

# ***VATIS Update Ozone Layer Protection . Mar-Apr 2006***

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## THE SCIENCE OF OZONE LAYER

### Ozone layer gets thicker

A new study has found that the ozone layer might be thickening, thanks to a reduction in the emissions that have eroded it. However, the scientist leading the investigation, Professor Janet Bornman, said the threat of harmful UV rays remained high.

The report, published by a 28-member panel for the United Nations, says the rates of sunlight-induced skin cancer are expected to rise in light-skinned populations around the world. Rates of melanoma are forecast to double by 2015, and not decrease for another 30 years, despite early indications the ozone layer is on the mend.

We think that the ozone layer is repairing itself. There are many other factors that one needs to take into consideration before we say for sure, but it appears to be recovering, Prof. Bornman said. The improvement was probably because of a drop in emissions, she said. However, holes in the ozone layer are expected to persist for many decades.

Website: [www.stuff.co.nz](http://www.stuff.co.nz)

### Inside the ozone layer

A new atmospheric model is able to quantify man-made versus naturally occurring damage to the stratosphere with an eye towards repairing the diminishing ozone layer that is located within the stratosphere. That is the premise of a recently published paper in Science titled, Anthropogenic and Natural Influences in the Evolution of Lower Stratospheric Cooling.

Researchers used a model to observe the stratosphere, the layer above the troposphere, and better understand what has contributed to its cooling over the past approximately 25 years. The stratosphere contains the ozone layer, which absorbs sunlight and heats the stratosphere. This long-term cooling trend is generally accepted to result from the loss of the ozone layer as a result of man-made influences. However, the cooling trend is not uniform like ozone loss, but rather broken into a series of jumps or discontinuities. These jumps are associated with major volcanic eruptions (El Chichon in 1982 and Mt. Pinatubo in 1991) that inject aerosols into the stratosphere. The aerosols also absorb sunlight and heat the stratosphere, thus temporarily offsetting the cooling trend from ozone loss. The volcanic eruptions are considered to be a natural influence.

The model that researchers used to evaluate the influences included not only the ozone loss and volcanic eruptions but also solar activity, and a few other variables that also affect stratospheric temperature. What they found was that when all these factors are included, the model does an excellent job of reproducing the observed cooling of the stratosphere over the record of satellite observation from 1980 to 2005 both the long-term cooling trend and the jumps.

Since we can make this determination, it gives us confidence in the models ability also to predict future cooling of the stratosphere over the next century from increasing greenhouse gases, such as carbon dioxide, said Dr. Brian Soden from the University of Miamis Rosenstiel School, one of the six authors of the paper.

Increasing carbon dioxide warms the earths surface and troposphere, but eventually it actually cools the stratosphere. In the next century, carbon dioxide will likely become the dominant contributor to stratospheric cooling, say the authors. Future stratospheric cooling, in turn, may have important implications for the rate of recovery of the ozone hole in the southern hemisphere and possibly even the loss of ozone over the polar regions of the northern hemisphere.

Website: [www.rsmas.miami.edu](http://www.rsmas.miami.edu)

## Ozone hole expected to increase in size

According to scientists in Germany, the hole in the Earths ozone layer could grow significantly over the next few years, reigniting fears over skin cancer, cataracts and damage to vulnerable plant life. They say that changes in the suns activity have delayed natural repairs to the layer of gas high in the stratosphere, and are about to trigger further ozone loss. The ozone layer, which shields the earth from the worst of ultraviolet radiation, will not begin to recover until the end of the decade.

Dr. Martin Dameris, who led the research at the Institute for Atmospheric Physics in Wessling, Germany, said: The ozone hole will stay around for another four to five years. We cant expect it to start to recover until 2010 and then it will take another 40 to 50 years to repair completely. The German team pinned the blame on the 11-year solar cycle, which makes the amount of solar radiation striking the earth periodically rise and fall. According to Dr. Dameris, although scientists knew that the cycle influenced ozone, they overlooked its role in controlling the layers recovery.

The team said, reporting their findings in the journal Geophysical Research Letters: We do not expect recovery, but a return to stronger ozone depletion and deeper ozone holes in the next few years in line with the expected lower solar activity. The suns activity is expected to fall until the solar minimum in 2007/08. They reached their conclusions using a computer model that looked at how the suns activity and material spewed into the atmosphere by volcanic eruptions affected ozone. The computer correctly predicted levels of ozone from 1960 to 2003, making them confident it can accurately forecast what would happen next.

Website: [www.hindu.com](http://www.hindu.com)

## Plants show impact of ozone layer thinning

The pollution that causes ozone depletion is declining, but the warming of the atmosphere will see a global thinning of the ozone layer, says a United Nations panel. The panel of 24 scientists that met in Alexandra, New Zealand, is preparing to report to the United Nations on changes to the ozone layer and subsequent

consequences.

The scientists say one discovery has turned traditional thinking on its head food plants across the world are developing a poisonous protective layer to shield against harmful ultraviolet rays. It had been believed that radiation only had a negative effect on plants, but scientists now say a screening pigment produced by most plants can be toxic to predators and help with disease prevention which could result in less use of pesticides and fungicides. Scientists have not detected any negative effects on humans, but are uncertain if the increased levels of toxins might have impact the wider food chain.

Website: [www.physorg.com](http://www.physorg.com)

## ODS PHASE-OUT IN INDIA

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### Railways to phase-out air-conditioned coaches

Keeping in view the Montreal Protocol, the Indian Railways is planning to phase out/modify 780 air-conditioned (AC) coaches, which were manufactured before 1994 and use R-12 refrigerant. Since 1994, the Railways switched over to using R-22, an environment friendly refrigerant, in AC coaches. R-12 refrigerant has to be phased out by the year 2010. About 300 coaches out of 780 would complete their service life by the year 2010 and will be phased out in normal course. The balance 480 coaches shall be converted by the year 2010 with environment-friendly gas R134a. Work for this has already started. This information was given in a written reply to a question in the Lok Sabha.

Website: [www.pib.nic.in](http://www.pib.nic.in)

### Government okays import of compressors

The Ministry of Environment and Forest (MoEF) has issued a clarification, allowing free import of compressors that do not pose any threat to the ozone layer. This ends the concern among those car makers whose vehicles have imported compressors that their production will suffer once the compressor inventory runs out. MoEF had earlier put an effective stop on import of compressors, whether they contain ODS or not. This could have led to a stoppage of air-conditioner supplies to car makers, thereby bringing the production of cars also to a stop. Close to 90 per cent of the cars made in India come with factory-fitted air-conditioners.

Allowing the import of compressors, in response to a query from the Customs Department, the recent communication clarified that these compressors be not filled with refrigerants that are hazardous to the ozone layer. Industry sources said the move to curb import of compressors could have hurt the production schedule of some foreign car manufacturers.

Website: [www.business-standard.com](http://www.business-standard.com)

## IN THE NEWS

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### Pacific nations move to phase out ODS

Pacific island countries have been given a major boost in their efforts to phase out ozone depleting substances (ODS), in particular chlorofluorocarbons (CFCs). This will assist in meeting their requirements under the Montreal Protocol, said a press release from the South Pacific Regional Environment Programme (SPREP).

A regional meeting of the Pacific regions ozone officers in Suva, Fiji, reviewed the implementation of the worlds only regional-scale ODS phase-out strategy approved by the Montreal Protocols Multilateral Fund. The Funds Executive Committee at its meeting in Canada in March 2002 had allocated approximately US\$800,000 for the project managed by the United Nations Environment Programme (UNEP). The ODS phase-out project is implemented in close cooperation with the Australian and New Zealand governments and coordinated by the SPREP Secretariat.

The project would enable 11 countries (the Federated States of Micronesia, Kiribati, the Marshall Islands, Palau, the Solomon Islands, Tonga, Tuvalu, Vanuatu, the Cook Islands, Nauru and Niue) to completely phase out CFC imports by the end of 2006. The use of ODS in the Pacific region is limited to CFCs, HCFCs (for refrigeration and air-conditioning) and methyl bromide (fumigant in quarantine and pre-shipment applications). The consumption of CFCs in Pacific island countries is already at near-zero levels. Fiji halted its use in 2000, which has had a follow-on effect on other countries.

Website: [www.pacificislands.cc](http://www.pacificislands.cc)

## Pharmaceutical sector to enjoy some relaxation

The pharmaceutical sector of developing countries would get some relaxation of the rules of Montreal Protocol for more two years in phasing out CFC gases used in the production of metered-dose inhalers (MDIs) for protecting human health. The recently concluded 17th meeting of the parties to the Montreal Protocol in Dakar, Senegal, accepted a Bangladesh proposal for essential-use exemption for CFC consumption during 2007-09 period for manufacturing MDIs.

The meeting of the parties recognized the possible difficulties of the developing countries with regards to the allocation of CFCs for MDIs production from 2007 onwards, when 85 per cent CFCs are to be phased out in accordance with Montreal Protocol decision, said Mr. Jafrul Islam Chowdhury, Bangladeshs state minister for environment and forest, who represented his country at the Dakar meeting. The proposal enjoyed the support of the European Union, Australia, Columbia, the United States and Mauritius, he said.

As per the decision of the meeting, the developing countries have to prepare an Action Plan for the MDI sector and submit it to the Executive Committee of the Montreal Protocols Multilateral Fund. The executive committee of the Fund would examine the situation and consider options that might assist the potential non-compliance that the developing countries may have to face in 2007 after 85 per cent reduction of CFCs. The 18th meeting of the parties to be held in India in 2007 would take final official decision about the essential-use exemption, Mr. Chowdhury said, adding he is confident for a positive decision in the meeting.

Website: [www.bangladeshobserveronline.com](http://www.bangladeshobserveronline.com)

## China to change its export policy for ODS

Following a report from the Environmental Investigation Agency (EIA) uncovering widespread illegal exports of CFC from China, the Chinese government has committed to change the export policy, take action against

the smugglers and implement measures to put a stop to the black market operations. The pledge from the Government of China was made in Senegal at the 17th Meeting of the Parties to the Montreal Protocol.

Head of EIAs Ozone Layer Campaign, Dr. Ezra Clark, stated: It is hugely encouraging that China has made this commitment, in front of delegates from 190 countries, to take rapid and effective action to combat illegal trade in CFCs in China. One specific pledge made by the Chinese delegation was to change domestic policy by restricting CFCs exports only to manufacturers, and forbidding exports from brokers and traders. Dr. Clark added that the measure would go a long way to containing illegal trade in ODS.

Website: [www.eia-international.org](http://www.eia-international.org)

## ODS phase-out effort gains ground in the Philippines

The campaign to phase out ozone-depleting substances (ODS) continues to gain ground in the Philippines. Mr. Michael T. Defensor, Department of Environment and Natural Resources (DENR) Secretary, said that the country's strict adherence to the Montreal Protocol was further strengthened with the introduction of the Voucher System into service shops in the country. Under this system, financial assistance is given to accredited refrigeration and air-conditioning service shops to purchase tools and equipment to ensure ozone-friendly operations.

Piloted last November, the scheme will help service shop owners and operators cope with the implementation of the National CFC Phase-out Plan. Already, 34 vouchers amounting to 3.4 million pesos (US\$66,670) were issued to service shops within Metro Manila. About 40 shops in different parts of Metro Manila have been included in the pilot phase of the voucher system. Likewise, 356 technicians were briefed on the mechanics of the voucher system to provide them with a better grasp of the scheme. DENR through the Philippine Ozone Desk of the Environmental Management Bureau has allotted a total of 375 million pesos (US\$7.35 million) for the project.

To encourage the participation among repair shop owners, DENR has increased the maximum grant amount from 75,000 pesos (US\$1,470) to 100,000 pesos (US\$1,960) for service shops. Mr. Defensor said that as of 2005, the importation of CFC-12 (Freon) has been cut down by 50 per cent or a total of 2,988 metric tonnes. This will be further reduced by 2007 and CFCs will not be used in the country by 2010. In addition, DENR together with the Department of Transportation and Communications and its Land Transportation Office will strictly monitor the use of CFCs in car air-conditioning units.

Also included in the country's CFC phase-out plan are the guidelines for the gradual phase-out of CFC in metered-dose inhalers (MDI). This move is in coordination with the Bureau of Food and Drugs and the Department of Health. Other activities of the Ozone Desk include the management of various ODSs such as Halon 1211 and methyl bromide.

Website: [www.gov.ph](http://www.gov.ph)

## Viet Nam unveils ODS phase-out plan

Viet Nam will phase out local consumption of CFCs and Halon by 2010, following targets set by the Comprehensive National Programme to gradually eliminate ozone depleting substances (ODS). The Ministry of Natural Resources and the Environment (MoNRE) worked with the World Bank to introduce a master plan

to relevant ministries, organizations and more than 70 agencies who are users, importers, suppliers or sales agents of these substances. The plan was unveiled at a seminar titled The National CFC and Halon Phase-out Plan for Viet Nam, which was held in Ha Noi recently.

The MoNRE reported that of the more than 100 identified substances that deplete the earth's ozone layer, ten substances are still being used in Viet Nam in sectors like refrigeration, cosmetics, fire fighting, and tyre and medicine manufacturing. These substances will continue to be used in the country until 2010. It is estimated that the National Plan, which will be carried out by the MoNRE with a grant of US\$1.26 million from the Multilateral Fund through the World Bank, will phase out nearly 320 t of ODS.

Website: [www.vietnamnews.vnagency.com.vn](http://www.vietnamnews.vnagency.com.vn)

## Pakistan makes progress in ODS phase-out

The Environment Secretary of Pakistan, Mr. Khalid Latif Chaudhry, has said that the government was taking steps for the complete implementation of Montreal Protocol. He said that use of CFCs has been frozen to a low level, and the import, sale and use of carbon tetrachloride (CTC) would be banned after 2010. The government would import only 58 tonnes of CTC on need basis during 2006-05. Mr. Khalid Latif said that import of methyl chloroform (1,1,1-trichloroethane) had already been banned from 21 December 2004.

Website: [www.paktribune.com](http://www.paktribune.com)

## Freon phase-out in the Philippines

The Department of Environment and Natural Resources (DENR) has started in its own offices the implementation of the National CFC Phase-Out Plan (NCP) aimed at reducing and eventually phasing out ozone depleting substances (ODS) such as Freon, commonly used as cooling agent in air-conditioners and refrigerators. In a statement, DENR said 92 of its own service vehicles are due for inspection to determine how many are still using CFCs.

The DENR Mobile Air-Conditioning Team is set to finish the inventory and inspection of all service vehicles used by DENR in its Central Office by mid-February. DENR officer-in-charge Mr. Armando de Castro said the vehicular inspections are part of the mandatory tests that will be conducted this year on all air-conditioned vehicles prior to their registration with the Land Transportation Office.

Under the NCP, all vehicles built from 1999 to the present that still use CFC-12 (Freon) in their air-conditioners will not be allowed to register or renew their registration. The registration of older car models (1998 and below) that use CFC will be allowed until 2012.

Website: [www.bond.lanesystems.com](http://www.bond.lanesystems.com)

## USEPA reduces allowances for ODS exports

The Environmental Protection Agency (EPA) of the United States has released the final rule, Protection of Stratospheric Ozone: Adjusting Allowances for Class I Substances for Export to Article 5 Countries. The rule reduces the allowances that permit production of Class I ozone depleting substances solely for export to developing countries to meet those countries' basic domestic needs.

The rule also adjusts the baseline Article 5 allowances for companies for specific Class I controlled substances and establishes a schedule for reductions in the Article 5 allowances for these substances in accordance with the Montreal Protocol and the Clean Air Act (CAA). This action also extends the allocation of Article 5 allowances for the manufacture of methyl bromide solely for export to developing countries beyond 1 January 2005.

Website: [www.engineers.ihs.com](http://www.engineers.ihs.com)

## REFRIGRATION/AIR-CONDITIONING

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### Next generation refrigerants

DuPont Fluorochemicals, the United States, has announced that it has identified and is now testing new proprietary refrigerants that will meet the European Union (EU) requirements to reduce the global warming potential (GWP) of refrigerants in future automotive air-conditioning systems. The new refrigerants are expected to be compatible with conventional HFC-134a automotive air-conditioning systems with the need for only minor modifications.

These new refrigerants would be commercialized within three to five years, in time to meet the timeline set by the pending EU F-Gas regulation. The F-Gas requirements call for the phase-out of HFC-134a in all new vehicle models beginning in 2011, and in all new cars by 2017, and replacement with alternatives having GWP lower than 150. The new DuPont refrigerants are expected to be non-flammable and to have significantly lower GWP than current refrigerants.

Unlike carbon dioxide (CO<sub>2</sub>), these refrigerants are expected to offer performance similar to HFC-134a and would not require a complete redesign of current automotive air-conditioning systems. DuPont is currently working with key players in the industry to ensure that solutions under development will meet the needs of the industry.

Website: [www.refrigerants.dupont.com](http://www.refrigerants.dupont.com)

### Closed-loop cooling for electrical enclosures

Vortec Cold Pump cooling systems, from ITW Air Management in the United States, are thermostatically controlled, closed-loop air-conditioners that use CFC-free R22 or HFC-134A refrigerants. Room air is continuously drawn through an external filter, across condenser coils (where it removes the heat drawn from the enclosure) and flows out the top external vent. The sealed enclosure remains clean and cool because internal air is cooled and dehumidified continuously as it is drawn across the evaporator coils.

Vortec Cold Pumps form a reliable air-conditioning system for electrical control panels and enclosures. These units, which maintain NEMA 12 ratings, are perfect for both new installations as well as retrofitting to cabinets already in place. Top and side mount models are available with cooling capacities ranging from 1,800 to 6,000 BTUH. The pumps provide effective cooling protection for heat-sensitive electronics in numerous applications.



The company also offers high efficiency, closed-loop enclosure cooling for NEMA 4X rated cabinets and control panels. Constructed of high-grade 16-gauge, type 304 stainless steel, these Cold Pumps are built to withstand the harshest environments. The UL-listed side mount units provide cooling capacities from 1,600 to 8,500 BTUH and are available in either 115 V or 230 V models.

Contact: ITW Air Management, 10125 Carver Road, Cincinnati, Ohio 45242-4798, United States of America. Tel: +1 (513) 891 7485; Fax: +1 (513) 891 4092.

Website: [www.vortec.com](http://www.vortec.com)

## Mobile chilling units

Opti Temp Inc., the United States, offers mobile chilling units with all-stainless steel cabinet and hardware that prevent rusting of the unit in harsh outdoor applications. The units have stainless steel NEMA 4 weather proof electrical enclosure and special low ambient controls, allow the unit to operate in -40C to +40C ambient temperatures.

The water-cooled Opti-Chillers have turbine pump, with silicon carbide seals, for dependable high flow and pressure characteristics. The patented refrigeration circuitry allows good stability, zero to 100 per cent load capacity control, and eliminates compressor cycling to improve compressor life. Heaters are available as a standard option such that if heating is required the unit will heat, and if cooling is needed the unit will cool, automatically. The adjustable pressure actuated bypass valve allows for adjustment of flow to the laser or process. Excess flow is routed back to the chiller to protect the unit.

The chillers are equipped with environmentally friendly HFC refrigerant, and have rugged construction using all non-ferrous fittings. All units are CE certified.

Contact: Opti Temp Inc., 484 W. Welch Ct., Traverse City, MI 48686, United States of America. Tel: +1 (231) 946 2931; Fax: +1 (231) 946 0128.

Website: [www.globalspec.com](http://www.globalspec.com)

## Central chilling stations

Colortronic North America Inc., the United States, makes a range of central chilling stations. CCS air/water-cooled chilling stations come with: high-efficiency screw compressors, Allen Bradley PLC with interface, stainless steel-brazed plate evaporator (60-75), shell-and-tube evaporators (90-195), cleanable shell-and-tube condenser(s), NEMA 12 electrical enclosure branch circuit fusing and high and low refrigerant pressure safeties.

The chilling stations employ HFC-134a refrigerant and have electronic expansion valves, digital low temperature freeze-stat and liquid line solenoid and shut-off valves. The water-cooled chillers have an energy efficiency rating (EER) of 15.7 BTU/Wh, while the remote control air-cooled chilling stations have an EER of 10.0 BTU/Wh.

Contact: Colortronic North America Inc., 4100 Market Place, Flint, MI 48507, United States of America. Tel: +1 (810) 720 7300; Fax: +1 (810) 720 2598

E-mail: [colortronicweb@corpemail.com](mailto:colortronicweb@corpemail.com)

Website: [www.colortronicna.com](http://www.colortronicna.com)

## Ozone-friendly refrigerants

Shandong Dongyue Chemical Co. of China offers two ozone-friendly refrigerants. Refrigerant 418a is a SNAP-approved replacement for R-22 and R-502, which are used in air-conditioning, industrial cooling, refrigerated transport, etc. The non-toxic, non-inflammable refrigerant can be used without any change in the main parts or line of existing R-22 and R-502 systems. Its GWP is same as R-22 and better than R-502.

Refrigerant 415a is a SNAP-approved alternative to R12 and R134a, which find use in automobile air-conditioning. The non-toxic, non-inflammable refrigerant is claimed to offer rapid cooling and thus help save energy. The product is a drop-in replacement that does not need any changes to be made to the R12/R134a refrigeration system.

Contact: Shandong Dongyue Chemical Co. Ltd., Dongyue International Fluorine-Silicon Material Industry Zone, Zibo City, Shandong Province, China 256400. Tel: +86 (533) 822 0867; Fax: +86 (533) 822 0509.

Website: [www.dongyuechem.com](http://www.dongyuechem.com)

## Cooling with liquid CO<sub>2</sub>

Two refrigeration companies in the United Kingdom, Trox Advanced IT Cooling Systems and Star Cooling, have become the first in the world to market a data centre cooling system based on the use of liquid carbon dioxide (CO<sub>2</sub>). The new Advanced IT Cooling System (AITCS) uses CO<sub>2</sub> held in high-pressure, flexible or solid stainless-steel pipes to directly absorb the heat emitted from data equipment cabinets. Unlike conventional systems, which rely on fan- or water-based cooling, the Trox design works more like a large-scale heat sink, drawing heat away from equipment at a high rate of efficiency.

The company has characterized CO<sub>2</sub> as seven times more efficient at cooling over an identical volume of water. The current cooling capacity is 30 kW per cabinet, which could increase to 40 kW and beyond in the near future. CO<sub>2</sub> is electrically benign sometimes a worry with water-based systems and is considered to be an environment-friendly refrigerant. The new design, however, is more expensive than other options.

Contact: Trox Advanced IT Cooling Systems Ltd., Caxton Way, Thetford, Norfolk IP24 3SQ, United Kingdom. Tel: +44 (1842) 851280; Fax: +44 (1842) 851279

E-mail: [info@troxaitcs.com](mailto:info@troxaitcs.com)

Website: [www.techworld.com](http://www.techworld.com)

## Ozone-friendly HFC retrofit refrigerant

ISCEON 39TC (ASHRAE R-423A), from DuPont, the United States, is an easy-to-use, non-ozone-depleting HFC retrofit refrigerant for R-12 in centrifugal chillers. The refrigerant provides easy, quick, cost-effective retrofit. The retrofit typically requires a single lubricant change to polyol ester without additional flushing, avoiding expensive engineering changes to existing chiller equipment. It can be topped off during service without removing the entire refrigerant charge. ISCEON 39TC provides required cooling capacity and comparable energy efficiency as R-12. It also has similar discharge temperature and pressure as R-12.

Contact: Du Pont Company Pte. Ltd., 1 Harbour Front Place, 11-01 Harbour Front Tower One, Singapore 098633. Tel: +65 65863688; Fax: +65 62727494.

Website: [www.refrigerants.dupont.com](http://www.refrigerants.dupont.com)

## SOLVENTS

### Solvent-based, semi-aqueous cleaner

Hurricane 9000, marketed by Midbrook Inc., the United States, is a heavy-duty, solvent-based, semi-aqueous cleaner specifically formulated to remove heavy soils and graphite impregnated stamping fluids. The non-ozone depleting product offers low-temperature application, and is an excellent citrus degreaser that can be used in straight concentration. It dissolves oil-based contaminants and removes packed grease and baked-on oils from aluminum, magnesium, bronze, copper, brass and steel.

Contact: Midbrook Inc., 2080 Brooklyn Road, Jackson, MI 49204-0867, United States of America. Tel: +1 (517) 787 3481; Fax: +1 (517) 787 2349

E-mail: [sales@midbrook.com](mailto:sales@midbrook.com)

Website: [www.midbrook.com](http://www.midbrook.com)

## Cleaning solutions for ultrasonic cleaners

Kemet International Ltd., the United Kingdom, offers cleaning solutions for ultrasonic cleaning equipment. CO-42 is a cleaning and degreasing fluid with many of the performance characteristics of 1,1,1-Trichloroethane, but without any ozone depleting properties. It cuts through contamination such as lapping and polishing residue, grease, oils and general surface contamination. CO-42 is relatively quick-drying, but not so fast as to leave any stain on the surfaces of products. The controlled wetting and evaporation properties of CO-42 make it extremely versatile that it is a very efficient cleaning agent for all metals, most plastics, ceramics, glass and similar materials.

C70 cleaning solution is a solvent cleaning and degreasing fluid with all of the characteristics needed to remove grease, oil and residues from parts. It is supplied in a pressurized container complete with detachable extended spray tube for reaching into the most difficult areas. It has a very fast evaporation rate, but does not leave any stain. The versatile non-ODS solution can be used on all metals, ceramics, glass, etc.

Contact: Kemet International Ltd., Parkwood Trading Estate, Maidstone, Kent ME15 9NJ, United Kingdom.  
Tel: +44 (1622) 755 287; Fax: +44 (1622) 670 915

E-mail: [sales@kemet.co.uk](mailto:sales@kemet.co.uk)

Website: [www.kemet.co.uk](http://www.kemet.co.uk)

## Cleaner-degreaser concentrate

Mirachem 500 Cleaner-degreaser is a non-ODS, non-hazardous, water-based, detergent blend that does not contain any chelating ingredients such as EDTA, phosphates or chlorinated solvents. This product, from Mirachem Corporation in the United States, is designed to remove organics from any surface compatible with water, such as grease, oil, hydraulic fluid, cutting fluid, dirt, ink, grime, extruding oil and lubricants.

Unlike traditional cleaners such as high alkaline or solvent, Mirachem 500 uses the power of water, which is safer for the material being cleaned, the environment and the operator. The product makes water wetter, allowing water to penetrate chemical structures that would normally repel water, and allowing water to go into a suspension with normally non-soluble materials. Mirachem 500 allows water to break the sticky bonds between soils and surfaces, allowing them to be safely rinsed or wiped away.

Website: [www.mirachem.com](http://www.mirachem.com)

## Ultrasonic cleaner

The Torrent automated single chamber cleaning system, from Ney Ultrasonics in the United States, uses an automated operation in conjunction with a safe aqueous process. The process features spray under immersion, ultrasonics and high-speed hot air down-draft drying. The combination of spray under immersion and ultrasonics effectively handles applications such as degreasing formed and machined metal components or other precision products.

Torrent provides an environmentally safe and effective alternative to ozone depleting solvent systems. Its moderate throughput, affordable design and small footprint make it ideal for cell-based manufacturing cleaning requirements. All the process parameters are easily programmed (embedded Intel 8032 microprocessor) and controlled through a membrane keypad and the parts are not touched by the operator during the cleaning process.

The overall system dimensions are 183 cm 165 cm 178 cm including plumbing manifold in rear of unit. The interior process tank dimensions are 62 cm x 51 cm x 45.7 cm. The cleaner has two high-pressure pumps for fluid control and spray manifold, and 36 advanced piezoelectric transducers bonded directly to process tank bottom. The sweep frequency is adjustable from 4 kHz/s to 1740 kHz/s and the output RF power is fully controllable.

Website: [www.ptb-sales.com](http://www.ptb-sales.com)

## Biodegradable degreaser

CRC Industries (Aust) Ltd., Australia, markets Natural Degreaser, which is a naturally formulated, biodegradable cleaner/degreaser with the natural cleaning power of citrus. CRC Natural Degreaser does not require water wash-off and does not leave sticky residue commonly associated with citrus-based cleaners. It does not contain any ozone depleting chemicals or chlorinated solvents. The product is an advanced technological blend of natural citrus and organic solvents, and is non-corrosive and suitable for use on all metals.

Contact: CRC Industries (Aust) Pty Ltd., No. 9 Gladstone Road, Castle Hill, NSW 2154, Australia.

Website: [www.crcind.com.au](http://www.crcind.com.au)

## ODS-free cleaners and degreasers

Innovative Organics, the United States, is offering a range of ODS-free cleaning and degreasing products. AmberTap™ 22 is a water-based, heavy-duty tapping fluid that does not contain volatile organic compounds (VOCs). It is formulated ready-to-use, does not have an unpleasant odour and will rinse off easily. AmberTap 22 functions optimally on ferrous and non-ferrous metals, and may be used in a variety of machining operations, such as tapping, drilling, boring, reaming, broaching, swaging and tube bending.

AmberClean™ 502 is a non-silicate, non-foaming, biodegradable metal spray cleaner with a water-based formulation founded on new cleaning technology. It possesses a degree of environmental and personal safety that exceeds typical cleaners for similar applications. AmberClean™ L12 is a multipurpose, water-based, biodegradable cleaner, which does not contain VOCs. Its powerful surface active agents cut through and remove combinations of grease, oil, dirt, waxes, cutting fluids, lubricants and other organic contaminants from metal surfaces. AmberClean L12 is well suited for immersion or hand-wipe applications and may be used with ultrasonic tanks, re-circulation pumps or other similar equipment. Both AmberClean products feature Innovative Organics proven corrosion inhibition technology that protects metal surfaces during cleaning processes without using silicates.

AmberSolve™ 931 is a multipurpose solvent cleaning product that offers most environmentally sound and safe alternative to traditional petroleum and chlorinated solvents. This unique formula uses solvents of very low volatility and can be used to clean and degrease metal and ceramic surfaces. AmberSolve™ STR3000 is a versatile cleaner that can be used in metal finishing, laboratory, bonding or printing applications as an alternative to CFC solvents. Both these formulations are completely biodegradable and do not contain carcinogens.

Contact: Innovative Organics, 4905 East Hunter Avenue, Anaheim, CA 92807, United States of America. Tel: +1 (714) 701 3900; Fax: +1 (714) 701 3901.

Website: [www.innovativeorganics.com](http://www.innovativeorganics.com)

## Natural precision cleaner

The All Citrus Cleaner Degreaser from Stoner Inc., the United States, is an all natural precision cleaner typically used as a degreaser for removing deposits and contaminants from metals, tools, moulds, machinery,

engines and auto parts. The heavy-duty cleaner removes greases, oils, waxes, inks, tars, silicones, etc. from metals, painted surfaces, ceramic, fibreglass and other materials. The precision cleaner also finds many applications in the electronics, automotive, aerospace and general fabrication industries.

All Citrus Cleaner Degreaser is made from a highly refined extract of citrus fruits. Its powerful formula cleans fast and does not contain any Class I or Class II ozone depleting substances. The citrus-scented product dries fast without leaving any residue. It is applied as a spray, and then wiped dry or blown dry with compressed air. It is virtually harmless to metals, glass, ceramics, fibreglass and wood.

Contact: Stoner Inc., 1070 Robert Fulton Highway, Quarryville, PA 17566, United States of America. Tel: +1 (800) 227 5538; Fax: +1 (717) 786 9088

E-mail: [timesaver@stonersolutions.com](mailto:timesaver@stonersolutions.com)

Website: [www.criticalcleaning.com](http://www.criticalcleaning.com)

## Heavy-duty degreaser

Napier Environmental Technologies Inc., Canada, offers Citri-Degreaser™ that quickly cuts through grease, industrial soils and petroleum-based liquid products. Citri-Degreaser is safe for use in parts washers, steam cleaners and hot or cold pressure washers. The water-based and biodegradable product will replace many specialized cleaning and degreasing products. Citri-Degreaser is non-flammable, non-abrasive and non-toxic. The non-ozone depleting product allows easy clean up with running water.

Contact: Napier Environmental Technologies Inc., 720 Eaton Way, Delta, BC V3M 6J9, Canada. Tel: +1 (604) 526 0802; Fax: +1 (604) 526 7772

E-mail: [cservice@napiere.com](mailto:cservice@napiere.com)

Website: [www.biowash.com](http://www.biowash.com)

## Fast-drying aerosol cleaners

Amax Industrial Products, the United States, offers fast-drying cleaning solvents. Contact Cleaner V removes grease, oil, dirt, condensation and moisture from circuit boards, precision instruments, oxygen equipment, controls, switches, motors and film. Safe for short-term contact (normal aerosol spray use) on a wide variety of plastics and other surfaces, this non-flammable, residue-free formulation has a dielectric strength of over 20 kV and zero ozone depletion potential.

Contact Cleaner III is ideal for removing carbon build-up from exhaust tracks, cleaning excess sealant, removing baked-on brake dust, as well as for cleaning electrical/electronic parts and other delicate mechanisms. Its superior wetting action enables penetration into minute spaces to clean and degrease. Contact Cleaner III is safe on rubber, paint, plastic, metal, fabric and glass surfaces. This non-corrosive cleaning/degreasing agent leaves no residue.

Website: [www.amaxindustrial.com](http://www.amaxindustrial.com)

## AEROSOLS

### Environment-friendly low-density foam

Researchers at Sandia National Laboratories in Livermore, California, the United States, have developed a low-density, energy-absorbing foam. TuffFoam was originally conceived by Sandia materials scientists as an encapsulant material to protect sensitive electronic and mechanical structures from harsh environments. It is a water-blown, closed-cell, rigid polyurethane foam that features formulations as low as 32 kg/cubic metre density.

Besides its use as a structural material, the foam is likely to have other applications such as thermal and electrical insulation, and as a core material for the automobile and aerospace industries. Largely due to its low density, Sandia's TuffFoam might find use in the surfboard sector as a drop-in replacement material for polyurethane, which is taking in the impact of ever-tightening environmental regulations. A key feature of TuffFoam is that it does not contain toluene diisocyanate, the chemical used in the production of the polyurethane foam surfboard blanks that is most problematic with respect to environment regulations. Another attractive feature of the Sandia product is that all of the chemicals used to make TuffFoam are commercially available in commodity quantities.

Website: [www.cleanedge.com](http://www.cleanedge.com)

### Study of polymer foaming process

In the United Kingdom, Dr. Tri Tuladhar and Prof. Malcolm Mackley, Chemical Engineering Department, University of Cambridge, conducted a study on the foaming of polystyrene (PS) melt under closely controlled pressure, volume and temperature using a multipass rheometer (MPR) that allows online observation of micro-bubble evolution and growth. Pentane, carbon dioxide (CO<sub>2</sub>) and nitrogen are used as physical blowing agents in the manufacture of polymer foam and as plasticizers to reduce melt viscosity during processing. The dissolved gas concentration and pressure influence the rheological behaviour of melt and the microstructure of the product during growth and its final foamed product.

Visco-elastic behaviour of the foamed PS samples was investigated using the MPR and compared with pure PS and homogeneous melt of PS and dissolved gas. In addition, the effect of processing parameters such as pressure release rate, temperature and shear on the bubble growth kinetics, and final foamed product was also examined. A bubble growth model was also developed to fit experimental data which gave insight into an early stage of bubble growth.

Systematic foaming experiments were carried out by decompression of PS melt saturated with either CO<sub>2</sub> or pentane in the MPR. The pressure was reduced by increasing the MPR chamber volume by moving both top and bottom pistons apart at a speed of 1 mm/s. After a very short lag period, many small nuclei were optically visible. Nucleation appeared to occur randomly leading to subsequent bubble growth from these sites. With time, more bubbles nucleated and grew. The bubbles initially appeared to be circular; as more bubbles formed and grew in close proximity, their shape was influenced by neighbours, leading to polygonal shaped bubbles. Most of the growth takes place within the first 10 seconds. The foam microstructure and bubble size also

depended on the homogeneous mixing of polymer and gas in the compressed state and the pressure release rate during decompression.

Website: [www.cheng.cam.ac.uk](http://www.cheng.cam.ac.uk)

## Pumping & metering systems for blowing agents

Foamtek, the United States, supplies pumping and metering systems for local and central applications involving alternative blowing agents. The liquid and gas metering systems provided by Foamtek are constructed of the highest quality components. Brand names ensure reliable systems with worldwide servicing. These systems, designed for consistency and accuracy, aid in ensuring process repeatability and product quality.

Innovative solutions offered by Foamtec for pumping and metering of gas and liquids include:

High-pressure atmospheric gas pumping and metering system

High-pressure liquid pumping and metering system

Combination units two or more blowing agents (liquid/liquid, gas/gas or gas/liquid)

Central plant systems central pumps with local metering stands

Electric diaphragm, pneumatic, hydraulic, and mechanical pump system designs

Special multiple loop control system capable of automatic proportioned or cascaded flow control for multiple blowing agents

Micro-motion mass flow meters

Compact free-standing designs

P.I.D. control

Filtration

Contact: Foamtek LLC, P.O. Box 474, Amesbury, Massachusetts 01913, United States of America. Tel: +1 (508) 776 2647; Fax: +1 (508) 437 0490

E-mail: [info@foamtekcorp.com](mailto:info@foamtekcorp.com)

Website: [www.foamtekcorp.com](http://www.foamtekcorp.com)

## Insulation boards and methods for their manufacture

BFS Diversified Products LLC, the United States, has patented a method for producing polyisocyanurate insulation foams. The method entails bringing into contact a stream of reactants that includes an isocyanate with another stream of reactants that include a polyol and a blowing agent that is a blend of isopentane and n-pentane in a weight ratio of 7:1 to 1:1.



By employing the blowing agent that consists of isopentane and n-pentane, with hardly any cyclopentane, the method overcomes many problems associated with other methods, allowing for the economic and efficient manufacture of insulation boards. Chlorinated or fluorinated carbon compounds are totally absent and the absence of cyclopentane provides for insulation boards that are not as susceptible to dimensional instability. Moreover, the blended blowing agent helps provide insulation boards with good insulation efficiency.

The blowing agent may optionally include other blowing agents such as alkanes, (cyclo)alkanes, hydrofluorocarbons, hydrochlorofluorocarbons, fluorocarbons, etc.

Website: [www.appft1.uspto.gov](http://www.appft1.uspto.gov)

## Foaming polystyrene with a mixture of CO<sub>2</sub> and ethanol

Researchers from Industrial Materials Institute, National Research Council of Canada, and their counterparts in Owens Corning, the United States, have jointly studied the usage of a mixture of carbon dioxide (CO<sub>2</sub>) and ethanol as blowing agent for foaming polystyrene (PS).

Use of mixtures as blowing agents in thermoplastic foam extrusion has gained renewed interest in the past few years due to the introduction of difficult-to-process alternative gases, targeted as potential replacement for the ozone-depleting blowing agents. Blending suitable physical foaming agents (PFAs) often provides a better control of processing conditions. For example, a specific PFA could be selected for its inflation performance and blended with other co-blowing agents chosen for their stabilizing role. Although a considerable amount of work has been done in that area, very little information has been disclosed in open literature.

CO<sub>2</sub> has been reported as an interesting candidate for low-density PS foaming, although the required concentrations are associated with high processing pressures owing to the low solubility of the gas. Thus, stable processing conditions are difficult to achieve. This work studied the effect of blending CO<sub>2</sub> with ethanol as a co-blowing agent for PS foaming, and examined the extrusion foaming performance of this mixture with respect to its solubility and rheological behaviour. The function of each blowing agent during the process was analysed with respect to the plasticization, nucleation, expansion and stabilization phases.

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## AEROSOLS

### New HFA pressurized metered-dose inhaler

AstraZeneca has received Finnish approval for its new pressurized metered-dose inhaler (pMDI) formulation of the inhaled corticosteroid budesonide (Pulmicort) for the treatment of asthma in adults and children. This formulation based on hydrofluoroalkanes (HFA) will replace the currently available chlorofluorocarbon (CFC) pMDI formulation. The new HFA pMDI has been developed by SkyePharma PLC, a drug delivery company in the United Kingdom. It will be available in 100 g and 200 g strengths.

SkyePharma has been responsible for all product development aspects. The study programme comprises

investigations of the new and the current formulation, as well as clinical studies in children, adolescents and adults. A high dose safety evaluation is also included. The new formulation is clinically comparable to the old formulation in all respects.

Website: [www.medicalnewstoday.com](http://www.medicalnewstoday.com)

## Ranbaxys HFA MDI for asthma treatment

Ranbaxy Laboratories, India, recently launched its branded product, Osonide (Ciclesonide) inhaler, a novel once-a-day (OD) treatment of Asthma. Osonide is available in hydrofluoroalkanes (HFA) based pressurized metered dose inhalers in two strengths, 160 g and 80 g.

Osonide HFA pMDI, unlike CFC-based inhaler, is environment-friendly and ensures better delivery in patients airways with the unique property of being activated only in the lungs, thereby reducing the side effects. Mr. Sanjeev I. Dani, Ranbaxys Regional Director for India & Middle East, said: The introduction of Osonide inhaler underscores Ranbaxys commitment to effectively address the problems encountered by the asthmatic patients in India and showcases our strength in developing innovative solutions in this fast growing segment. The product will provide physicians with a contemporary therapeutic option.

Website: [www.ranbaxy.com](http://www.ranbaxy.com)

## HALONS

### Foam fire suppression system

Just-In Case Fire Co., the United States, offers Fire Caddy DC, a 12-V self-contained, foam-based fire suppression system that provides the fire fighting capability of up to twelve large fire extinguishers. It can be used for supplemental fire protection and also in conjunction with installed powder systems for engine fire protection. Resembling a small toolbox, the Fire Caddy DC delivers about 25 litres/minute at 110 psi. A 5 ft suction hose, extendable to 15 ft, delivers water from any portable reservoir.

Fire Caddy DC incorporates FlameOut, a non-toxic, environment-friendly, biodegradable suppressant that is engineered to extinguish Class A and B fires. The cooling properties of FlameOut ensure that hot spots do not re-ignite. Additionally, FlameOut is the only certified Halon replacement that is approved for both commercial and residential use. Standard supply is with 9.5 l of FlameOut. To enable boaters to fight fires from a safer distance than with handheld extinguishers, 25 ft of 3/4 layflat fire hose with nozzle is also included.

Website: [www.fs-world.com](http://www.fs-world.com)

### Indirect release high-pressure fire suppression

Firetrace, manufactured by Firetrace International in the United States, extinguishes fire directly at its source using a unique pressurized flexi-tube delivery system that allows installation virtually anywhere fire protection is required. This tubing is leak-resistant, flexible and temperature-sensitive. Because Firetrace is a self-contained and stand-alone system, its operation is not affected by power or water main failures. Firetrace reacts reliably every time.

The Firetrace Indirect Release High-Pressure (IHP) System uses the Firetrace tube as a fire detection and system activation device, not as the discharge tube. Once the tubing senses the fire, the tube ruptures and the resulting drop in pressure causes the indirect valve to activate. Carbon dioxide (CO<sub>2</sub>) is then discharged from the cylinder through a fixed piping network and out of the diffuser nozzles, flooding the area in extinguishant and suppressing the fire quickly and thoroughly.

Multiple diffuser nozzles may be added to meet the application requirements. One of the advantages of using CO<sub>2</sub> as the suppression agent is that it has no impact on the ozone layer. As with other gaseous agents, it quickly and easily penetrates all areas within an enclosure.

Contact: Firetrace International, 15678 N. Greenway-Hayden Loop, Suite #103, Scottsdale, AZ 85260, United States of America. Tel: +1 (480) 607 1218; Fax: +1 (480) 315 1316

E-mail: [firetrace@firetrace.com](mailto:firetrace@firetrace.com)

Website: [www.firetrace.com](http://www.firetrace.com)

## Water mist system for fire and explosion suppression

Pursuit Dynamics plc, the United Kingdom, has developed a unique water mist generation system for fire and explosion suppression. The PDX FireMist System is a revolutionary water mist system capable of continuous long distance projection with a Dv90 droplet size below 5 microns. Water mist suppresses fires through two main mechanisms: cooling and inerting. Both mechanisms benefit from the smallest possible water droplets; the smaller the droplet the greater the surface area generated from a quantity of water, the faster its evaporation and greater its cooling impact.

Several successful tests showed FireMist to be particularly well adapted to tackling blazes that involve trapped people such as plane crashes or industrial fires as it quickly lowered temperatures without the use of noxious chemicals such as Halon.

Contact: Pursuit Dynamics plc, Shackleton House, Kingfisher Way, Hinchingsbrooke Business Park, Huntingdon, Cambs PE29 6HB, United Kingdom. Tel: +44 (1480) 422050; Fax: +44 (1480) 422059

E-mail: [info@pursuitdynamics.com](mailto:info@pursuitdynamics.com)

Website: [www.fs-world.com](http://www.fs-world.com)

## Yulian Nozzle fire suppression system

The Yulian Nozzle<sup>TM</sup> fire suppression system, from Newlink Global Engineering Corporation in the United States, is designed to replace Halon. Recent tests at the Federal Aviation Administration (FAA) Fire Test Centre, proved the Yulian Nozzle fire suppression system to be the most effective Halon alternative fire suppression system tested to date. These tests showed that the system reduced temperatures in a cargo compartment from 1,200 to 100F within 30 seconds of activation of the system. The system accomplished this without any noticeable water damage.

The Yulian Nozzle fights fires by attacking two legs of the fire triangle (heat and oxygen). FAA tests showed that it outperformed Halon in extinguishing fire by greater than 100 per cent. In the Argonne National Laboratory test, the Yulian Nozzle extinguished a fuel fire in less than 3 seconds. The unique design of the Yulian Nozzle eliminates the need for dangerous chemicals. This system uses significantly less water and pressure than traditional water mist systems.

Contact: Newlink Global Engineering Corp., 6187 Grovedale CT, Suite 200, Alexandria, Virginia 22310-2553, United States of America. Tel: +1 (703) 971 3303; Fax: +1 (703) 971 3304.

Website: [www.newlink.net](http://www.newlink.net)

## Replacement for Halon 1301

HFC-227ea is the leading chemical replacement agent for Halon 1301 in the special hazards suppression market. It is marketed by DuPont, the United States, under the trademark of FE-227™. It has been preferentially selected by the market for its unique combination of efficiency, environmental properties, cost, people safety and ability to prevent or extinguish fires. For a system installation in an existing or new facility, FE-227 is the Halon 1301 replacement agent of choice because it is a clean, electrically non-conductive and non-corrosive agent that does not leave any residue.

FE-227 is safe for use in applications where people are normally present for both Class-A and Class-B fire assets. It is intended to prevent or suppress fires in situations where conventional extinguishing agents such as water, dry chemical and carbon dioxide are unacceptable because they may cause collateral damage, significantly interrupt business productivity or present a safety risk. These situations exist primarily where there is electrical or sensitive electronic equipment servicing a critical operation, the loss of which would be the cost of not only the equipment but also business interruption. Other situations involve delicate or irreplaceable materials such as those found in libraries, museums and historical sites.

Website: [www.dupont.com](http://www.dupont.com)

## Fixed fire suppression system that uses gelled gas-powder

Sea-Fire Marine, the United States, is offering Fire Foe, a pre-engineered, automatic fire suppression system that provides efficient, site-specific fire protection utilizing EnviroGel, an environmentally responsible non-corrosive, gelled gas-powder. As an alternative to Halon and its current replacements, EnviroGel is safe for people and equipment. It is approved by SNAP, UL and USCG.

The self-contained device extinguishes fires through a self-activating, temperature-sensitive tube. As a fire begins, heat fills the affected compartment causing Fire Foe's patented pressurized tube delivery system to flood the area with EnviroGel. The chemical absorbs heat energy and covers the combustible material to prevent re-ignition. The system is maintenance-free and clean-up of agent residue is minimal. With a simple mounting bracket design, the tube is easily installed almost anywhere. Model sizes are available for protecting compartments from 15 cft up to 130 cft.

Contact Sea-Fire Marine Inc., 9331-A Philadelphia Road, Baltimore, MD 21237, United States of America.  
Fax: +1 (410) 687 5503

E-mail: [info@sea-fire.com](mailto:info@sea-fire.com)

Website: [www.boatingonthehudson.com](http://www.boatingonthehudson.com)

## Water mist fire extinguisher

The water mist fire extinguisher from Amerex Corporation, the United States, is a unique extinguisher that safely and effectively puts out Class A fires, where a Class C hazard (live electrical equipment) exists. It is claimed to be the safest extinguisher for human exposure because of its unique, fine spray of de-ionized water that leaves no residue and its non-toxic nature that will not cause any contamination. Approved by Underwriters Laboratories, the water mist extinguisher is available in 6 litre and 9 litre units and can discharge a distance of 10-12 ft. The equipment has a non-magnetic construction and is tested by an independent lab to be safe in a Tesla-3 MRI environment.

Website: [www.prweb.com](http://www.prweb.com)

## FUMIGANTS

### Cinnamon bark and the sun as methyl bromide alternatives

Despite international treaties to phase out use of the ozone destroying methyl bromide by early 2005, roughly 9,500 metric tonnes are applied each year to crops in the United States alone. There is nothing else that kills weeds, pests and bacteria as well. At the Ecological Farm Conference held recently in Pacific Grove, California, the United States, researchers explained organic alternatives to methyl bromide. Founder of AgraQuest, Ms. Pamela Marrone, described a promising strain of fungus that releases a fumigant as it grows. *Muscador albus* was discovered on cinnamon tree bark in Honduras. When grown in a petri dish, it killed every living organism in the dish.

Extensive tests and field trials have proved that the fungus kills a wide range of diseases in the soil. It is non-toxic to humans and it is organic. The gases emitted by *M. albus* are all well known compounds mostly natural alcohols and acids but together they destroy pests. Pellets, made from the fungus and their food, can be applied to soil before tilling to kill many common plant diseases. Once the food is used up, the fungus dies. However, *M. albus* does not control weeds, one of the common uses for methyl bromide.

Two most pernicious weeds in Florida are pigweeds and nutsedges, which can be completely eliminated only by methyl bromide. Ms. Erin Rosskopf of the United States Department of Agriculture investigated two plant diseases that specifically kill pigweeds and nutsedges. The diseases do not harm crops or plants outside of the weeds immediate families. The main problem is that neither can be easily grown in the mass quantities needed to market them commercially. Until someone finds a way to grow these weed diseases, Ms. Rosskopf advocates using soil solarization.

Mr. Krishna Subbarao of University of CaliforniaDavis, discussed crop rotation as an alternative to methyl bromide. If broccoli is plowed into the ground after harvest, the properties of its leaves kill organisms that can cause wilting and rot.

Website: [www.santacruzsentinel.com](http://www.santacruzsentinel.com)