 1 页

产品名称	空气净化器		型号规格	/	
			商　标	/	
任务来源	企业委托		检测类别	委托检测	
委托单位名称	Shepros Sdn.Bhd：希普乐有限公司				
生产企业名称	/				
产品等级	/	批号(编号)/生产日期	/	样品数量	1台
委托日期	2014 年 10 月 29 日	检验地点	上海市宜山路 716 号 6 号楼		
到样日期	2014 年 10 月 29 日	委托单编号	DZ0000420		
样品状态描述	主机运行正常。				
检测项目和检测依据	检测项目：可吸入颗粒物净化效率（以粒径≤2.5μm计）洁净空气量，可吸入颗粒物（以粒径≤2.5μm计）净化效率。 GB/T 18883-2002 室内空气质量标准； GB/T 18801-2008 空气净化器； JCC/I201003.1-2013 室内空气净化器净化性能评价要求； 及委托方要求。				
检测日期	2014 年 10 月 29 日至 2014 年 11 月 17 日。				
检测结论	按照上述检测依据检测，数据详见本报告检测结果汇总页。 （检测报告专用章） 签发日期：2014年11月17日				
委托单位通讯资料	地　址	/			
	邮　编	/	电　话	/	
备　注	本栏空白。				

主检：　　审核：　　批准：

PM 2.5

上海市环境保护产品质量监督检验总站

检 测 报 告

检测结果汇总				
序号	检测项目	单位	检测结果	
1	可吸入颗粒物（以粒径≤2.5μm 计）洁净空气量	m^3/h	453	
2	可吸入颗粒物（以粒径≤2.5μm 计）净化效率	%	10min	92
			20min	99
			30min	>99
			40min	>99
			50min	>99
			60min	>99
本栏空白				
备注	1、测试舱条件： 体积：30m^3，温度：（23~27）℃，湿度：（40~60）%RH。 2、测试方法： 测试以香烟烟雾为尘源，以计重法测试粒径≤2.5μm 的可吸入颗粒物，初始浓度控制在（5.0±0.5）mg/m^3 范围内， 60min 自然衰减小于 10%。 3、实验中的污染物净化效率计算公式为： 污染物净化效率=[（初始浓度-终止浓度）÷初始浓度]×100%。			

检测结果内容结束。

PM 2.5

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885918

检测情况说明	
样品状态和检测过程描述	1、检测时样品正常，无异常情况发生。 2、检测时仪器工作正常，无异常情况发生。 3、检测用样品照片： 
实验室状态描述	实验室温度：（23~27）℃； 实验室湿度：（45~60）%RH。
检测用主要仪器	激光可吸入颗粒物浓度测试仪（8533104607）等。
备　注	本栏空白。

PM 2.5

2012090235U (2012)沪质监认字071号

报告编号 2014I20-35-885915

检 测 报 告

产品名称：空气净化器

型号规格：/

委托单位：Shepros Sdn.Bhd；希普乐有限公司

检测类别：委托检测

上海市环境保护产品质量监督检验总站

TVOC

声　明

a) 本报告无本质检机构检测报告专用章无效；

b) 本报告无主检、审核、批准签名无效；

c) 本报告涂改无效；

d) 复制报告未重新加盖本机构检测专用章无效；

e) 本报告提供的结果仅对本次被测的样品有效；

f) 未经本质检机构书面批准，不得复制本检测报告（全文复制除外）。

质检机构联络信息

地址：上海市宜山路716号　　电话：021-64706968

邮编：200233　　传真：021-64706968

E-mail：ep@simt.com.cn

上海市环境保护产品质量监督检验总站

检 测 报 告

报告编号：2014I20-35-885915　　共 3 页　第 1 页

产品名称	空气净化器		型号规格	/	
			商　标	/	
任务来源	企业委托		检测类别	委托检测	
委托单位名称	Shepros Sdn.Bhd：希普乐有限公司				
生产企业名称	/				
产品等级	/	批号(编号)/生产日期	/	样品数量	1台
委托日期	2014 年 10 月 29 日	检验地点	上海市宜山路 716 号 6 号楼		
到样日期	2014 年 10 月 29 日	委托单编号	DZ0000420		
样品状态描述	主机运行正常。				
检测项目和检测依据	检测项目：总挥发性有机化合物净化效率。 GB/T 18801-2008 空气净化器； GB/T 18883-2002 室内空气质量标准； 及委托方要求。				
检测日期	2014 年 10 月 29 日至 2014 年 11 月 17 日。				
检测结论	按照上述检测依据检测，数据详见本报告检测结果汇总页。 （检测报告专用章） 签发日期：2014年11月17日				
委托单位通讯资料	地　址	/			
	邮　编	/	电　话	/	
备　注	本栏空白。				

主检：　　审核：　　批准：

TVOC

上海市环境保护产品质量监督检验总站

检 测 报 告

检测结果汇总				
序号	检测项目	单位	技术要求	检测结果
1	总挥发性有机化合物净化效率	%	检测在 30m³ 测试舱内进行，总挥发性有机化合物初始浓度控制在（6.0±1.2）mg/m³ 范围内，检测时间为 1 小时。	>99
本栏空白				
备注	1、检测时测试舱内温度为（23~27）℃，湿度为（40~60）%RH。 2、检测时总挥发性有机化合物起始浓度为 6.2mg/m³，1 小时自然衰减 6%。 3、实验中的污染物净化效率计算公式为： [（气态污染物初始浓度-气态污染物终止浓度）÷气态污染物初始浓度]×100%。 4、测试时机器内使用的是 2 号网。			

检测结果内容结束。

TVOC

上海市环境保护产品质量监督检验总站

检 测 报 告

检测情况说明	
样品状态和检测过程描述	1、检测时样品正常，无异常情况发生。 2、检测时仪器工作正常，无异常情况发生。 3、检测用样品照片： 
实验室状态描述	实验室温度：（23~27）℃； 实验室湿度：（45~60）%RH。
检测用主要仪器	大气采样器（BSH2810）；气相色谱仪（US10351046）等。
备　注	本栏空白。

TVOC

CNAS L0823

广州工业微生物检测中心

Guangzhou Testing Center of Industrial Microbiology

广微检测 GMT

检测报告

REPORT FOR ANALYSIS

签发单位（公章）：广州工业微生物检测中心

Issue Mechanism: Guangzhou Testing Center of Industrial Microbiology

Staphylococcus Bacteria

广微检测 GMT

广州工业微生物检测中心

Guangzhou Testing Center of Industrial Microbiology

说　明

1、本报告只对来样负责任。如对分析结果有疑问，请向本中心业务科查询，来函来电请注明报告编号。

2、来样自完成检测之日起，本中心保存一个月，如因对分析结果有疑议提出复检，请在一个月内通知本中心业务科。微生物检测不复检。

3、报告打“*”项目为还未通过广东省计量认证和中国合格评定国家认可委员会认可的能力范围内的项目。

4、本报告未加盖检测单位“检测报告专用章”无效，无签发人签名无效，涂改无效。

5、未经本中心书面批准，不得复制本报告。

EXPLANATION

1、The report is only responsible for the given samples.If you have any question about the analysis result,please inquire for the Business Office of our center.
and give us your report code.

2、From the day the test is completed,the sample will be preserved for a month in our center. Please inform our Business Office within a month if you want to retest the sample.We do not retest the microbe items.

3、The item marked with"*"in the report is the one which has not passed the Certification of Guang Dong Measurement Accrediation or China National Accreditaion Service for Conformity Assessment.

4、The report is invalid if altered,without inspector's seal and signatures of the accredited issuer.

5、The report is prohibited from copying without written permission of our center.

Staphylococcus Bacteria

检测编号：WJ20146197
Test No.

广州工业微生物检测中心

GUANGZHOU TESTING CENTER OF INDUSTRIAL MICROBIOLOGY

检 测 报 告

REPORT FOR ANALYSIS

收样日期：2014 年 12 月 29 日
Date Received

检测日期：2015 年 1 月 5 日
Date Analyzed

样品名称 Name of Sample	空气净化器	样品来源 Source of Sample	送检
委托单位 Applicant	Shepros Sdn. Bhd；希普乐有限公司	委托人 Client	吴烨琳
生产单位 Manufacturer	——	样品等级 Sample Grade	——
型号规格 Type and Specification	——	商标 Brand	——
生产日期和批号 Date and Batch Number of Production	——	样品数量 Quantity of Sample	1 台
样品描述 Sample description	机器	样品包装 Packing of Sample	盒装
样品图片 Sample Picture			
检验依据和方法 Standard and Methods	GB 21551.3—2010 家用和类似用途电器的抗菌、除菌、净化功能 空气净化器的特殊要求		
检测项目 Items of Analysis	除菌率（金黄色葡萄球菌 ）		
备注 Remarks	——		

以下空白
Blank Below

Staphylococcus Bacteria

检测CNAS L0823

2012191101Z

检测编号：WJ20146197
Test No.

广州工业微生物检测中心

GUANGZHOU TESTING CENTER OF INDUSTRIAL MICROBIOLOGY

检 测 报 告

REPORT FOR ANALYSIS

收样日期：2014 年 12 月 29 日
Date Received

检测日期：2015 年 1 月 5 日
Date Analyzed

空气消毒试验方法

1. 试验器材
   1) 菌种：金黄色葡萄球菌
   2) 微生物气溶胶发生器: PLG 2000
   3) 培养基：普通营养琼脂培养基
   4) 采样器：六级筛孔空气撞击式采样器
2. 测试条件
   1) 试验舱容积：30m^3
   2) 环境温度：20℃~25℃
   3) 环境湿度：50%~70% RH
3. 机器运行状态
   试验过程开启“最高风速”档。
4. 测试步骤
   1) 取第 4~7 代 37℃培养 24 小时的细菌斜面培养物，用 10mL 的营养肉汤反复吹洗，洗下菌苔，用无菌过滤棉过滤后，用营养肉汤稀释至适宜浓度，制成雾化菌悬液。
   2) 将实验用器材一次性分别放入两个气雾室，并关闭门，开启高效过滤器净化，同时调节两个气雾室温度为 20℃~25℃，相对湿度为 50%~70%。
   3) 喷雾染菌：开启微生物气溶胶发生器，0.2MPa 染菌 15min~20min，喷雾染菌完毕后，风扇继续搅拌 10min，然后静置 15min。
   4) 同时对试验组和对照组分别用六级筛孔空气撞击式采样器采样。
   5) 试验组开启空气净化器运行，作用 1h 后采样，对照组也在相应时间段采样。
   6) 取未用的同批培养基 2 份，与试验采样的样本同时进行培养，作为阴性对照。
   7) 试验重复 3 次，取 3 次试验结果的算术平均值为最后的试验结果。
5. 计算公式

自然消亡率 $N_t(\%)=\frac{V_0-V_t}{V_0}\times 100$ (V_0为对照组试验前空气含菌量，V_t为对照组试验后空气含菌量)

除菌率 $K_t(\%)=\frac{V_1\times(1-N_t)-V_2}{V_1\times(1-N_t)}\times 100$ (V_1为试验组试验前空气含菌量，V_2为试验组试验后空气含菌量)

以下空白
Blank Below

Staphylococcus Bacteria

检测编号：WJ20146197
Test No.

广州工业微生物检测中心

GUANGZHOU TESTING CENTER OF INDUSTRIAL MICROBIOLOGY

检 测 报 告

REPORT FOR ANALYSIS

收样日期：2014 年 12 月 29 日
Date Received

检测日期：2015 年 1 月 5 日
Date Analyzed

检测结果：

样品编号	试验菌种	作用时间 (h)	对照组 试验前平均菌落数 V_0 (cfu/m³)	对照组 试验后平均菌落数 V_t (cfu/m³)	对照组 自然消亡率 N_t (%)	试验组 试验前平均菌落数 V_1 (cfu/m³)	试验组 试验后平均菌落数 V_2 (cfu/m³)	除菌率 K_t (%)
WJ20146197-1	金黄色葡萄球菌	1	1.67×10^5	1.36×10^5	18.56	1.68×10^5	69	99.95

以下空白
Blank Below

编制：杨永锦 Editor　审核：[illegible] Checker　签发：[illegible] Issuer　签发日期（公章）：2015.1.9 Date Reported

广州工业微生物检测中心 检测报告专用章

Staphylococcus Bacteria

广微检测 GMT

公正·规范·准确·高效

广州工业微生物检测中心

Guangzhou Testing Center of Industrial Microbiology

地　址：广州市黄埔区科学城尖塔山路1号　　邮政编码：510663
电　话：(8620) 61302671, 61302801　传真：(8620) 61302672
网　址：http://www.gtcim.com
Address:No.1 Jian Ta Shan Rd.Huang Pu District.Guangzhou
Postcode:510663
Phone: (8620) 61302671, 61302801　Fax: (8620) 61302672
http://www.gtcim.com

Staphylococcus Bacteria

SHEPROS®

Safety, Heath & Environment Product Solutions

Disclaimer

All publications of Shepros or bearing Shepros' name contain information, including Codes of Practice, safety procedures and other technical information that were obtained from sources believed by Shepros to be reliable and/ or based on technical information and experience. As such, we do not make any representation or warranty nor accept any liability as to the accuracy, completeness or correctness of the information contained in these publications. While Shepros recommends that its clients refer to or use its publications, such reference to or use thereof by its clients or third parties is purely voluntary and not binding. Shepros makes no guarantee of the results and assume no liability or responsibility in connection with the reference to or use of information or suggestions contained in Shepros' publications. Shepros has no control whatsoever as regards, performance or non performance, misinterpretation, proper or improper use of any information or suggestions contained in Shepros' publications by any person or entity and Shepros expressly disclaims any liability in connection thereto. Shepros' publications are subject to periodic review and users are cautioned to obtain the latest edition.