



VATIS UPDATE

# Ozone Layer Protection

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## Highlights

- Method to trace persistent CFCs ●
- Breakthrough technology uses water as refrigerant ●
- Low running cost options for PCB cleaning ●
- HFC-245fa spray PU foam systems co-blown with water ●
- Self-contained compressed air foam systems ●
- Method to reduce pest infestations in stored food ●



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- Networking and partnership with international organizations and key stakeholders; and
- Training of national personnel, particularly national scientists and policy analysts.



*The shaded areas of the map indicate ESCAP members and associate members*

**Cover Photo**

Water mist extinguishing system

*(Credit: FOGTEC Brandschutz GmbH & Co.,  
Germany)*

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Ozone Layer Protection**

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# SCIENCE OF THE OZONE LAYER

## Two-way link between ozone layer and climate change

International efforts to protect the ozone layer are a success and have stopped additional ozone losses and contributed to mitigating the greenhouse effect, according to a new report. The executive summary of the Scientific Assessment of Ozone Depletion 2010, published jointly by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), provides new information about the effects of climate change on the ozone layer, as well as the impact of ozone changes on the Earth's climate.

The report was written and reviewed by some 300 scientists and launched on the International Day for the Preservation of the Ozone Layer. It is the first comprehensive update in four years. Given that many substances that deplete the ozone layer are also potent greenhouse gases (GHGs), the report says that the Montreal Protocol has "provided substantial co-benefits by reducing climate change." In 2010, the reduction of ozone depleting substances as a result of the Montreal Protocol, expressed in carbon dioxide (CO<sub>2</sub>) equivalent emissions (about 10 Gigatonnes per year), were five times larger than those targeted by the first commitment period (2008-2012) of the Kyoto Protocol, the GHG emissions reduction treaty.

Dr. Achim Steiner, UNEP Executive Director said: "This represents a further potential area for action within the overall climate change challenge. An international group of modellers working with UNEP recently concluded that current commitments and pledges linked with the Copenhagen Accord are not likely to keep a global temperature rise to under 2°C by 2050. The gap between scientific reality and ambition is estimated to average around 4.7 Gigatonnes of CO<sub>2</sub> equivalent per year – a gap that needs to be urgently bridged over the next decade or so if the 2°C target is to be met."

The Scientific Assessment Panel will present the executive summary of the new report at the annual Meeting of the Parties to the Montreal Protocol,

to be held in Kampala, Uganda, between 8 and 12 November 2010. The full body of the report will be available in early 2011. *Contact: Ms. Carine Richard-Van Maele, Chief, Communications and Public Affairs, WMO. Tel: +41 (22) 730 8315; E-mail: cpa@wmo.int. Or Mr. Nick Nuttall, UNEP Spokesperson/Head of Media, UNEP. Tel: +254 (207) 62 30 84; E-mail: nick.nuttall@unep.org.* (Source: [www.wmo.int](http://www.wmo.int))

## NASA awards ozone instrument suite for first JPSS spacecraft

In the United States, the National Aeronautics and Space Administration (NASA), on behalf of the National Oceanic and Atmospheric Administration (NOAA), has awarded a sole source contract to Ball Aerospace and Technology Corp. (BATC) for the Ozone Mapping and Profiling Suite (OMPS) instrument on the first Joint Polar Satellite System (JPSS).

OMPS will monitor ozone, collect total column and vertical profile ozone data, and continue the current daily global data provided by the Solar Backscatter Ultraviolet Radiometer/2 and Total Ozone Mapping Spectrometer, but with higher accuracy and precision. The collection of this data contributes to fulfilling the United States treaty obligation to monitor the ozone depletion for the Montreal Protocol to ensure no gaps in coverage.

Under this contract, BATC will manufacture, test and deliver OMPS, support instrument integration on the JPSS-1 spacecraft, and provide launch and post-launch support. The instrument will be similar to OMPS planned for flight on National Polar-orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project mission. JPSS-1 is being planned for launch in 2014. This is a cost-reimbursement contract in the amount of approximately US\$82.4 million, with a period of performance from October 2009 to September 2014. (Source: [www.prnewswire.com](http://www.prnewswire.com))

## Method to trace persistent CFCs

Ultrafine measurements of atmospheric gases could help track down persistent sources of chlorofluorocarbons (CFCs) thought to be slowing the recovery of the ozone layer. A team of scientists has shown how it is possible to chemically "finger-

print” CFCs to potentially trace their origin. The researchers from University of East Anglia (UEA), the United Kingdom, and University of Frankfurt, Germany, worked on samples of atmosphere retrieved from high in the stratosphere (up to 35 km) by French space agency balloons.

Using mass spectrometers, they were able to detail the ratios of different types (isotopes) of chlorine atoms present in fantastically small concentrations – just 500 parts per trillion – of CFC-12. “This is the first time we have been able to measure the isotopes in gases in such small concentrations in the atmosphere, and also one of the first applications for chlorine isotope ratios in the atmosphere,” said Dr. Jan Kaiser, UEA School of Environmental Sciences. The new research shows that the higher one goes in the atmosphere, the more of a heavier chlorine atom (chlorine-37) is present in any sample of CFC-12. “CFCs are eventually broken down by light in a process called photolysis, and the CFCs with the lighter isotopes (chlorine-35) break down faster,” explained Dr. Johannes Laube, also from UEA. “This is an effect that has been observed for other gases, such as nitrous oxide.”

Even though the production and use of CFC-12 is forbidden by the Montreal Protocol, it is still found in the atmosphere. “We find fresh plumes when we go on aircraft campaigns in the lower atmosphere, the troposphere. This indicates it is either still being produced or is being stockpiled,” said Dr. Kaiser. It is established that different manufacturing techniques will produce gases with particular isotopic ratios. Such information could help the authorities identify continuing sources. (Source: [www.bbc.co.uk](http://www.bbc.co.uk))

### **Environment, Health and Safety manual for National CTC Phase-out Programme**

The “Environment, Health and Safety Manual For National CTC Phase-out Programme” has been published by Sri Ramachandra University jointly with GTZ Proklima.

For more information, contact:

*National CTC Phase-out Plan*  
*GTZ Proklima Country Office*  
 A-33 Gulmohar Park, New Delhi 110 049, India  
 Tel: + 91 (11) 2661 1021  
<http://www.ctc-phaseout.org>

## **ODS PHASE-OUT IN INDIA**

### **India celebrates International Ozone Day**

Presiding over a function to celebrate the International Ozone Day on 16 September 2010, Mr. Jairam Ramesh, Minister of State for Environment & Forests (Independent Charge), observed that environment is associated with the country’s culture and it is a way of life for Indians. Stressing on the need to protect the ozone layer, he said, “Montreal Protocol is the most successful protocol in the world today to save ozone. India has played a very constructive role in it.” He pointed out that the country achieved the goal of eliminating the production of chlorofluorocarbons 17 months before the committed date.

A number of competitions were organized for school children to mark the occasion. These included poster competition, painting competition, quiz on ozone science, skit competition, model making competition and slogan writing competition. Prizes to the winners of these competitions were presented on the day. (Source: [pib.nic.in](http://pib.nic.in))

### **Seminar on ODS in defence sector**

A national seminar on ‘Management of Ozone Depleting Substance in Defence Services’ was held recently at DRDO Bhawan, New Delhi, under the aegis of corps of Electronics and Mechanical Engineers (EME) in association with Confederation of Indian Industry (CII) and the support of Ministry of Environment and Forests (MoEF) and Defence Research & Development Organization (DRDO).

Prof. S.C. Saxena, Director, Indian Institute of Technology (IIT), Roorkee, was the Chief Guest for the seminar, which was attended by delegates from defence services, academic institutes, civil industries and DRDO. During the seminar, renowned speakers shared their view on action plan on phasing out ozone depleting substances (ODSs) in accordance with Montreal Protocol from various applications and suggested alternative substances for these applications.

## Alternatives to CFC-containing metered dose inhalers (MDIs): Zydus' initiatives

Metered dose inhalers (MDIs) containing chlorofluorocarbons (CFCs) provide a reliable and an effective therapy for respiratory diseases such as asthma and chronic obstructive pulmonary disease (COPD). MDIs generally use CFC-12 as a propellant. To suspend or dissolve medication, CFC-11 and CFC-114 are mostly used, either alone or in a mixture. In 1998, approximately 500 million MDIs were used worldwide, using about 10,000 tonnes of CFCs. The use of inhaled medication has been increasing because of increasing prevalence of respiratory diseases.

Research has found that use of chemicals like CFCs were contributing to the build-up of ozone-depleting substances (ODS) in the atmosphere and development of an 'ozone hole above the Antarctic. The Montreal Protocol, drafted under the auspices of the United Nations Environment Programme (UNEP), aims to phase out the production and consumption of ODS to prevent further damage to the ozone layer, and eventually allow the ozone layer to repair itself.

Alternatives to CFC-MDIs are primarily MDIs based on hydrofluorocarbons (HFCs), single or multi-dose dry powder inhalers (DPIs), hand-held or stationary nebulizers, orally administered drugs (tablets, capsules or liquids) and injectable drugs.

As an environmentally conscious pharmaceutical company, Zydus Cadila initiated extensive work on conversion of CFC inhalers to hydrofluoroalkane (HFA) inhalers. With several CFC-based inhalation formulations in its product basket, it was also a challenge to adopt a new technology of non-CFC based propellants.

The common propellants used in the inhalers – CFC-11 and CFC-12 – are supportive to solution and suspension formulations when blended with suitable excipient, whereas the propellants HFA-134a and HFA-227 are poor solvents and do not support the formulations. Because of the different physical properties of HFA propellants, a change in the basic production set-up was required, incurring high investment. Gaskets and O-rings in the earlier filling heads were also not suitable for the HFA propellants. This meant a complete change in the filling technology.

CFC-based products were filled using a two-stage technology, whereas new HFA-based products could be developed with a single-stage technology. Therefore, a new development and production set-up was made for trials of different HFA-based MDIs. Vacuum crimper and single-stage filling head were introduced into the new line. To meet the challenge posed by the high pressures of these new propellants, special tanks were built. A new concept of online stress bath was introduced wherever cans are exposed to 55°C for a certain length of time.

The selection of correct packaging components, like valve and canister, was key to the development of these new MDIs. HFA propellant does not suit valve components like different gaskets, O-rings and metering chamber commonly used in CFC products. The canister typically is built of aluminium or stainless steel. A change in the valve components as well as canisters was also needed. Formulations were developed to address the higher sedimentation of the drugs in the new propellants.

In view of the CFC phase-out demand, the development time line was also a concern. A separate task force of senior scientists, and manufacturing and QA professionals was set up. With all the above variants, it was a big challenge for them to match all the test parameters of these new formulations with CFC-based formulations. A well equipped lab with latest and high-cost testing equipment was set up to carry out different tests. Today, most of the CFC inhalers have been converted to HFA inhalers. A wide range of products has already been launched in the Indian market. The earlier consumption of CFCs in MDI was around 20 to 22 tonnes in a year. Now it has been reduced drastically to 2 to 3 tonnes. This reduction in CFC consumption itself shows the success of the phase-out programme. *Contact: Mr. S.G. Belapure, President (Manufacturing - Formulations), Cadila Healthcare Ltd., Sarkhej Bavla N.H. No. 8A, Moraiya, Sanand District, Ahmedabad 382 210, India. Tel: +91 (2717) 250331, 250332, 250336 & 250337; Fax: +91 (2717) 250319; E-mail: sgbelapure@zyduscadila.com.* (Source: Direct communication)

Lt. Gen. A.K.S. Chandele, Director General, EME, during his address brought out the relevance of phasing out ODS and its significance for defence forces. Maj. Gen. T.M. Mhaisale, Commander HQ, Technical Group, EME, in his concluding remarks emphasized the need for synergy between all concerned agencies to achieve the desired results regarding phasing out ODS. (Source: pib.nic.in)

## HCFC Phase-out Management Plan

Based on the decision of the 19<sup>th</sup> Meeting of the Parties, the Executive Committee (ExCom) of Multilateral Fund (MLF) had initiated discussions on guidelines for preparing Hydrochlorofluorocarbon (HCFC) Phase-out Management Plans (HPMP) and policy guidelines for determining the cost for HCFC phas-out in different applications. The 54<sup>th</sup> ExCom approved the guidelines for HPMP.

Considering the future activities on the phase-out of HCFC production and consumption in India to comply with the accelerated phase-out schedule, the Empowered Steering Committee of the Ministry of Environment & Forests (MoEF) at its 33<sup>rd</sup> meeting, on 21 November 2007, decided to involve the World Bank, United Nations Development Programme (UNDP), United Nations Industrial Development Organization (UNIDO), United Nations Environment Programme (UNEP), and the governments of Germany and France. UNDP has been designated as the Lead Agency for HPMP. Accordingly, all these agencies have included activities to phase-out HCFC in their respective business plans for the period 2008-2010. (Source: www.ozonecell.com)

## HPMP awareness seminars

The Ozone Cell of the Ministry of Environment and Forests (MoEF) and Refrigeration and Air-Conditioning Manufacturers' Association (RAMA) organized an awareness seminar on 13 August 2010 in Delhi in continuation with the seminars organized at Chennai and Mumbai in July 2010. The seminar discussed the methodology and policies related to Hydrochlorofluorocarbon (HCFC) Phase-out Management Plan (HPMP) preparation, as well as technical options for the replacement of HCFCs in refrigeration and air-conditioning (RAC) equipment manufacturing. The seminar was attended by the stakeholders, especially from

the RAC industry including small and medium manufacturers of RAC equipment.

The Ozone Cell also organized, in cooperation with the Indian Polyurethane Association (IPUA), three HPMP Awareness Seminars at Delhi, Chennai and Mumbai during the months of June/July 2010. These seminars focused on creating awareness among the stakeholders for HCFC phase-out in foam manufacture as per the accelerated phase-out schedule of the Montreal Protocol. The seminars discussed policies related to HPMP preparation and technical options for replacement of HCFCs as foam blowing agents. These events were well attended by the stakeholders, especially the foam manufacturing industry. (Source: www.ozonecell.com)

## Cipla targets global pacts for CFC-free inhalers

Cipla Ltd., India, is in talks with a slew of global pharmaceutical heavyweights to strike long-term supply agreements for its inhalers free of chlorofluorocarbons (CFCs). CFC-free inhalers, with an estimated market potential of US\$3 billion world over, tops long-term growth plans of the company. Cipla is reported to be in talks with at least three global pharma companies – Pfizer Inc., the United States, GlaxoSmithKline Pharmaceuticals Ltd., the United Kingdom, and Boehringer Ingelheim GmbH, Germany – to enter into long-term supply contracts for its CFC-free inhalers for different markets. The talks are in nascent stage and any deal is expected only after a couple of quarters from now, industry analysts observed. (Source: www.financialexpress.com)

## Trane India joins IDBI Bank in chiller replacement project

Trane India, a subsidiary of Ingersoll-Rand Plc based in Ireland, will work with India's IDBI Bank to replace 370 chillers that use chlorofluorocarbons (CFCs). IDBI Bank is the implementing agency in India for a World Bank project under which chillers, components typically used in cooling devices like air-conditioning plants, will be replaced with non-CFC devices that use less energy. "Trane will replace existing inefficient CFC-based centrifugal chilled water systems with new non-CFC based

energy efficient centrifugal or screw-chilled water systems,” said Mr. Rajesh Sikka, Business Leader for Trane India.

The value of the project, which is backed by the Global Environment Facility, Montreal Protocol Investment Fund and Carbon Fund, is US\$13.2 million, according to the World Bank website. The project would reduce 159 tonnes of CFCs and 3.86 million tonnes of carbon dioxide, a statement from IDBI Bank said. (Source: [www.bloomberg.com](http://www.bloomberg.com))

## Workshop on CFC-MDI phase-out in India

A one-day national consultative workshop on policy and regulations – “CFC-based MDI Phase-out Transition Strategy Implementation and Adoption of CFC-Free Alternatives in India” – was held in New Delhi on 20 May 2010. The workshop was organized by Development Facilitators – a national level advocacy organization based in New Delhi – with enabling technical and resource support from the United Nations Environment Programme (UNEP). The event received coordinating support from: Central Drug Standards Control Organization (CDSCO), Ministry of Health and Family Welfare (MoHFW), Government of India (GoI); Ozone Cell, Ministry of Environment and Forests (MoEF), GoI; and the United Nations Development Programme (UNDP).

The overall focus of the workshop was on the drug policy requirements that are to be aligned with India’s commitment to completely stop use of chlorofluorocarbons (CFCs) in the production of metered dose inhalers (MDIs) by 2012, and to achieve complete conversion of CFC-MDIs to non-CFC-MDIs by December 2013. Dr. A. Duraisamy, Director of Ozone Cell, Dr. Surinder Singh, Drugs Controller General of India, Dr. B.P. Nilaratna, Joint Secretary, MoEF, and Mr. Atul Bagai, Regional Officer (Networking) Compliance Assistance Programme, UNEP, Bangkok, apprised the delegates about various aspects of CFCs. Two key presentations were made by Dr. A. Duraisamy and Mr. A.K. Pradhan, Assistant Drugs Controller (India), focusing on the current scenario with regard to control of supply of CFC for MDIs. The presentations were followed by interaction with various representatives from major MDI manufacturers in India. (Source: [www.ipapharma.org](http://www.ipapharma.org))

## IN THE NEWS

### Rising to the challenge of HCFC phase-out

This year’s observance of International Ozone Day marks yet another milestone for the Montreal Protocol and its Multilateral Fund (MLF), as the year marks the total phase out of three major ozone depleting substances (ODS): chlorofluorocarbons (CFCs), halons and carbon tetrachloride (CTC). By the end of December 2009, Article 5 countries had phased out 250,000 ozone depletion potential (ODP) tonnes of consumption and 196,000 ODP tonnes of production. This accomplishment has not only helped protect the ozone layer but has also provided significant climate benefits since ODS such as CFCs are also very potent greenhouse gases. By 2015, two of the three remaining ODS, namely methyl chloroform and methyl bromide, will have been phased out.

Despite these achievements, there remains the significant challenge of accelerated phase-out of hydrochlorofluorocarbons (HCFCs), as set out in decision XIX/6 of the Meeting of the Parties to the Montreal Protocol in September 2007. Article 5 countries must comply with the freeze in HCFC consumption and production in 2013 and the 10 per cent and 35 per cent reduction targets in 2015 and 2020. Over the last three years, the Montreal Protocol and MLF have been working towards supporting the goal of accelerated HCFC phase-out. At its 60<sup>th</sup> Meeting in April 2010, the Executive Committee (ExCom) of MLF agreed the majority of policies to enable developing countries to initiate their HCFC phase-out activities and to reflect in full the spirit of decision XIX/6. In this context, ExCom also included consideration of more funding for introducing low global warming potential (GWP) alternatives to HCFCs. This marks a small but significant change from MLF’s approach to select the lowest cost technology to achieve the required reduction in ODS. ExCom is developing an approach to prioritize the technologies that will replace HCFCs so that the most cost effective and environmentally friendly technologies could be chosen.

ExCom is now fully engaged in helping Article 5 countries to phase-out HCFCs and this spirit will

continue to guide the way ahead towards the goal of full compliance with the control measures of the Montreal Protocol, including those for HCFC. *Contact: Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, Suite #4100, 1000 De La Gauchetière Street West, Montreal, Quebec H3B 4W5, Canada. Tel: +1 (514) 282 1122; Fax: +1 (514) 282 0068; E-mail: secretariat@unmfs.org.* (Source: [www.uneptie.org](http://www.uneptie.org))

## Agreement on CFC collection in the Philippines

In the Philippines, the Department of Environment and Natural Resources (DENR) and a private company will sign an agreement on 15 September 2010 for collecting refrigerants like chlorofluorocarbons (CFCs) and other ozone-depleting substances (ODS) around the country. "This will assist service shops of refrigerators, air-conditioners and chillers to recover their refrigerants instead of just venting or releasing them into the atmosphere," DENR Secretary Mr. Ramon Paje said. Under the agreement, Delsa Chemicals and Multi-Products – an importer and distributor of refrigerants nationwide in the last 42 years – will collect, transport and store the refrigerants from service shops and owners of industrial chiller refrigerators. Delsa will update DENR's Environmental Management Bureau (EMB) on its collection activities each month. About two tonnes of recovered refrigerants will be collected monthly from service shops across the country, government figures showed. (Source: [www.gmanews.tv](http://www.gmanews.tv))

## SAE International updates R-134a service standards

The Society of Automotive Engineers (SAE) International has updated the equipment standards covering the recovery and onsite recycling of R-134a refrigerant employed to service mobile air-conditioning (MAC) systems. SAE International's standard 'J2788 HFC-134a (R-134a) Recovery/Recycling Equipment and Recovery/Recycling/Recharging for Mobile Air-Conditioning Systems' supersedes the 'SAE J2210 HFC-134a (R-134a) Recovery/Recycling Equipment for Mobile Air-Conditioning Systems' to reduce refrigerant emissions during servicing and provides requirements for charging refrigerant into MAC systems.

In 1995, SAE International had issued 'J1770 Automotive Refrigerant Recovery/Recycling Equipment' intended for use with both R-12 and R-134a. Like J2210, J1770 does not meet the current state of art to assure refrigerant recovery from MAC system and does not provide any method to assure the system is accurately recharged with refrigerant. Hence, J1770 and J2210 standards have been cancelled.

SAE's Interior Climate Control Standards Committee has developed requirements for the new R-1234yf refrigerant to be used in future MAC systems. 'J2843 R-1234yf Recovery/Recycling/Recharging Equipment for Flammable Refrigerants for Mobile Air-Conditioning' and 'J2851 R-1234yf Refrigerant Recovery Equipment for Mobile Automotive Air-Conditioning Systems' are among the new SAE standards. It is anticipated that the new R-1234yf SAE Standards and Recommended Practices will be published in 2011. (Source: [www.prnewswire.com](http://www.prnewswire.com))

## Eco-friendly quarantine pre-shipment service in Indonesia

Export Service Centre Indonesia, a member of the non-profit Kearny Alliance based in the United States, now offers quarantine pre-shipment (QPS) service at its eco-friendly facility in Denpasar, Bali. Eco2 venture is a partnership between Export Service Centre Indonesia and the leading eco-friendly treatment provider, Eco2 B.V. of the Netherlands. It offers QPS treatment solutions for commodities, containers and cargo.

"Our 'green' QPS facility is critical to the future of Indonesia's exports," said Mr. Eugene Verspoor, General Manager of the Export Service Centre. "In 2013, methyl bromide will be phased out worldwide. The only alternative without the use of toxic gases is the QPS treatment based on the heat and low oxygen. For exporters, our system is also cost-effective, since they do not have to worry about extra costs incurred for clearing containers due to gas levels," he added.

Environmental concerns are top-of-mind in most importing countries. Worries over toxic gas, ozone layer depletion and global warming mean tighter scrutiny of containers and treatment methods. This means importers may face significant costs

if containers are quarantined. Some of these costs include: degassing fees of 600 euros and daily demurrage of 45 euros (plus handling charges); delayed delivery that may incur penalties and handling charges; and customers' complaints over toxic methyl bromide residue. (Source: [www.news.wiretoday.com](http://www.news.wiretoday.com))

## Viet Nam fully abides by rules concerning ozone depletion

An official from the Ministry of Natural Resources and the Environment, Viet Nam, avers that the country has strictly complied with the regulations of the Montreal Protocol, which Viet Nam ratified in 1994. Mr. Nguyen Khac Hieu, Vice Head of the Department of Hydro-Meteorology and Climate Change, made the assertion on 16 September, the International Day for the Preservation of the Ozone Layer, which has "Ozone layer protection: governance and compliance at their best" as this year's theme. He said that in recent years, Viet Nam has made a huge effort to synchronously apply both technological solutions and policies to closely control the import and export of ozone depleting substances. Viet Nam has also banned the import of devices that use chlorofluorocarbons (CFCs). By January 2010, Viet Nam had eliminated 500 tonnes of CFCs and 3.8 tonnes of halon.

The World Bank forecasts that in the next 15-20 years, Viet Nam will need about US\$20 million to completely phase out the use of hydrochlorofluorocarbon (HCFC), an ozone depleting substance mainly used in air-conditioning or cooling units. The Department of Natural Resources and the Environment is joining the World Bank in formulating a national plan to eliminate HCFC. This project is expected to be operational in 2011 and ensure a 10 per cent cut of the total consumption of HCFCs by 2015. (Source: [english.vovnews.vn](http://english.vovnews.vn))

## Bhutan advances its date with HCFC phase-out

The OzonAction Programme of the United Nations Environment Programme's Division of Technology, Industry and Economics (UNEP-DTIE) has been working closely with Bhutan's National Environment Commission Secretariat (NECS) in the development of Hydrochlorofluorocarbon (HCFC) Phase-

out Master Plan (HPMP) over a time frame of 20 years. Relevant ministries of the country and other national stakeholders have agreed to commit and collaborate in the implementation of HPMP. Bhutan has committed to phase out the consumption of HCFCs, mainly used in the refrigeration and air-conditioning servicing sector in large industrial establishments, hotels and resorts, corporate offices, government sectors and domestic servicing sector. The plan also involves policy and legislations, training and capacity building activities, and information outreach for HCFC phase-out.

"OzonAction Programme will work shoulder to shoulder with Bhutan to stop the consumption of this group of chemicals earlier than the Montreal Protocol phase-out deadline, as was done when CFCs were phased out by Bhutan" remarked Mr. Rajendra Shende, who heads OzonAction Programme. "Scaling the Himalayan peaks require excellent supply chain management. OzonAction would do exactly that by providing capacity building and technology support," added Mr. Shende. *Contact: Ms. Peldon Tshering, Chief Environment Officer, National Environment Commission Secretariat, P.O. Box 466, Thimphu, Bhutan. Tel: +975 (2) 323384; Fax: +975 (2) 323385; E-mail: [peldon@nec.gov.bt](mailto:peldon@nec.gov.bt). (Source: [www.unep.fr](http://www.unep.fr))*

## Pakistan contributing to save the ozone layer

Pakistan is playing important role to save the ozone layer from harmful impacts of ozone depleting substances (ODS) and promotion of ozone-friendly technology, said Federal Minister for Environment Mr. Hameedullah Jan Afridi, while addressing a high-level meeting with stakeholders to review future plans and strategies for ODS elimination.

On the occasion of the International Ozone Day, Mr. Afridi said there was need to take concrete measures for creating awareness about ozone depletion and environmental issues. He said to leave a green footprint and protect the ozone layer, old refrigerators and air-conditioner that employ non-ODS refrigerants and foams must be urgently replaced. Federal Secretary Mr. Muhammad Javed Malik, Additional Secretary Mr. Kamran Ali Qureshi, Environment Director General Mr. Javed Ali Khan and other stakeholders attended the meeting. (Source: [www.dailytimes.com.pk](http://www.dailytimes.com.pk))

# REFRIGERATION/ AIR-CONDITIONING

## New refrigerant receives ASHRAE designation

Genetron Performax LT refrigerant from Honeywell, the United States, has received the official designation of R-407F from the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE designations assign safety classifications for refrigerants based on toxicity and inflammability data. ASHRAE has rated Genetron Performax LT as "A1", indicating it has low toxicity and is non-inflammable.

According to Honeywell, Genetron Performax LT is designed to provide superior refrigeration performance in both new equipment and equipment that uses R-22. The refrigerant provides similar performance to R-22, but requires fewer equipment modifications than other R-22 retrofit alternatives. It offers improved energy efficiency and lower global warming potential than other HFCs.

Honeywell reports that Genetron Performax LT minimizes the power consumption of operating supermarket refrigeration systems. In comparably designed systems at design conditions, Genetron Performax LT can be 5-10 per cent more efficient than the industry standard R-404A, sources say. (Source: [contractingbusiness.com](http://contractingbusiness.com))

## HFC-based heat pump split system

Sanyo, a global company that is part of Panasonic Corporation based in Japan, has launched a new range of high efficiency air-to-water heat pump split systems, designed to provide low-cost, low-carbon heating and cooling for domestic and small commercial premises. The R410A-based range joins Sanyo's new 'Heating Solutions' range, which, when complete, will comprise a comprehensive offering of heat pump-based heating products.

The new split-type hydrofluorocarbon (HFC) system is available in capacities from 5 kW to 24 kW, and provides hot water at up to 50°C for use in underfloor heating and radiators, and hot and chilled water for heating and cooling via fan coils.

Equipped with quiet-running DC inverter-driven rotary compressors, the system is notably more efficient than traditional gas boilers, operating with a coefficient of performance (COP) of about 4.0 and cutting energy bills by 30 per cent or more.

The outdoor unit can be located up to 30 m from the indoor unit, giving great flexibility for locating it away from sight. The compact indoor unit has a high-efficiency plate heat exchanger, back-up electric heaters, water pump and central control panel. The control system uses a combination of ambient room sensors coupled with water temperature sensors to optimise energy performance and ensure perfect comfort conditions at all times. Outdoor and indoor units are connected by two small diameter refrigerant pipes. Because of the use of DC inverters, the system requires a very low starting current, typically around 2 A upon start-up. (Source: [www.plumbingpark.co.uk](http://www.plumbingpark.co.uk))

## Carbon dioxide cascade refrigeration system

In the United States, Fresh & Easy Neighbourhood Market has opened its first grocery store in southern California, employing a refrigeration system that uses carbon dioxide (CO<sub>2</sub>) refrigerant. This sub-critical CO<sub>2</sub> cascade refrigeration system – said to be one of only four in the United States – reduces the impact of the store's refrigeration on the ozone layer by about 70 per cent as compared with industry standards. By using a natural refrigerant, the system has an approximately 50 per cent lower global warming potential than traditional refrigerants.

The store also earned a silver certification award from the United States Environmental Protection Agency (EPA) GreenChill Partnership by meeting benchmarks for cutting emissions that harm the ozone layer and contribute to global warming. Fewer than 40 of the nation's 35,000 grocery stores have received GreenChill Store Certification awards. The energy efficiency characteristics of the new refrigerators include energy-efficient doors on dairy and freezer cases, and triple-pane glass with anti-fog coating on refrigerator doors so that no door heaters are needed for icing or fogging. Night curtains conserve energy while keeping product at the appropriate temperature overnight. (Source: [refrigeratedtrans.com](http://refrigeratedtrans.com))

## Breakthrough technology uses water as refrigerant

AquaStar Holdings Inc., the United States, will be introducing shortly its technology breakthrough that enables the unprecedented use of water as a refrigerant in residential, light-industrial and commercial air-conditioners, replacing environmentally hazardous chemical refrigerants. AquaStar air-conditioners reportedly exceed environmental regulations, setting a challenging new standard for ultra-efficiency Seasonal Energy Efficiency Ratio (SEER) rating, and delivering a remarkable electricity cost-savings to the consumer. *Contact: Aqua Star Holdings Inc., #2961 W. MacArthur Boulevard, Suite #214, Santa Ana, CA 92704, United States of America. Tel: +1 (949) 955 2721; E-mail: rfanderson@suti.com.* (Source: pr-usa.net)

## Refrigeration solutions with carbon dioxide refrigerant

CO2OLtec™ refrigeration systems from Carrier Kältetechnik Deutschland GmbH, Carrier Corporation's unit in Germany, offers sustainable, reliable state-of-the-art refrigeration solutions for low and medium temperature for all food retail store formats, which deliver a world-class low total equivalent warming impact (TEWI) rating. In general, the environment-friendly carbon dioxide (CO<sub>2</sub>) refrigerant installations provide improved energy efficiency by about 10 per cent in average in mild to cold climate conditions and no global warming impact due to refrigerant leak compared with a conventional hydrofluorocarbon (HFC) direct expansion refrigeration system.

The CO2OLtec refrigeration system features a proprietary passive oil management system for the refrigeration racks to ensure higher reliability. In the shop area and cold rooms, the working pressure is reduced to 35-40 bar compared with max. 120 bar necessary in a transcritical CO<sub>2</sub> refrigeration circuit. Specifically designed CO<sub>2</sub> compressors for direct expansion and high pressure system components are tested extensively for high reliability. *Contact: Carrier Kältetechnik Deutschland GmbH, Suerther Hauptstraße 173, 50999 Koeln (Cologne), Germany. Tel: +49 (2236) 60101; Fax: +49 (2236) 601154; E-mail: info@carrier-KT.de.* (Source: www.carrier-refrigeration.com)

## SOLVENTS

### Economical vapour degreaser

The Ensolv cleaning solution from Enviro Tech Europe, the United Kingdom, is said to be a suitable alternative to trichloroethylene (TCE) in vapour degreasing. It is an economical vapour degreaser that operates at 70°C, which equates to less energy, easier handling, faster throughput and lower usage, according to the company. Because EnSolv has physical properties and performance characteristics that nearly match TCE, it is a simple drop-in replacement that requires no special skills or equipment. Safe for operators, the solvent is non-inflammable and non-hazardous. *Contact: Enviro Tech Europe, Bermuda House, 45 High Street, Hampton Wick, Kingston upon Thames, KT1 4EH United Kingdom. Tel: +44 (208) 281 6370.* (Source: www.manufacturingtalk.com)

### Natural degreaser with sustainable chemistry

Daimler Industries, the United States, offers under Eco-Green® brand a new preparation named Ultra-Power™ Super Duty Degreaser. The new solvent applies advanced, microchemistry to the toughest cleaning applications. Ultra-Power degreaser preparation employs a sustainable green chemistry that has been laboratory tested to be non-hazardous to humans, animals and the earth. The preparation is manufactured without ozone-damaging ingredients, noxious solvents and toxic volatile organic compounds (VOCs). The natural degreaser was engineered to biodegrade at nearly twice the rate of competing degreasers. As with other Eco-Green solutions, the new formula registers perfect safety scores in the National Fire Protection Association (NFPA) hazard category.

Daimler's new natural degreaser applies a custom microscopic chemistry that breaks hydrocarbon bonds and dissolves gunk without dangerous solvent reactions. The green preparation is designed for use on a multitude of common and uncommon surfaces. Daimler sells the green chemical in a variety of sizes for a variety of budgets and needs. *Contact: Mr. Matt Baratta, Daimler Industries Inc., 16 Tower Office Park, Woburn, MA 01801,*

United States of America. Tel: +1 (781) 3934 900; E-mail: matt@daimer.com; Website: www.daimer.com. (Source: www.onlineprnews.com)

## Azeotrope and azeotrope-like compositions

Arkema France, along with three inventors, has filed for patenting azeotrope and azeotrope-like compositions consisting of chlorotrifluoropropene, iso-pentane, n-pentane, cyclo-pentane and their mixtures. The object of the present invention is to provide novel compositions that can serve as refrigerants, heat transfer fluids, blowing agents and solvents, which provide unique characteristics to meet the demands of low or zero ozone depletion potential (ODP) and lower global warming potential (GWP) as compared with the current hydrofluorocarbon (HFC) compositions.

The preferred compositions of the invention tend both to be low to non-inflammable and to exhibit relatively low GWPs. The applicants have found that such compositions can be used to great advantage in a number of applications, including as replacements for chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and HFCs (such as HCFC-23, HFC-134a, HFC-245fa, HFC-365mfc) in refrigerant, aerosol and other applications. Additionally, applicants have recognized that azeotrope or azeotrope-like compositions of chlorotrifluoropropene – particularly 1-chloro-3,3,3-trifluoropropene (HCFO-1233zd) – and iso-pentane, n-pentane, cyclo-pentane and mixtures thereof can be formed. Thus, the invention also provides methods of producing an azeotrope-like composition using these chemicals. *Contact: Arkema France, 420, rue d'Estienne d'Orves, F-92700 Colombes, France.* (Source: www.wipo.int)

## Low running cost options for PCB cleaning

Guyson International, the United Kingdom, is providing a range of Kerry ultrasonic precision cleaning systems that ensures low running costs for medium to high volume printer circuit board (PCB) assemblers. The Kerry Microsolve Co-solvent systems achieve cleanliness standards to specifications including British Standards (BS), Institute for Printed Circuits (IPC), European

Space Agency (ESA) and United States Military Standard (MIL SPEC). The co-solvent process defluxes all types of PCBs, assembled and re-worked, removes no-clean solder flux residues, and eliminates the white deposits associated with traditional single solvent and water-based detergent processes.

The Kerry co-solvent system has two ultrasonic, heated cleaning stages equipped with continuous filtration. In the first stage, a mixture of hydro-fluoroether (HFE) solvent and a hydrocarbon solvating agent removes gross contamination. Large quantities of flux and general contamination can be taken up by the solvating agent, making the process particularly suitable for high volume cleaning with minimal tank maintenance. In the second stage, pure HFE solvent removes residues carried over from the first cleaning tank. Vapour rinsing follows, then freeboard drying. *Contact: Mr. Simon Bridge, Guyson International Limited, Snaygill Industrial Estate, Keighley Road, Skipton, North Yorkshire BD23 2QR, United Kingdom. Tel: +44 (1756) 799911; Fax: +44 (1756) 790213; E-mail: simon.bridge@guyson.co.uk.* (Source: www.onlineprnews.com)

## Vapour degreasing with no ozone depletion

The components of Lenium HFT have been accepted by the Significant New Alternatives Policy (SNAP) of the United States Environment Protection Agency (EPA) as an alternative to ozone-depleting substances. Lenium HFT forms part of Lenium range of vapour degreasing solvents from Petroferm Cleaning Products, the United States.

Lenium HFT removes difficult materials, including fluorinated fluids, hydraulic oils, metalworking fluids and greases. It is suitable for vapour-degreasing equipment and 'cold cleaning' applications. The solvent is suitable for replacing trichloroethylene, perchloroethylene, methylene chloride, HCFC-225, HCFC-141b and n-propyl bromide (nPB). The blend is a low global warming potential cleaner with zero ozone depletion potential. *Contact: Petroferm Cleaning Products, 3938 Porett Drive, Gurnee, Illinois 60031, United States of America. Tel: +1 (847) 244 3410; Fax: +1 (847) 249 6346; E-mail: customerservice@petroferm.com.* (Source: www.manufacturingtalk.com)

## Proprietary solvent blends

Poly Systems USA Inc., the United States, offers Solvon® series solvent blends consisting of high-purity n-propyl bromide (nPB) and pentafluorobutane (pFB). This Solvon® series is formulated especially to replace chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC) solvents such as CFC-113, HCFC-141b and HCFC-225ca/cb.

Currently, there are three members in this series. Solvon FB2 is very mild, with high surface wetting and medium evaporation rate. Solvon FB5 is mild, with high surface wetting and high evaporation rate. Solvon FB7 is less mild, and has the highest surface wetting and low evaporation rate among the three. All three solvents are tailored for cold cleaning and deposition applications. They can be utilized as a vehicle to deliver and deposit of various dispersion mixtures, such as lubricants and coatings.

Application can be as aerosol, pre-saturated wipes, sprays, swabs and cold immersion washes. The solvents remove light, medium and heavy duty oils and greases, waxes, polishing compounds, buffing compounds, release agents, hydraulic fluids, particulates and lubricants, besides no-clean fluxes on optical components, composites, printed circuit boards, electromechanical devices, electronic components, computers, ceramics, connectors, relays, medical devices, moulds, tape-heads, etc.

Solvon solvents are compatible with metals (brass, aluminium, copper steel, stainless steel, carbon-steel, nickel, silver, gold, etc.), glass, ceramics, composites, plastics, polymers and elastomers. *Contact: Poly Systems USA Inc., P.O. Box 49, 39 Avenue C, Bayonne, NJ, 07002, United States of America. Tel: +1 (800) 696 9520; Fax: +1 (201) 437 1628.* (Source: [www.solvon.com](http://www.solvon.com))

### OzonAction Communication Strategy

OzonAction Communication Strategy for Global Compliance with the Montreal Protocol presents a path by which the Clearinghouse will evolve according to the ongoing political, environmental and communications trends, and develop and deploy efficient strategic approaches for information, communication and education delivery to Article 5 Countries. For additional information, contact:

UNEP DTIE OzonAction Programme  
15 rue de Milan, 75441, Paris, France  
Tel: +33 (1) 4437 1457; Fax: +33 (1) 4437 1474  
E-mail: [ozonaction@unep.org](mailto:ozonaction@unep.org)

## FOAMS

### Thermoplastic foam blowing agent combination

Along with two inventors, Arkema Inc., the United States, has filed a patent application on a blowing agent for thermoplastic foams such as extruded polystyrene foam. The blowing agent is a blend of a low solubility blowing agent – such as 1,1,1,2-tetrafluoroethane – and a dichloroethylene – such as trans-1,2-dichloroethylene (TDCE). The blowing agent combination enhances processability of thermoplastic foam when foaming thermoplastics with blowing agents, particularly hydrofluorocarbons (HFCs) such as HFC-134a.

It was found that adding a small amount TDCE to a foamable thermoplastic composition being blown with low solubility blowing agent can lower the required operating pressure and limit premature degassing – two critical issues when using HFC-based blowing agents. This results in better control of the foaming process in the production of thermoplastic foams, such as open-cell or closed-cell styrenic insulating foams. Adding TDCE can also improve the solubility of the blowing agent in the resin mix, allowing for more blowing agent to be added. This allows for lower density, closed-cell foam to be produced than when the blowing agent is used without TDCE. Increasing the blowing agent (like HFC-134a) loading by increasing the solubility in the resin can result in improvement in the insulating performance of the closed-cell foam. (Source: [www.freepatentsonline.com](http://www.freepatentsonline.com))

### Foaming poly(methyl methacrylate) with CO<sub>2</sub>-isopropanol mixture

Mr. Richard Gendron, Industrial Materials Institute of National Research Council Canada, and Mr. Pierre Moulinie, Bayer Polymers LLC-Americas, the United States, have studied a mixture carbon dioxide (CO<sub>2</sub>) and 2-propanol (PrOH) as foaming agents for poly(methyl methacrylate). CO<sub>2</sub> gas was dissolved in liquid PrOH to form a homogeneous liquid mixture into the extruder. The system has the advantage of the CO<sub>2</sub>/PrOH ratio remaining stable, and the mixture being easily metered with a suitable pump.

While the poly(methyl methacrylate) foamed with this equilibrium mixture was similar to foams prepared with separately injected CO<sub>2</sub> and PrOH, there appears to be synergistic effects on the plasticization of poly(methyl methacrylate), the researchers report. Furthermore, a delay in the onset of cell nucleation for PFA mixtures in which CO<sub>2</sub> was the main component was also noted. *Contact: Mr. Richard Gendron, Industrial Materials Institute, National Research Council Canada, 75 De Mortagne Boulevard, Boucherville, Quebec J4B 6Y4, Canada. E-mail: richard.gendron@cnrc-nrc.gc.ca.* (Source: cel.sagepub.com)

## HFC-245fa spray PU foam systems co-blown with water

Researchers from Alliedsignal Inc., the United States, and AlliedSignal Europe N.V., Belgium, have investigated spray polyurethane (PU) foam systems co-blown with HFC-245fa and water as alternatives to HCFC-141b blowing agent in the construction sector. Industry evaluations have shown that HFC-245fa produces foams with the highest insulation value of any alternative blowing agent.

The higher vapour pressure of HFC-245fa and its potential impact on packaging have been a concern to the spray foam industry. The new study provides data on the use of HFC-245fa foam systems co-blown with water, which meet the needs of the spray foam market. They are cost-effective, produce foams with low k-factors and good physical properties, and can be stored and shipped in existing drums. This will allow applicators and manufacturers to safely use existing equipment without significant modifications or safety concerns.

HFC-245fa and water used as co-blowing agents provide a wide range of benefits in spray foam. Since less HFC-245fa is used, the vapour pressure is lower, and the cost of the system is reduced while improving the physical properties of the foam. There is, however, an increase in k-factor. The researchers have determined that the addition of low levels of alpha-methyl styrene to a spray foam polyol blend lowers the vapour pressure of the polyol blend and enhances the k-factor of the foams produced. This allows the user to optimize k-factor while lowering the cost. The study

concluded that HFC-245fa/water co-blown spray foam is a quality, cost-effective and safe alternative to HCFC-141b-blown foams. *Contact: Ms. Mary Bogdan, Alliedsignal Inc., 20 Peabody St., Buffalo, New York, NY 14210, United States of America.* (Source: cel.sagepub.com)

## Polymer foam with low bromine content

Dow Global Technologies Inc., the United States, and four inventors have jointly applied for patenting a process to prepare extruded polymer foam comprising an alkenyl aromatic polymer, a brominated flame retardant, a hydrobromic acid scavenger, graphite and organic compounds, and using a blowing agent composition comprising a polymer and blowing agents having an ozone depletion potential of zero and a global warming potential that is less than 1,000.

The extruded polymer foam comprises at least 50 wt% alkenyl aromatic polymer, 0.8-1.4 wt% bromide, 0.05-0.5 wt% hydrobromic acid, at least 1.5 wt% graphite and less than 0.1 wt% C-C and O-O labile organic compounds. It passes the German B2 fire test without requiring 0.1 to 0.5 wt% of C-C or O-O labile organic compounds, while comprising 1.4 wt% or less bromide. Surprisingly, 1.4 wt% bromide in combination with a hydrobromic acid scavenger is adequate to provide extruded polymeric foam with sufficient flame resistance to pass the German B2 fire test of DIN4102. The process invented comprises the following steps:

- Providing in an extruder a foamable polymer composition at an initial temperature at or above its softening temperature and at an initial pressure that precludes its foaming;
- Exposing the foamable polymer composition to a pressure that is below the initial pressure and that allows the foamable polymer composition to expand into a polymer foam; and
- Allowing the foamable polymer composition to expand into polymer foam.

The polymeric foam of the present invention is useful, for example, as thermal insulating material. *Contact: Dow Global Technologies Inc., 2040 Dow Centre Midland, MI 48674, United States of America.* (Source: www.wipo.int)

## New foam-forming compositions

Insulating foams depend on the use of halocarbon blowing agents, not only to foam the polymer, but primarily for their low vapour thermal conductivity, a very important characteristic for insulation value. Along with two inventors, E.I. Du Pont de Nemours and Co., the United States, has filed for a patent on foam-forming compositions that contain a mixture of cis-1,1,1,4,4,4-hexafluoro-2-butene and 1,1,1,3,3-pentafluoropropane. The application also covers a closed-cell polyurethane or polyisocyanurate polymer foam prepared from reaction of an effective amount of the foam-forming composition with a suitable polyisocyanate, suitable for use in insulation purposes, for example, in building construction and in the manufacture of energy efficient electrical appliances. *Contact: E.I. Du Pont de Nemours and Co., 1007 Market Street, Wilmington, Delaware, DE19898, United States of America.* (Source: [www.wipo.int](http://www.wipo.int))

## Foam-forming system with reduced vapour pressure

Bayer MaterialScience LLC, the United States, together with an inventor, has applied for patent on a foam-forming system that generates lower vapour pressure. The patent covers an isocyanate-reactive composition containing a blowing agent, which includes HFC-134a and water, and characterized by a vapour pressure that is lower than that of comparable compositions without the stabilizing composition of the invention. The stabilizing composition of the invention includes an ethoxylated nonylphenol and propylene carbonate. This composition is included in the isocyanate-reactive composition in an amount sufficient to promote the solubility of the blowing agent.

The new composition may be stored at ambient conditions rather than under pressure for periods as long as 3 months. It may be hand-mixed with an isocyanate to produce a rigid polyurethane foam having good physical properties. It comprises: an isocyanate-reactive material, such as a polyether polyol or a polyester polyol; HFC-134a; water; a nonylphenol ethoxylate; and propylene carbonate. *Contact: Bayer MaterialScience LLC, 100 Bayer Road, Pittsburgh, Pennsylvania, PA 15205-9741, United States of America.* (Source: [www.wipo.int](http://www.wipo.int))

## HALONS

### Self-contained compressed air foam systems

ACAF Systems Inc., the United States, is launching an innovative, cost-effective and self-contained fire suppression system based on compressed air foam (CAF). The SC Series fire suppression products from ACAF Systems form the next generation in foam fire suppression, says Mr. David Munroe, President of the company.

The core machine is a pre-fabricated CAF generator, which contains the special combination of nitrogen gas tanks as well as mechanical fixtures. There is no water, electricity or motor fuel. From this central unit, three diverse options exist that can be tailored to fit the unique fire hazard or challenging situation: Automatic Fixed Pipe Spray System, Automatic Fire Hose Reel System, and Automatic Oscillating Monitor System.

The special foam is non-toxic, environmentally safe and easy to clean after discharge. It is a special mix of an aqueous film-forming foam concentrate and water that contains no solvents, but only vegetable-based materials. The foam is non-corrosive and suitable for liquid hydrocarbon fires and all Class A fires. At the heart of this special foam agent is compressed nitrogen, the power that drives the system and creates the CAF. *Contact: David Munroe, president, ACAF Systems Inc., 6 Grand View Street, Coventry, Rhode Island, RI 02816, United States of America. Tel: +1 (401) 828 9787; Fax: +1 (401) 828 9788; E-mail: [info@acafsystems.net](mailto:info@acafsystems.net).* (Source: [www.acafsystems.net](http://www.acafsystems.net))

### Water mist system: a halon alternative solution

The Centre for Fire, Explosive & Environment Safety (CFEES) of Defence Research and Development Organization (DRDO), India, has developed water mist technology for fire suppression in defence applications. The fixed system has been tested, evaluated and validated as per international standards and has been accepted for incorporation into submarines. CFEES has also developed portable handheld water mist system

to be used as the first fire fighting system, especially in open areas. Atomizers of different design were developed to generate the mist of droplet size less than 100  $\mu\text{m}$  and these atomizers were characterized for droplet size distribution and mist generation rate.

Water mist is created by a gun in which two fluids – water and air – are mixed at a low pressure (less than 15 bar). The portable water mist system has been successfully tested as per EN 3-7:2004. The technology was validated for fire suppression up to 3 MW fire in 590 M3 fire simulation chamber as per International Maritime Organization protocol (IMO CIRC 1165) and all fire were suppressed within 60 seconds. The technology, which has been accepted for onboard installation in underwater naval vessels, has been transferred to the industry for bulk production. *Contact: Mr. Suresh Lal, Additional Director, Centre for Fire, Explosive & Environment Safety, Defence Research and Development Organization, Ministry of Defence, Brig. S.K. Mazumdar Marg, New Delhi 110 054, India.* (Source: CFEES, New Delhi)

## Clean agent fire extinguishing system

Wilhelmsen Ships Equipment – part of Norway's Wilh. Wilhelmsen Holding ASA – has industrialized its Sevo Novec 1230 System for the offshore and maritime industry. The Unitor 1230 Clean Agent Fire Extinguishing System is an environmentally friendly alternative, with limited impact on the environment and is harmless to people. The system can be applied on merchant marine and offshore structures, as design is in accordance with International Convention for the Safety of Life at Sea (SOLAS). The system is approved by all major classification societies.

Unitor 1230 Clean Agent is designed as a total flooding system for Category A machinery spaces, cargo pump rooms on tankers, LNG carrier cargo compressors rooms and other spaces onboard vessels or on offshore installations needing fire protection. The system is applicable where space is at a premium. It can protect switchboard rooms and computer service installations. It is an excellent solution for halon retrofitting. With Unitor 1230 Clean Agent's stored pressure of 34.5 bar, existing piping arrangements can be utilized for

halon retrofits. The system has the largest nozzle coverage designed specifically for the offshore and marine industry, with a unique nozzle discharge pattern. It has small pipe dimensions, saving installation space, weight and lowering total installation cost.

The company offers a complete design, documentation and system delivery with an option to install and commission. *Contact: Wilh. Wilhelmsen Holding ASA, P.O. Box 33, NO-1324 Lysaker, Norway. Tel: +47 6758 4000; Fax: +47 6758 4080.* (Source: [www.wilhelmsen.com](http://www.wilhelmsen.com))

## Technology for halon decomposition treatment

In Japan, as part of the efforts to resolve global environmental issues, Chubu Electric and Chukyo Fron Co. Ltd. have jointly developed a halon decomposition treatment technology that realizes a high level of decomposition performance. Halons contribute to global warming and the destruction of the ozone layer, their manufacture has been prohibited since 1994 under international treaty. Existing stocks of halons, as well as collected and recycled halons, in the country are managed by a specified non-profit corporation, but it is predicted that the amount of unused halons will increase in future as they are replaced by alternative fire-extinguishing agents.

Chubu Electric has therefore developed a halon decomposition treatment technology utilizing its solid alkali reaction method. In this original method of treatment, halons are decomposed in a direct reaction with an electrically heated solid alkali reactant (such as lime), enabling the production of toxic by-product gases associated with halons, such as bromine, to be controlled. On-field trials of the halon decomposer conducted by the two companies have shown that the technology can achieve a high level of decomposition, satisfying the standard values specified by the Guidelines on the Destruction of Halon in Japan. Because the method employed by the system does not involve combustion, it is ideally suited to the decomposition of the expected excess halon stock. *Contact: Mr. Koji Futora, President, Chukyo Fron Company Ltd. 1-605 Yoshizu, Nagoya City, Aichi Prefecture, Japan. Tel: +81 (52) 433 0088.* (Source: [www.chuden.co.jp](http://www.chuden.co.jp))

## FUMIGANTS

### Method to reduce pest infestations in stored food

In the United States, an entomologist and food storage expert from South Carolina State University has highlighted the need for continual food storage monitoring. "Infestation could happen at any point from the farm to the table," Dr. Rizana Mahroof said. "When you store any grain, you have to regularly monitor new samples." In an effort to help reduce infestations and mitigate losses in the food industry, Dr. Mahroof conducted a research study that would reduce insect infestations in stored products such as wheat, corn, rice, other cereal grains, grain-based products, spices and nuts through the development and use of environmentally conscious pest management practices. Working with entomologists from Clemson University and Kansas State University, she used insect-produced pheromones to disrupt communication among insects, which ultimately suppresses their population.

After both lab and field trials, Dr. Mahroof said it was discovered that by releasing the non-toxic pheromones in a high concentration through a dispenser, the insects would become confused and gravitate towards the pheromones and exit the grains. The mating is then postponed and disrupted, she said. (Source: thetandd.com)

### Planting density for grafted melon as methyl bromide alternative

One of the major challenges of melon (*Cucumis melo* L.) yield is the decrease of fruit yield and quality caused by soil diseases. Soil disinfection with methyl bromide (MBr) has been used to prevent soil-borne diseases damage. Researchers from joint projects of the United Nations Industrial Development Organization (UNIDO) with Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) of Mexico and with Advanced Polytechnic School of Spain have investigated planting density of grafted melon as an alternative to MBr.

Field experiments were carried out in open fields in soils infested with *Fusarium oxysporum* f. sp.

*melonis*, *Olpidium bornovanus* and Melon Necrotic Spot Virus (MNSV) in Colima, Mexico, where melons (American cantaloupe) had been grown previously using soil fumigation with MBr. Yield and quality of melon cultivar Cruiser F1 grafted on two rootstocks of *Cucurbita maxima* Duchesne (RS841) and *C. moschata* Duchesne (Shintosa camelforce) were evaluated during two consecutive years. Each experiment had five treatments, two of which with non-grafted plants at a density of 18,519 plants/ha, with and without MBr fumigation. The other three treatments consisted of grafted plants in non-fumigated soil with plant densities of 14,815, 11,111, and 9,260 plants/ha.

The use of melon grafted on RS841 and Shintosa camelforce rootstocks significantly increased the average fruit weight, the total yield and desirable traits of melons in soil without the need for MBr. Grafting may thus be considered an alternative to MBr fumigation, the researchers concluded. With the use of grafted melon plants, planting density may be reduced by 60 per cent, obtaining higher yields than those obtained from non-grafted plants grown on fumigated land. *Contact: Dr. M.V. Huitrón-Ramírez, UNIDO/SEMARNAT, Instituto Tecnológico de Colima – México, Puente de Tecamachalco No. 26 Interior 3, C.P. 11000 Mexico, D.F., Mexico.* (Source: www.sciencedirect.com)

### Soil fumigant receives registration

Arkema, France, has been granted registration by the United States Environmental Protection Agency (EPA) for Paladin®, an innovative, pre-plant soil fumigant that is very effective against nematodes parasites, weeds and soil-borne plant pathogens. Paladin is a new and effective soil fumigant pesticide based on dimethyl disulphide – a substance derived from sulphur – for substitution of methyl bromide. Paladin has no ozone depletion potential, a low global warming potential and is short-lived in the atmosphere. It is registered for pre-plant use for tomato, pepper, melon, eggplant, cucumber, strawberry, ornamental and forest nursery crops. Paladin has been shown to be very effective on its own in the control of parasitic nematodes. When applied together with chloropicrin, Paladin effectively controls most soil-borne plant pathogens and a wide range of weeds, including yellow and purple nutsedge. (Source: www.arkema-inc.com)

## RECENT PUBLICATIONS

### Manual for the Refrigeration and Air-conditioning Technicians and Engineers

It is an e-book for people who are involved in training and organization of service and maintenance of refrigeration and air-conditioning (RAC) systems. It is aimed at technicians and managers who are engaged in service and maintenance; RAC trainers and course developers in educational establishment; and National Ozone Units responsible for servicing and maintenance regulations and programmes related to the Montreal Protocol. The overall thrust of this manual is to encourage technicians to work with systems in an environment-friendly manner, and to get the equipment itself to have a lower impact.

Contact: UNEP DTIE OzonAction Branch, 15 rue Milan, 75441 Paris Cedex 09, France. Tel: +33 (1) 4437 1450; Fax: +33 (1) 4437 1474; E-mail: [ozonaction@unep.org](mailto:ozonaction@unep.org).

### 2010 ASHRAE Handbook – Refrigeration

The 2010 *ASHRAE Handbook – Refrigeration* covers the refrigeration equipment and systems for applications other than human comfort. This book includes information on cooling, freezing, and storing food; industrial applications of refrigeration; and low-temperature refrigeration. Meant as a reference for the practicing engineer, this volume is also useful for anyone involved in cooling and storage of food products. An accompanying CD-ROM contains all the volume's chapters in both I-P and SI units. This edition includes two new chapters: one on carbon dioxide refrigeration systems, and the other covering the terminology of refrigeration. Chapter order and groupings have been revised for more logical flow and use.

Contact: Handbook Editor, American Society of Heating, Refrigerating and Air-Conditioning Engineers Inc. (ASHRAE), 1791 Tullie Circle, Atlanta, GA 30329, United States of America.

## TECH EVENTS

**02-05 Nov**  
Orlando  
United States

**2010 Annual International Research Conference on Methyl Bromide Alternatives & Emissions Reductions**  
Contact: Methyl Bromide Alternatives Outreach,  
6556 N. Dolores Avenue,  
Fresno, California, CA 93711,  
United States of America.  
Tel: +1 (559) 449 9035;  
Fax: +1 (559) 449 9037;  
Website: <http://mbao.org>.

**08-12 Nov**  
Bangkok  
Thailand

**22nd Meeting of the Parties to the Montreal Protocol**  
Contact: The Ozone Secretariat,  
United Nations Environment Programme (UNEP),  
United Nations Avenue,  
Gigiri, P.O. Box 30552,  
Nairobi 00100, Kenya.  
Tel: +254 (20) 762 3851, 762 3611;  
Fax: +254 (20) 762 4691, 762 4692;  
E-mail: [ozoneinfo@unep.org](mailto:ozoneinfo@unep.org).

**02-03 Dec**  
Kobe  
Japan

**International Symposium on New Refrigerants & Environmental Technology 2010**  
Contact: JRAIA Symposium Desk,  
c/o Kinki Nippon Tourist Co. Ltd.,  
Global Business Management Branch,  
Tokyo Kintetsu Building, 6F,  
19-2 Kanda-Matsunagacho,  
Chiyoda-ku, Tokyo 101-8641,  
Japan.  
Tel: +81 (3) 5256 1581;  
Fax: +81 (3) 5256 1588;  
E-mail: [jraia2010-gb@or.knt.co.jp](mailto:jraia2010-gb@or.knt.co.jp);  
Website: [www.jraia.or.jp](http://www.jraia.or.jp).

**2011**

**07-09 Apr**  
Shanghai  
China

**CHINA REFRIGERATION EXPO 2011**  
Contact: Ms. Lu Peng,  
Beijing International Exhibition Centre,  
F/6, Henghua International Mansion,  
College of Engineering & Petroleum,  
26 Yuetanbeijie, Xicheng District,  
China 100045.  
Tel: +86 (10) 58565888;  
Fax: +86 (10) 58566000;  
E-mail: [penglu@biec.com.cn](mailto:penglu@biec.com.cn).

**10-11 May**  
Duesseldorf  
Germany

**Blowing Agents & Foaming Processes 2011**  
Contact: iSmithers,  
Shawbury, Shropshire,  
SY4 4NR, United Kingdom.  
Tel: +44 (1939) 250383, 252421;  
E-mails: [info@ismithers.net](mailto:info@ismithers.net);  
[conferences@ismithers.net](mailto:conferences@ismithers.net);  
Website: [www.ismithers.net](http://www.ismithers.net).

## PUBLICATIONS from APCTT

### PERIODICALS

(Free access at [www.techmonitor.net](http://www.techmonitor.net))

- Asia Pacific Tech Monitor (6 issues/year) (e-version)
- VATIS Update (6 issues/year)
  - Biotechnology (e-version)
  - Non-conventional Energy (e-version)
  - Food Processing (e-version)
  - Ozone Layer Protection # (e-version)
  - Waste Management (e-version)

### BOOKS

	Indian Rupees* (India, Bhutan and Nepal)	US Dollars*
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| <input type="checkbox"/> Managing Innovation for the New Economy: Training Manual, 2002<br>Volume 1: How to Guide & Quick reference materials<br>Volume 2: Articles & Lectures   | 1,000.00                             | 50.00                            |
| <input type="checkbox"/> Regional Capacity-building for the Adoption of ISO-14000 and<br>Transfer of Environmentally Sound Technology: Training Manual, 2000   | 600.00                               | 30.00                            |
| <input type="checkbox"/> Small Rural Industries in the Asia Pacific Region: Enhancement of<br>Competitiveness of Small Rural Industries in a Liberalized Economic<br>Environment and the Impact of Poverty Alleviation, 2000   | 600.00                               | 30.00                            |
| <input type="checkbox"/> Technology Transfer and Technological Capacity-building in Asia<br>and the Pacific <ul style="list-style-type: none"> <li><input type="radio"/> Volume 1: Big Countries and Developed Economies, 1999</li> <li><input type="radio"/> Volume 2: ASEAN, NIEs, SAARC and the Islamic Republic<br/>of Iran, 1999</li> <li><input type="radio"/> Volume 3: Least Developed and Pacific Island Countries and<br/>Economies in Transition, 1999</li> <li><input type="radio"/> Volume 4: Emerging Issues in Regional Technological Capability-<br/>building and Technology Transfer, 1999</li> </ul> | 600.00<br>600.00<br>600.00<br>600.00 | 30.00<br>30.00<br>30.00<br>30.00 |
| <input type="checkbox"/> Rural Industrialization as a Means of Poverty Alleviation: Report of<br>the Regional Seminar on the Enhancement of Partnerships among<br>Governmental, Non-governmental and Private Sector Entities for the<br>Promotion of Rural Industrialization for Poverty Alleviation, 1999   | 600.00                               | 30.00                            |
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| <input type="checkbox"/> Development and Utilization of S&T Indicators: Emerging Issues in<br>Developing Countries of the ESCAP Region, 1998   | 300.00                               | 15.00                            |
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| <input type="checkbox"/> Proceedings of the Consultative Meeting on Technology Management<br>Education and Training for Developing Countries, 1997   | 800.00                               | 40.00                            |

*Notes: Amount less than Rs 500 should be sent through a demand draft only. Otherwise, payment should be made by cheque/ demand draft/UNESCO coupon in favour of the Asian & Pacific Centre for Transfer of Technology, payable at New Delhi.*

*\* Print version supported by the Ozone Cell, Ministry of Environment & Forests, Government of India, for distribution to a select target group.*

*\* Amount to be sent to APCTT with the order for covering costs and handling charges.*