VATIS UPDATE

Ozone Layer Protection

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Highlights

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UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

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ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY

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MINISTRY OF ENVIRONMENT AND FORESTS
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The Centre will achieve the above objectives by undertaking such functions as:

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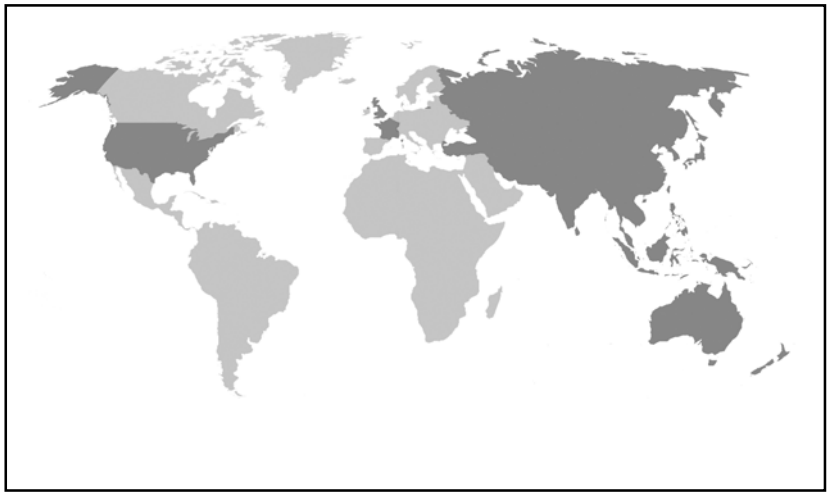
- Networking and partnership with international organizations and key stakeholders; and
- Training of national personnel, particularly national scientists and policy analysts.



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

Cover Photo

R134A refrigerant

(Credit: Hangzhou Fuming Refrigeration Co., Ltd., China)

VATIS* Update
Ozone Layer Protection
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SCIENCE OF THE OZONE LAYER

Antarctic ozone hole the smallest in five years

International efforts to phase out the use of chlorofluorocarbons (CFCs) and other ozone depleting substances (ODS) may be paying off, according to research carried out by the National Institute of Water and Atmospheric Research (NIWA) in New Zealand. The Antarctica ozone hole is the smallest it has been in the past five years, NIWA said. While a one-year reduction in the ozone hole can't indicate a recovery stage, NIWA's atmospheric experts say the new information adds to a pattern of less severe ozone holes in recent years.

Satellite data combined with ground-base measurements, including the Antarctica New Zealand Arrival Heights observatory near Scott Base, show the hole reached a maximum area of about 22 million square kilometres and a 27 million tonnes deficit of ozone this year, compared with 24 million square kilometres and a 35 million tonnes deficit last year. The largest hole was 29 million square kilometres and a 43 million tonnes deficit, recorded in 2000 and then repeated in 2006, according to NIWA.

"We see a lot of year-to-year variation in ozone holes, caused by differences in atmospheric temperature and circulation," said NIWA atmospheric scientist Dr. Stephen Wood in a statement. "So we can't definitively say the ozone hole is improving from one year of observations." Noting that there have now been a few years in succession with less severe holes, Dr. Wood observed that it was "an indication we may be beginning to see a recovery". Continued monitoring and measurements might reveal soon if "we are really seeing the start of a sustained, long-term recovery," Dr. Wood added. (Source: www.msnbc.msn.com)

Ozone layer's future linked strongly to climate change

The ozone layer faces potential new challenges even as it continues its recovery from earlier damage, according to a recently released international science assessment. The report, prepared by the Scientific Assessment Panel of the United Nations Montreal Protocol on Substances that Deplete the Ozone Layer, also presents stronger evidence that links changes in stratospheric ozone and the Earth's climate. The 2010 assessment was carried out under the auspices of the United Nations Environment Programme and the World Meteorological Organization. It involved more than 300 international scientists as authors and reviewers.

The report finds that over the past decade, global ozone levels, and ozone levels in the Arctic and Antarctic regions, are at a turnaround point – not decreasing, but not increasing either. The abundances of ozone depleting substances (ODS) in the atmosphere are responding as expected to the controls of the Montreal Protocol, with many now declining in both the lower and upper atmosphere. By successfully controlling the emissions of ODS, the Montreal Protocol has been beneficial also for the climate, because many of these substances are heat trapping, or greenhouse, gases that are linked to the Earth's warming.

Dr. A.R. Ravishankara, Director of Chemical Sciences Division, United States National Oceanic and Atmospheric Administration (NOAA), and co-chair of the Scientific Assessment Panel that produced the report, affirms that the Montreal Protocol has succeeded in protecting the ozone layer from much higher levels of depletion. "But the ozone layer will increasingly be influenced by other factors related to the changing climate," he adds. For example, climate change alters the atmosphere's temperature and circulation patterns, which in turn affect the processes that deplete the ozone layer. Effects also work in reverse: changes in the ozone layer have been linked to the shifts in seasonal surface winds noted over the Southern Hemisphere, contributing to the warming of the Antarctic Peninsula and the cooling of the high plateau. (Source: www.noaanews.noaa.gov)

Ozone layer hits record thickness in Sweden

Sweden's government weather agency reported recently that the ozone layer over its southern part reached its thickest levels at the end of 2010, surpassing the previous record set in 1991. Sweden's Meteorological and Hydrological Institute (Sveriges

Meteorologiska och Hydrologiska Institut, SMHI) explained that the weather was particularly favourable at the end of 2010 and it explained why the ozone layer was especially thick at the time.

In 2010, the annual value of the ozone layer's thickness over Norrköping stood at a new high of 351.7 Dobson units (DU). The previous record was set in 1991 at 341.8 DU. The November and December values in particular set up new records among the measurements regularly made at SMHI since 1988. "It is a step in the right direction, but it is still too early to say that the ozone layer has recovered. The favourable weather situation over the last few months has contributed to a record high," stated Dr. Weine Josefsson, a SMHI meteorologist.

Even in Norrland in the country's north, the values have been positive in the last two months of 2010. Air flows were affected by a special weather situation over western Europe, resulting in an extra thick ozone layer over this part of the world in these two months. It is possible that the Montreal Protocol restrictions on ozone depleting substances have also contributed to the thickening of the ozone layer. However, this type of measure is effective only over a long period of time and it is difficult to distinguish the effect of natural variations in this case.

Variations in ozone layer thickness can differ much from one day to the next. Last year also started with a wide variation, which is typical in the winter. The thickness in the spring was pretty normal, while the summer began with a slight surplus in June, then a certain deficit in July and a small surplus in August. In the autumn, the thickness was above normal and beat a monthly record in November. This was followed by yet another record month in December, beating the previous record in 2009. 2011 has begun with more normal values. (Source: www.thelocal.se)

Informal Prior Informed Consent on Trade of Ozone Depleting Substances (iPIC)

The informal Prior Informed Consent on Trade of Ozone Depleting Substances (iPIC) is a voluntary and informal mechanism of information exchange on intended trade between the authorities in importing/exporting countries, which are responsible for issuing ozone depleting substances (ODS) trade licenses. For further information, contact:

UNEP DTIE OzonAction
E-mail: OzonAction@unep.org

ODS PHASE-OUT IN INDIA

India-United States workshop on hydrofluorocarbons

On 18 February 2011, India hosted a Joint India-United States workshop on hydrofluorocarbons (HFCs) in New Delhi. The workshop was led on the Indian side by the Minister of State (Independent Charge) for Environment and Forests, Mr. Jairam Ramesh, and from the United States side by Deputy Assistant Secretary of State for Environment, Mr. Daniel A. Reifsnyder. Besides government representatives, the workshop was attended by a large number of industry participants from both India and the United States. Civil society groups from the two countries, as well as observers from the European Union, were also present at the event.

Speaking at the event, Mr. Jairam Ramesh noted that India has been a responsible participant in the Montreal Protocol, which has made available both technology and finance (about US$300 million over a 10-12 year period) to India. India made the transition out of chlorofluorocarbons (CFCs) by August 2008, 17 months in advance of its commitment. India has already unveiled a roadmap to phase out hydrochlorofluorocarbons (HCFCs) by 2030. In addition, the nation recognizes the importance of addressing the problem of HFCs, a chemical that impact on the climate, because of the country's multiple vulnerabilities to climate change.

The Minister stressed on the need to think innovatively and consider action at four levels. First, action at the multilateral level through, for example, new or modified international treaties and multilateral funds. Second, action at the bilateral level through, for example, workshops. Third, action at the national level through autonomous actions, for instance, national-level regulations and incentives. The last, action at the industry to industry level, where there are enormous opportunities for technology development and cooperation, with United States companies in particular. He felt that India could well emerge as a technology supplier in this field, through indigenous development and joint ventures.

As part of its efforts to craft a practical approach to phasing out these greenhouse gases, India will discuss the issue with China, South Africa and Brazil at the BASIC meet in New Delhi. Mr. Jairam Ramesh indicated this approach would go beyond the current discussion, which is focused on the appropriate international legal instrument.

Speaking on the occasion, Mr. Reifsnyder noted the need for the transition out of HFCs, and emphasized that an early transition would help avoid high costs. He stressed that the United States was advocating a "phase-down" and not a "phase-out" of HFCs. He also underlined the need to think in multi-dimensional ways to address the problem caused by HFCs by, for example, considering an amendment to the Montreal Protocol, which would allow consumption and production of HFCs to be treated under it, while leaving the accounting of HFCs under the care of Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNFCCC). (Source: moef.nic.in)

United States and India convene joint Task Force on HFCs

During an India-United States workshop on 18 February 2011 on hydrofluorocarbons (HFCs), the two countries agreed to convene a joint Task Force that will examine effective approaches to reduce the use of climate-damaging HFCs. The Task Force is being established in recognition of the challenges faced by the current phase-out of hydrochlorofluorocarbons (HCFCs) under the Montreal Protocol on Substances that Deplete the Ozone Layer. HFCs, adopted as alternatives to HCFCs and other ozone-depleting substances, have zero ozone-depletion potential (ODP) but do have high global warming potential (GWP).

The newly established Task Force aims to develop options for reducing global usage of HFCs. The United States Deputy Assistant Secretary of State for Environment, Mr. Daniel Reifsnyder, and Special Secretary of India's Ministry of Environment and Forests, Mr. J.M. Mauskar, will co-chair the Task Force, which will include representatives from both governments as well as industry representatives, scientists and technical experts.

The options considered by the Task Force will send clear policy signals to discourage the use of HFCs and encourage the development and commercialization of low global warming potential alternatives. The options will be designed to provide certainty to the business community about the future of applicable chemicals and technologies. The Task Force will issue a report in August 2011 to describe the status of HFC alternatives and examine policy aspects of various approaches that would support a global reduction in HFC use. These will include national, industry-to-industry, and international options such as bilateral approaches between the two countries and the use of existing international agreements. (Source: www.state.gov)

Indian Air Force to phase out ozone depleting substances

The Indian Air Force is adopting a multi-pronged strategy to combat ozone depletion including limiting the use of Halon to mission critical uses, tighter control laws and incorporating accountability for phase-out of ozone depleting substances (ODS), said Air Chief Marshal P.V. Naik while delivering the inaugural address at a recent two-day International Workshop on "Benefits of ODS phase-out in defence forces" organized by Centre for Air Power Studies (CAPS). However, the Air Chief Marshal clarified that substituting an ODS would only be done only "if it doesn't impinge on operational effectiveness of the system in question".

For new weapon systems in the pipeline, inclusion of a clause in requests for proposals for provision of alternatives is being considered. The use of recycled Halon recovered from phased-out or downgraded aircraft and equipment is being planned. Original equipment manufacturers (OEMs) of existing weapons system are being asked to find suitable alternatives for full life-cycle support in respect of Halon, stated the Air Chief.

Management of ODS within the defence organizations, whether as fire-fighting agents, refrigerants or solvents, require very careful planning and execution, since many of these are scheduled to be phased out under the Montreal Protocol. Others who spoke at the inaugural session included Mr. J.M. Mauskar, Special Secretary, Ministry of Environment and Forests, and Senior Legal Officer, Division of Environmental Law and Conventions, United Nations Environment Programme (UNEP). (Source: www.india-defence.com)

IN THE NEWS

Governments gear up to fight environmental crimes

In November 2010, India's Directorate of Revenue Intelligence (DRI) officials seized an innocent-looking shipment of gas cylinders that had arrived in New Delhi from the Middle East. These were labelled as R-134a, a refrigerant gas that does not deplete the ozone layer. But a close inspection based on a tip-off revealed that the 1,139 cylinders, each weighing 13.6 kg, contained R-22 (HCFC-22), an ozone depleting substance (ODS) restricted under the Montreal Protocol.

The haul in India was just the latest in a series. A coordinated global drive between May and November 2010 yielded 7,500 cylinders containing 108 tonnes of illegal ODS and more than 650 shipments of ODS goods, which included a range of chemicals used in refrigeration, foam and fumigation.

The smuggling of cheap but banned ozone depleting chemicals is expected to rise, as the Montreal Protocol mandates their substitution with more ozone-friendly but expensive substances, making the profits from illegal trade substantial. Mr. Atul Bagai, Senior Coordinator for the Asia-Pacific of United Nations Environment Programme (UNEP), cautioned in an interview that "Illegal trade could undermine the success of the Montreal Protocol and delay recovery of the ozone layer." (Source: www.straitstimes.com)

South-South cooperation in the Asia-Pacific region

Facilitation of South-South cooperation between countries is one of the key activities of the OzonAction Programme of the United Nations Environment Programme's Division of Technology, Industry and Economics (UNEP-DTIE). Countries with more experience on the Montreal Protocol implementation assist other countries in developing and implementing the Montreal Protocol phase-out measures.

The latest achievement was the successful cooperation between the Maldives and India in organizing a three-day environmental film festival during 27-29 January 2011 in Male, Maldives. "The Safe Planet Film Festival" signifies a strong collaboration between these two countries in carrying out innovative activities for environmental conservation, specifically the phase out of harmful ozone depleting substances (ODS).

The Maldives, India and UNEP DTIE OzonAction, along with other key partners, are currently planning to jointly organize another major environmental event in the Maldives in May 2011 – Technology Bazaar: Ozone and Climate Friendly Products. The Technology Bazaar will exhibit environment-friendly technologies [non-hydrochlorofluorocarbon-based, energy-efficient, low carbon, low global warming potential (GWP), sustainable and available or in the pipeline] from leading companies and institutions in tourism, fisheries, cold storages and transportation sector from around the world. The Bazaar would be a unique culmination of cutting edge non-HCFC-based technologies.

This is the first time that such Technology Bazaar will be organized in the Asia and the Pacific region. It will be held back to back with the Joint Meeting of the Regional Ozone Networks for West Asia and South Asia. Exhibitors and visitors from related industries as well as ozone and climate experts from Asia and the Pacific region are expected to join this event. (Source: www.unep.org)

European Commission pushes for carbon credit system reform

The European Commission is pushing for a reform of the carbon credit system under the United Nations Clean Development Mechanism (CDM), claiming it incentivises some firms to adjust plants to produce more HFC-23 hydrofluorocarbon and then destroy it to claim the profitable credits. The Commission officials claim that it would be far cheaper to simply give the factories the money to install the equipment to destroy the gas.

According to a proposal published by the Commission in November 2010, it will move for a full ban on certified emission reductions from all industrial gas projects. The European Union member states will vote on the proposal in February 2011 when the Commission's climate change committee meets.

However, participants in the carbon market warn that if the European Union acts unilaterally to ban the credits, it will undermine confidence in CDM

and leave producers of industrial gases with no financial incentive to curb emissions of hydrofluorocarbons. (Source: www.businessgreen.com)

Quality assurance and test specifications for ODS

In Luxemburg, the Quality Assurance Association for the De-manufacture of Refrigeration Equipment of RAL Institute (German Institute for Quality Assurance and Certification) has published new quality assurance and test specifications for the treatment and disposal of foam products, including building materials, containing chlorofluorocarbons (CFCs) and other ozone depleting substances (ODS).

With the publication of its new quality assurance specifications GZ-729 (Quality assurance and test specifications for the de-manufacture of foam products containing ozone-depleting substances), RAL Institute claims to have become the first standards organization to present a detailed quality assurance scheme with quality requirements that are realistic and achievable in practice. GZ-729 covers the collection, storage and treatment of polymer foam products containing ODS and their preparation prior to recovery or disposal. The new quality assurance scheme and the associated quality mark will be managed by the Association.

Each recycling company will need to undergo annual testing by independent auditors who determine whether all the quality assurance criteria have been met. The results of the performance audit are then submitted to the Association's independent Quality Committee. If the Committee accepts the results, the company is awarded the GZ-729 quality mark. (Source: www.waste-management-world.com)

New technical standards for HFO-1234yf Refrigerant

The SAE Interior Climate Control Standards Committee has announced the publication of new SAE International documents covering the use of HFO-1234yf refrigerant in mobile air-conditioning (MAC) systems. This refrigerant was evaluated in 2009 within an SAE Cooperative Research project and deemed safe for use by the industry group which worked together in the SAE CRP1234.

Over the last several years, this Committee's membership and extensive industry efforts, including SAE Cooperative Research Projects has resulted in the development or revision of 18 SAE International "J" standards for this new refrigerant. New vehicles entering production later this year will be equipped with this new low global warming potential (GWP) refrigerant.

These SAE International standards cover MAC systems that use HFO-1234yf refrigerant design requirements, service equipment and certification procedures for system components, service equipment and technician training. SAE International is a global association of more than 128,000 engineers and technical experts in the aerospace, automotive and commercial-vehicle industries. *Contact: Mr. Shawn Andreassi, SAE International Southern Office, 5 Research Drive, Greenville, SC 29607, United States of America. Tel: +1 (724) 772 8522; E-mail: pr@sae.org; Website: www.sae.org.* (Source: www.prnewswire.com)

Workshop on ozone depleting HCFCs in the Philippines

The Philippine Ozone Desk of the Department of Environment & Natural Resources-Environmental Management Bureau (DENR-EMB), in collaboration with the World Bank and ICF International, conducted a Launch Workshop for the Preparation of the Hydrochlorofluorocarbon (HCFC) Phase-out Management Plan in Quezon City in February 2011.

The objectives of the Workshop were: to gather information on the status of ODS phase-out implementation in the Philippines; the Philippines' existing policy framework and institutional arrangements regarding the control of HCFCs; and the key HCFC consumption sectors in the Philippines. The event also offered a venue for exchange of ideas on the roadmap for HCFC phase-out in the country considering technology, economic and social aspects.

The Workshop was attended by representatives from the World Bank, United Nations Development Programme (UNDP), United Nations Industrial Development Organization (UNIDO), as well as local stakeholders, such as government agencies, manufacturing concerns/end-users of HCFC, chemical and equipment suppliers, contractors, servicing companies, professional organizations, and local experts and resource persons.

Being an Article 5 country, the Philippines is expected to freeze HCFC consumption to baseline consumption (2009-2010 average) in 2013 and then reduce HCFC consumption according to the following schedule: 10 per cent by 2015; 35 per cent by 2020; 67.5 per cent by 2025; 97.5 per cent by 2030; and servicing tail of 2.5 per cent of the baseline level in 2030-2040. (Source: www.emb.gov.ph)

Sri Lanka acquires IP rights for ozone-friendly tea

Sri Lanka has registered a claim locally for intellectual property (IP) protection for Ceylon tea and the logo for "Ozone-friendly Pure Ceylon Tea" under global geographical indicators (GI) rules, which would help the country market its main export product. The ozone-friendly certificate authenticates that the tea is grown without the use of any ozone depletion substances (ODS).

Mr. Hasitha De Alwis, Promotions Director of the Tea Board, said that these local registrations are required before making overseas registrations. He said the government also plans to locally register the country's seven tea-growing regions – Nuwara Eliya, Dimbula, Uva, Udapusellawa, Kandy, Ruhuna and Sabaragamuwa – under GI indicators in 2011. Getting GI recognition under the Trade-Related Aspects of Intellectual Property Rights (TRIPS) – the IP rights rules of the World Trade Organization (WTO) – could be used as a marketing tool, like French wines that were among the first products to be registered under TRIPS. Sri Lanka stopped using methyl bromide in pest management after adopting alternative environment-friendly technologies for which it received the Montréal Protocol Implementers Award in 2007. (Source: news.lk)

Brazilian company wins award for CFC-free technology

Purcom Quimica Ltda., Brazil, has won the Abiquim Technology Award for 2010. The company won the award six months after obtaining the approval of United Nations and Brazil's Ministry of Environment for its polyurethane (PU) foam systems based on Ecomate, which eliminate the use of hydrochlorofluorocarbons (HCFCs). HCFCs will be banned from the Brazilian market in 2013, as required under the Montreal Protocol.

Purcom said it invested about US$2 million in the last five years to get approval for its system for 14 different applications in PU, including the filling of refrigerators, manufactured according to sustainability standards required by the largest producer of soft drinks in the world. "Ecomate will not require any investment by the industry and price difference compared to conventional formulas, is negligible," said Mr. Gerson Silva, Director of Research and Development. (Source: www.plasticsnews.com)

Strong bid to find fumigant alternative

In New Zealand, a US$2.5 million research programme was launched recently for finding a viable alternative for methyl bromide (MBr). The ozone depleting MBr is used in New Zealand basically to fumigate primary products, like raw logs, before their exports. Funding for the five-year research programme is being shared between the industry and the government.

Environment Minister Dr. Nick Smith said he would like to see New Zealand's use of MBr reviewed as soon as an acceptable alternative was found. Banning the chemical out of hand would put the nation's US$3 billion export industry at risk, he stated. MBr "is currently required at ports to meet phytosanitary requirements of importing countries for New Zealand timber exports," he pointed out.

New Zealand used 170 tonnes of MBr in 2007, compared with 1,757 tonnes by the United States and 1,112 tonnes by China. "My hope is that we will be able to significantly reduce the environmental harm from the use of methyl bromide by 2015," Dr. Smith said. (Source: www.stuff.co.nz)

Manual for Refrigeration Servicing Technicians

The manual 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: Service and maintenance technicians; Private company service/maintenance managers, technician trainers, and managers involved in developing their service and maintenance policies; RAC trainers and course developers; and National Ozone Units (NOUs). For more information, access:

http://www.unep.org/pdf/7443-e-Ref_manual_servicing_technicians.pdf

REFRIGERATION/ AIR-CONDITIONING

Nanotechnology in refrigeration

Dais Analytic Corporation, the United States, has announced that it is successfully operating a heating, ventilation, air-conditioning and refrigeration (HVAC/R) beta unit employing its Aqualyte™ nanotechnology materials using no refrigerant gases. The system, dubbed "NanoAir", creates a comfortable environment by managing a room's humidity and temperature levels. NanoAir is fully capable of heating, cooling, humidifying or dehumidifying air using water and nano-materials rather than ozone-depleting refrigerants.

Mr. Scott Ehrenberg, Chief Technology Officer, said, "NanoAir has been shown by third party testing to have the ability to reduce energy costs and harmful emissions by over 50 per cent versus equipment in use today."

NanoAir – which uses Dais' Aqualyte membrane, a nano-structured material – is engineered to be a useful replacement for stationary heating/cooling products while allowing for innovative installation approaches including nearly all forms of refrigerant-based equipment found in the transportation and food industries. *Contact: Dais Analytic Corporation, 11552 Prosperous Drive, Odessa, FL 33556, United States of America. Tel: +1 (727) 375 8484; Fax: +1 (727) 375 8485; E-mail: info@daisanalytic.com.* (Source: www.azom.com)

Process reclaims refrigerants to their original components

A United States-based company has devised a process to reclaim refrigerants to their original chemical constituents. CTC Refri-Green process from Midwest Refrigerants will enable hydrogen fluoride (HF), an increasingly scarce key chemical component of fluorocarbon refrigerants, to be reused without discharge into the atmosphere.

One of the primary components released by the process is hydrogen fluoride which is derived from the mineral fluorspar, an increasingly scarce commodity. Hydrogen chloride is also reclaimed, and waste gases such as carbon dioxide and/or carbon monoxide are captured from the process for re-use. The technology has been approved for use in the United States, and the company is awaiting approval from the United Nations Environmental Programme's Technology and Economic Assessment Panel (UNEP-TEAP) to be listed as an approved ODS destruction (conversion) technology. (Source: www.acr-news.com)

Carbon dioxide refrigeration in containers

Carrier Corporation, based in the United States, has come up with a new system to use carbon dioxide in container refrigeration. The NaturaLine system is reported to have been tested around the world in 2010 by Hapag-Lloyd based in Hamburg, Germany. Carrier will conduct full field trials this year.

Carrier's technology is said to incorporate several innovations, some of which are new to container refrigeration applications. These include a novel gas cooler/condenser coil that wraps around the fan and has enhanced surfaces to maximize heat transfer. It also takes advantage of a new marine-duty multi-stage compressor. New power electronics and an advanced software control system are said to be combined to optimize fan speeds and compressor capacity to match cooling loads and temperature control. (Source: www.acr-news.com)

Rooftop refrigeration system

Trane India – a subsidiary of Ingersoll-Rand Plc. based in Ireland and one of the leading players in heating, ventilation and air-conditioning systems – has introduced a new line of 15-165 kW Voyager I, II and III rooftop systems. The new systems offer increased energy and operation cost savings to retail outlets, supermarkets, warehouses, factories and other commercial and industrial environments. These Voyager systems will use the non-ozone-depleting refrigerant R410A.

"The units have among the highest coefficient of performance in their class and allow for easy tracking of operating costs with their easy integration into building management systems," said Mr. Rajesh Sikka, Business Leader for Trane India. To optimize energy use, the unit automatically switches from

thermodynamic heating to gas heating depending on the outdoor temperature, offering an optimized energy source choice between electric power and natural gas.

The rooftop units in the 35 to 160 kW range are available with an upgraded heat recovery option. This technology generates a reduction of fresh air/exhaust heat loss and a lower compressor electrical consumption while benefiting from the unit's standard free cooling capability. A dual fuel option turns these units into a hybrid, combining a reversible refrigeration system with a gas burner for auxiliary heat. The 70 to 160 kW Voyager systems also optionally offer a condensing (at part load) gas burner with a heating capacity that modulates from 30 per cent to 100 per cent based on building needs. (Source: www.constructionweekonline.in)

A chiller that uses 4-G HFO refrigerants

Turbomiser chiller, which uses the oil-less Turbocor compressor, is to be made available using the latest "fourth generation" hydrofluoroolefin (HFO) refrigerants. Klima-Therm and Cool-Therm of the United Kindom, who first developed the chiller together with Geoclima of Italy, have announced the availability of models to run on 1234ze, with 1234yf versions to follow when that refrigerant becomes available in commercial quantities.

HFOs, which have low global warming potential (GWP), are being developed by a number of refrigerant manufacturers for stationary equipment. HFO-1234ze has been available since 2008 and is currently used mainly as a blowing agent in the foam industry. Previous tests with HFO1234yz and HFO1234ze on a beverage cooler are said to have shown performances similar to R134a, but with a 300 times better GWP (4 and 6, respectively). HFO refrigerants also have lower discharge temperatures than R134a.

Turbomiser's developers say that the adoption of HFOs has not required a change in the design of the chiller or its components. Their own tests have shown that, while there is a reduction in total available compressor capacity, efficiency is increased by 10 per cent at any given cooling output. Turbomiser uses a combination of advanced adiabatic technology, liquid pump amplification, micro-channel condensers and the oil-less Turbocor compressors to cut energy use by as much as 60 per cent. (Source: www.acr-news.com)

Centrifugal chiller with magnetic bearing

McQuay International, the United States, has introduced the 700 tonne Daikin McQuay® centrifugal chiller under its Magnitude™ brand. Magnitude models are already known for oil-free, magnetic bearing design, and are the company's popular line of energy efficient chillers. Magnitude chillers have proven industry-leading efficiency, sustainable performance, and low sound levels. They help reduce energy and operating costs, create a comfortable environment and meet requirements for sustainable design, such as Leadership in Energy and Environmental Design (LEED®) certification criteria, the company claims. The Magnitude chillers use R-134a refrigerant, which has zero ozone depletion potential (ODP).

Speaking on the new 700 tonne model, Mr. Ray Good, Director of Chiller Product Management, said: "This oil-free technology increases reliability and reduces maintenance because there are no conventional bearings and hence no oil management system and associated maintenance costs. In a typical chiller, oil builds up in the evaporator, reducing energy efficiency up to 15 per cent. As a result of its higher sustainable operating efficiency and reduced maintenance, the Magnitude chiller delivers a lower cost of ownership compared with conventional centrifugal chillers."

With its positive pressure and oil-free design, the high-efficiency performance of the 700 tonne Magnitude chiller is sustainable through its operating life. By eliminating the high friction losses of conventional centrifugal compressors, the Magnitude chiller achieves exceptional full and part-load performance, the company claims. Part-load IPLV for the 700 tonne unit is as low as 0.306 kW/t, while maintaining world-class full load efficiency 0.532 kW/t. The chiller is suitable for use in universities, hospitals, manufacturing facilities and data centres. *Contact: McQuay International, P.O. Drawer 1551, Minneapolis, MN 55440, United States of America. Tel: +1 (763) 553 5330; Fax: +1 (763) 553 5177; Website: www.mcquay.com.* (Source: news.thomasnet.com)

SOLVENTS

Specialty vapour greaser fluid

Vertrel® MCA specialty fluid from DuPont, based in the United States, is a proprietary azeotrope of Vertrel XF and trans-1,2 dichloroethylene. It is ideal for use in a vapour degreaser. Its high solvency makes it very effective for precision and specialty cleaning jobs, especially with difficult soils, the company claims.

The main applications of Vertrel MCA are in: light, medium and heavy soil removal; defluxing; oxygen service cleaning; and precision cleaning. Vertrel MCA specialty fluid is compatible with commonly employed metallic and non-metallic materials, most plastics and elastomers and can be used to clean a wide variety of soils including cutting oils, gear oils, heavy greases, hydraulic oils, stamping oils, vacuum oils, waxes, and mineral oils. It evaporates quickly at room temperature, making it easy to remove from heat exchangers, valves and narrow pipes.

Vertrel MCA has zero ozone-depletion potential (ODP) and low global warming potential (GWP). It is used extensively to replace CFC-113, methyl chloroform, hydrochlorofluorocarbons (HCFCs) and perfluorocarbons (PFCs) in several applications. The specialty fluid has been accepted by the United States Environmental Protection Agency (EPA) under its Significant New Alternatives Policy (SNAP) programme, as a substitute for ozone-depleting substances (ODS). The solvent is not a hazardous air pollutant (HAP), exhibits no closed-cup or open-cup flash point, and is not classified as an inflammable liquid. Acute toxicity studies show that Vertrel MCA has low toxicity. (Source: www2.dupont.com)

Zero VOC cleaner degreaser

Eco-Spray ZV-2 from Ecolink, the United States, is a precision cleaner with zero volatile organic compound (VOC) formula that makes use of the latest innovations in solvent chemistry resulting in a high purity, no-residue fast-dry formula. Unlike high VOC solvents, such as citrus terpenes and n-propyl bromide, Eco Spray ZV-2 is able to perform a variety of cleaning jobs without contributing to the formation of photochemical smog. The product can clean metal and composite surfaces, and is particularly effective at removing silicone oil and grease contaminants.

Eco Spray ZV-2 contains no ozone depleting solvents such as HCFC-141b or halogenated solvents. It evaporates quickly without leaving any residue. It is low on toxicity. *Contact: Ecolink Inc., 2177-A Flintstone Drive, Tucker, GA 30084, United States of America. Tel: +1 (770) 621 8240; Fax: +1 (770) 621 8245; E-mail: info@ecolink.com.* (Source: www.ecolink.com)

Flushing and cleaning alternative to ODS solvents

Nettogaz Greenclean from Dehon Group, France, is an effective flushing and cleaning replacement for the ozone depleting R-11 and R-414b in new and existing refrigeration systems. Greenclean removes impurities and contaminants that could cause system problems, such as burn-out, acid formation, lubricant deterioration and build-up of oxides. Nettogaz Greenclean is particularly suited for the internal cleaning of refrigeration and air-conditioning systems after particle accumulation or compressor burn-out.

Greenclean is a non-toxic, non-inflammable, low viscosity flushing product that is easily removed from the system. In addition to the scouring effects of the cleaning agent, the blend is designed to foam in the system to be cleaned, which dramatically increases the cleaning power of the product. The Nettogaz Greenclean kit is adapted to clean small and medium-sized installations or circuit components. The kits come with the required connections, manifold, hoses and thermostat-controlled heating belt. *Contact: IDS Refrigeration Ltd., Surety House, Third Way, Avonmouth, Bristol BS11 9HL, United Kingdom. Tel: +44 (1179) 802520; Fax: +44 (1179) 802521; E-mail: info@idsrefrigeration.co.uk.* (Source: www.idsrefrigeration.co.uk)

Aqueous parts washing systems

Jensen Fabricating Engineers (Jenfab), the United States, is introducing a line of aqueous cleaning systems, including stand-alone cellular, batch and continuous parts washers. Jenfab systems are optimized for both turned and precision screw machined parts, and other complex part shapes,

including medical device parts, implants, stampings, CNC-machined parts and fine blanked parts.

The company's LeanClean 360 rotating basket, cellular aqueous cleaning systems clean, rinse and dry 1, 2, 4 and 8 baskets of parts/cycle, depending upon the model. These environmentally friendly, aqueous-based systems use no harmful solvents. Various Jenfab systems can process loads from about 22 to 15,875 kg/h. LeanClean 360 systems are ergonomically designed to load from the front at waist height. Baskets are rotated in solution where powerful underwater spray jets remove oils and chips from parts, even with complex shapes and blind holes. Basket movement can be programmed from gentle rocking to full 360° rotation.

Ultrasonic cleaning with advanced, tubular transducers and digital generators provides the most powerful ultrasonic action available. At over 95 per cent output efficiency, these transducers generate more cavitation power in the tank than any other ultrasonic type can provide, Jenfab claims. *Contact: Jensen Fabricating Engineers Inc., 555 Wethersfield Road, Berlin, CT 06037, United States of America. Tel: +1 (860) 828 6516; Fax: +1 (860) 828 0473.* (Source: www.processcleaning.com)

Perfluorocarbon solvents

3M™, the United States, is offering two perfluorocarbon solvents Performance Fluid PF-5052 and Performance Fluid PF-5056. Both fluids are clear, colourless, fully fluorinated liquids, which are stable chemically and thermally, and practically non-toxic and non-inflammable.

Both PF-5052 and PF-5056 have no ozone depletion potential (ODP) and are compatible with most metals, plastics and elastomers. They do not emit any volatile organic compound (VOC) or contribute to ground-level smog formation. But both have high global warming potential (GWP) and long atmospheric lifetime. As such, they should be carefully managed so as to minimize emissions.

PF-5052 is ideal for use in medium temperature range heat transfer applications. Unique solvent properties make it an ideal solvent for depositing or removing fluorinated oils and lubricants. PF-5056 has a high dielectric strength and excellent materials compatibility, which make it an effective alternative to chlorofluorocarbons in a wide range of applications, from low temperature cooling to lubricant deposition to process solvent applications. *Contact: 3M, Electronics Markets Materials Division, 3M Centre, Building 220-9E-11, St. Paul, MN 55144-1000, United States of America. Tel: +1 (800) 251 8634; Fax: +1 (651) 778 4244.* (Source: multimedia.3m.com)

Environment-safe alternative to methylene chloride

Mykal Industries Ltd., United Kingdom, has introduced PU Cleaner (SB 6), a product designed for flushing through polyurethane (PU) mixing heads that is a proven alternative to methylene chloride (CH_2Cl_2) in the aerospace and automotive sectors. CH_2Cl_2 has traditionally been used in the industry. However, the substance is currently classified as a significantly hazardous material for reasons of worker safety, storage, disposal and volatile organic compound (VOC) emissions.

PU Cleaner (SB 6) is claimed to be a powerful yet safe product for flushing PU mixing heads that is allowing companies to maintain their production schedules, while complying fully with health and safety legislation. It works in the flushing cycle the same way as CH_2Cl_2 and contains a release agent that, when used regularly, can prevent the build-up of semi-cured PU in the mixing chamber.

The product can also be re-used up to eight times, as it separates out from waste collected after the flushing cycle. *Contact: Mykal Industries Limited, Farnsworth House, Morris Close, Park Farm Industrial Estate, Wellingborough, Northamptonshire NN8 6XF, United Kingdom. Tel: +44 (1933) 402822; Fax: +44 (1933) 402488; E-mail: enquiries@mykal.co.uk.* (Source: www.manufacturingtalk.com)

Implementation Manual for the Ozzy Ozone Campaign

This manual is part of the Ozzy Ozone awareness campaign launched in 2004 by the OzonAction Branch of the UNEP Division of Technology, Industry and Economics (DTIE) in an effort to alert the world community about ozone layer depletion and to encourage people to take action to protect it as well as reverse the negative trends. For further 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

FOAMS

Hydrofluoroolefin blowing agent

Honeywell, a major technology conglomerate based in the United States, has introduced trans-1,3,3,3 tetrafluoropropene blowing agent under the trade name HFO-1234ze. This fourth generation blowing agent and propellant has low global warming potential (GWP) and zero ozone depletion potential (ODP), and is the first hydrofluoroolefin (HFO) to be commercialized into these industries. As a gas at room temperature, this molecule has diverse applications including as a blowing agent for polystyrene, polyurethanes and other polymers, and as an aerosol propellant.

HFO-1234ze blowing agent is non-inflammable by ASTM E-681 and EU A11 test methods. However, the material does exhibit flame limits at elevated temperatures. It is a moderate pressure gas, and applications necessitating pressurization need dry nitrogen. *Contact: Honeywell Belgium N.V., Haasrode Research Park, Grauwmeer 1, B-3001 Heverlee, Belgium. Tel: +32 (16) 391 278; Fax: +32 (16) 391 277.* (Source: www51.honeywell.com)

Commercial production of E-PLA

Scion Research, New Zealand, has carried out commercial-scale production trials of expanded poly(acid lactic) [E-PLA] beads for the first time. Scion announced successful commercial-scale production runs of foamed E-PLA, which reportedly demonstrated the potential of E-PLA beads as a realistic alternative to expanded polystyrene (EPS). One trial utilized a commercial EPS steam preformer in batch mode with a mould for an underfloor insulation block. The mould was filled and controlled automatically on commercial equipment and cooled before the part was removed. The patent pending technology is noteworthy for using conventional PLA beads as feedstock, where other E-PLA technologies require specialized higher melt strength PLA.

Scion's process employs moderate temperature and pressure conditions with liquid carbon dioxide (CO_2) as blowing agent, not supercritical CO_2. The liquid CO_2 acts as a plasticizer, lowering the glass transition temperature (Tg) of PLA and making it more ductile. Interestingly, small voids and cracks observed in the PLA beads before impregnation disappear after impregnation. "It is likely that the polymer chains are moving or realigning as a result of interaction with CO_2 under certain conditions," Scion reports. There is 5-8 wt per cent CO_2 in the final pellets. Impregnation in a liquid also reportedly keeps the beads from sticking together.

A competing process was developed by EPS producer Synbra Technology BV, the Netherlands. It utilizes PLA produced by a process developed by Sulzer Chemtech AG, Switzerland, together with Purac Biochem BV, the Netherlands. Synbra is in the process of scaling up commercialization of its BioFoam E-PLA. Synbra's beads are moulded in its own commercial steam chambers and forming equipment. Synbra licensed the Sulzer/Purac process in 2008, but it requires a high melt strength PLA co-polymer made with a combination of L and D lactide PLA monomers from Purac. (Source: plastics engineeringblog.com)

Extrusion foaming of PHBV

Mr. Damian Szegda from the School of Engineering and Design, Brunel University, the United Kingdom, has reported on two years of research on extrusion foaming of polyhydroxybutyrate-valerate (PHBV) in his thesis "Rheology and extrusion foaming of PHBV". It is believed to be the first processing data on foamed PHBV not coming from a supplier of the resin.

PHBV has moisture barrier of 5-26 water vapour transmission rate (WVTR), heat distortion temperature (HDT) of 140°C, and is home-compostable. Negative attributes include its narrow processing window, high crystallinity (58 per cent), brittleness (1-1.30 K/Jm^3 Charpy Notched Impact) and slow crystallization. It also degrades readily above its melt temperature (168°C). Other issues include low viscosity, sharp transition from solid to liquid phase, and room temperature (22°C) glass transition temperature (Tg).

Brunel foamed PHBV with an endothermic blowing agent based on sodium bicarbonate and citric acid in an linear low-density polyethylene (LLDPE) carrier, which decomposes into carbon dioxide and water. It tested 1.25 per cent, 2 per cent, 2.5 per cent, 5 per cent and 7.5 per cent blowing agent, achieving density reduction of 58 per cent with 5

per cent blowing agent. The optimum amount of blowing agent was 2 per cent because water released by the blowing agent causes degradation of the polymer. Brunel used a 30 mm diameter, 30:1 L/D co-rotating twin screw extruder with five heating/cooling zones, melting the polymer in the first zones, then super-cooling it below equilibrium melting temperature towards the die to avoid degrading the heat sensitive polymer and to increase melt strength.

The main issue was PHBV build-up in the die owing to super-cooling and stress-induced crystallization in narrow parts of the die, the paper reports. The PHBV accumulation altered processing conditions, increased die pressure and caused foam quality to deteriorate. "It was possible to extrude quality foams for only a limited amount of time," Mr. Szegda said. (Source: plasticsengineeringblog.com)

HCFO-1233zd and polyol blends for foam blowing

In the United States, Arkema Inc., along with three inventors, has filed a patent application on blowing agent compositions comprising the hydrochlorofluoroolefin HCFO-1233zd mixed with polyol blends consisting of at least one polyether polyol and at least one polyester polyol. The combination is useful in producing polyurethane and polyisocyanurate foams.

The blend of polyether and polyester polyols can vary in a ratio of 1:99 to 99:1 with the HCFO-1233zd blowing agent. It is preferred that a major portion of HCFO-1233zd is present in the blowing agent blend as its trans isomer, which exhibits a significantly lower geno toxicity in AMES testing than the cis isomer. Ideally, the cis isomers of 1233zd in the blend should be less than about 3 per cent.

The polyether polyols of the invention can include, glycerine-based, sucrose-based, mannich-based, amine-based, sorbitol-based and bio-based polyols. The polyester polyols can include aromatic and aliphatic types. The composition may contain additional compounds such as co-blowing agents, surfactants, polymer modifiers, toughening agents, colorants, solubility enhancers, flame suppressants, plasticizing agents, antibacterial agents, viscosity reduction modifiers, fillers, nucleating agents and catalysts. (Source: www.wipo.int)

HALONS

Clean agent fire protection system

Fireraser® from MGH Engineering & Control Ltd., Pakistan, is a clean agent fire protection system that employs Dupont™ FM-200® (HFC-227ea) as the extinguishing agent to suppress fires, without leaving any residue that would require costly clean-up. FM-200 is widely accepted as a replacement for Halon 1301, as it has zero ozone depleting potential (ODP), low global warming potential (GWP) and short atmospheric lifetime.

Fireraser discharges in 10 seconds or less, extinguishing fire quickly and effectively. It uses MGH's patented rupture disc valve design for additional flexibility, efficiency and speed. Fireraser is specifically designed for small space fire protection and in-cabinet fire suppression. It is an economical, pre-engineered, all-in-one clean agent fire protection system that is easy to install and maintain. Besides FM-200, it can also employ DuPont's FE-25™ or FE-227™. *Contact: MGH Engineering & Control Ltd., House No. 20, Street No. 5/A, Kot Shab Udin Shahdra, Lahore, Pakistan. Tel: +92 (42) 37913064; Fax: +92 (42) 37926147; E-mail: info@mgheng.com.* (Source: www.mgheng.com)

Zero ODP fire protection systems

CFF series from Cease Fire, Canada, is a dual-agent fire protection system that combines environmental and personnel safety with excellent fire extinguishing abilities. The series utilizes FE-227, or FM-200, the Halon-replacement gases from DuPont, the United States. FE-227 has zero ozone depletion and can be safely used around people. Its ability to interfere with the combustion process of a fire as well as to absorb heat from the fire at a molecular level makes it an incredibly efficient product, requiring much less volume than traditional competing fire suppressant chemicals that rely on limiting oxygen.

Combined with the FEE-227 is Cease Fire's proprietary powder blend, ABC Powder, which utilizes mono-ammonium phosphate and other additives

to form a thixotropic gel. This powder, released in combination with FE-227 gas, settles into the area, covering all surfaces in order to prevent re-ignition of the fire. Non-toxic, safe and proven to not induce corrosion or electrical conductivity, this powder is easily removed during clean-up. Cease Fire's fully self-contained and modular CFF-800 units are pre-engineered, requiring only a simple installation in the space to be protected. *Contact: Cease Fire LLC, 811 NE 112th Avenue, Suite 104, Vancouver, WA 98684, Canada. Tel: +1 (360) 567 0990; Fax: +1 (360) 567 1242; E-mail: international@ceasefire.com.* (Source: www.ceasefire.com)

Halon replacement fire suppression systems

The Linde clean agent systems FS 125 and FS 227 from Linde Gaz, Romania, use NAF S 125 and NAF S 227 fire suppression agents that are Halon replacements with zero ozone depletion potential (ODP). These electrically non-conductive agents leave no residues when released. Unlike conventional powder or water-based systems, fires are put out cleanly without causing additional damage.

Linde FS 125 is reportedly at least 20 per cent more efficient and Linde FS 227 at least 5 per cent more efficient at extinguishing fires than comparable products in the market, and requires less quantity of agent by weight. Both models possess design advantages arising from 80 per cent lower space consumption compared with inert gas systems and high-pressure options. A special additive greatly reduces the generation of toxic and/or corrosive breakdown products like hydrogen fluoride.

For handheld fire suppression, Linde Gaz offers the innovative FS P5 equipment with NAF P5, which is a new zero ODP clean agent that is an advantageous alternative to Halon 1211 as well as other clean agents, like carbon dioxide or HFC-236fa. NAF P5 is a reliable, effective and clean streaming agent with a patented formula that optimizes both physical and extinguishing characteristics closely to those of Halon 1211. As with Halon 1211 extinguishers, NAF P 5 systems can be safely used when an electrically non-conducting, volatile as well as inert media is essential or desirable. *Contact: Linde Gaz, Avram Imbroane 9, 300136 Timi°oara, Romania. Tel: +40 (256) 300700; Fax: +40 (256) 225608.* (Source: www.linde-gas.ro)

FUMIGANTS

Two-pronged strategy to limit escape of methyl bromide

Attempts to limit the escape of methyl bromide (MBr) soil fumigant into the environment have included applying plastic tarps to physically hold MBr in the soil or applying a reactive compound to the soil to degrade the fumigant. The two approaches, however, had not been tried in combination. Now, researchers have devised a plastic film that reacts with or captures most MBr before it enters the atmosphere. Dr. Richeng Xuan, Dr. Scott Yates and colleagues at the United States Department of Agriculture placed MBr-spiked soil in a stainless steel container and covered it with a three-layer film. The film's outer layers were plastic. Its middle layer was tissue paper infused with an aqueous solution of ammonium thiosulphate. The chemical reacts rapidly with MBr to produce methyl thiosulphate and bromine, which Dr. Xuan says are easy to trap and remove.

The scientists found that after 72 hours at 40°C, nearly all the MBr had moved into the tissue paper and reacted with the ammonium thiosulphate. Only 0.15 per cent of the MBr seeped through all three layers. By contrast, 50 per cent of the fumigant typically escapes to the atmosphere after application on agricultural fields. (Source: pubs.acs.org)

Methyl bromide alternatives for pre-sowing fumigation

Researchers led by Mr. Özhan Boz at the Faculty of Agriculture, Adnan Menderes University, Turkey, have conducted a study to evaluate the effects of soil fumigant alternatives to methyl bromide (MBr) on weeds, damping-off and seedling growth of tobacco. MBr (90 g/m^2), dazomet (D) (50 g/m^2) and metam sodium (MS) (100 ml/m^2) were evaluated in two locations in the Karacasu district of Aydýn province, Turkey. In addition, half doses of D and MS were investigated in the following year.

MBr treatment was found to have 52.5 per cent control against the post-emergence damping-off caused by *Pythium* spp., while alternative treatments had no effect on the disease in the first year.

In the second year, MBr and showed 77.6 per cent and 100 per cent control, respectively, against the disease. All treatments significantly controlled pigweed (*Amaranthus* spp.), common lamb's quarters (*Chenopodium album* L.), nettle-leaved goosefoot (*Chenopodium murale* L.), burning nettle (*Urtica urens* L.) common purslane (*Portulaca oleracea* L.) and large crabgrass (*Digitaria sanguinalis* L.), except D on pigweed (86.2 per cent), common lamb's quarters (68.6 per cent), nettle-leaved goosefoot (60.5 per cent) and burning nettle (64.3 per cent) at one location in the first year.

Similarly, all fumigants, including low doses of MS (50 ml/m^2) and D (25 g/m^2), greatly decreased the populations of pigweed species, common lamb's quarters, common purslane, prostrate knotweed (*Polygonum aviculare* L.) and sowthistle species (*Sonchus* spp.) in the second year. Tobacco (cv. Akhisar) seedling height and weight increased significantly with treatments of MBr, and high doses MS and D at the two locations in both years. *Contact: Mr. Özhan Boz, Adnan Menderes University, Faculty of Agriculture, Plant Protection Department, 09100 Aydýn, Turkey.* (Source: mistug.tubitak.gov.tr)

Ammonia fertilizer may solve methyl bromide problem

Researchers in the United States have shown in laboratory experiments that ammonia fertilizer can degrade soil fumigant methyl bromide (MBr). Although the study is preliminary, the researchers propose that the method could prevent MBr emissions from crop fields. Earlier studies had found that MBr degrades quickly under alkaline conditions to harmless methanol and bromide. Farmers use several alkaline substances on their fields, such as lime and ammonia fertilizer. Dr. Scott Yates, a soil scientist at the United States Department of Agriculture, and his colleagues wondered if these bases could enhance degradation of MBr.

In the laboratory, the scientists measured how fast MBr degraded in solutions of ammonia, calcium hydroxide and potassium carbonate. Ammonia was the most effective, breaking down the pesticide about 16 times faster than calcium hydroxide did. The researchers then conducted a proof-of-principle experiment that simulated the field conditions by applying MBr to soil samples in the lab at the same concentration that farmers use and sealing the soil samples under a virtually impermeable plastic film. The ammonia degraded more than 99.5 per cent of the MBr after just 8 hours.

The study shows that farmers could cut MBr emissions so effectively that the result would appear as if the pesticide had been banned, says Dr. Robert Rhew, a biogeochemist at University of California, Berkeley. However, he and Dr. Susan Kegley, principal scientist at the Pesticide Research Institute, point out that the plastic tarps used on fields do not provide the tight seals available in a laboratory because the tarps are frequently blown off by the wind or pierced by roving deer and birds. (Source: pubs.acs.org)

DNA technique to aid crops and trees against fungal attack

An international team of scientists has developed a new technique to aid crops at risk from a devastating agricultural parasite commonly known as the "honey fungus", one of the most serious diseases of trees and crops across the northern hemisphere. The development allows crop to be screened for natural resistance by adding DNA with fluorescent genes to the fungus before being planted out.

The research collaboration between the United States Department of Agriculture's Agricultural Research Service (ARS) and the University of Bristol has the ability to transform and genetically manipulate the plant-pathogenic fungus *Armillaria mellea* by artificially introducing DNA into it. DNA was introduced using *Agrobacterium*, a bacterium that is commonly used to genetically modify plants.

The most effective pesticide to prevent *Armillaria* root disease, methyl bromide, is being phased out due to its role in depleting the ozone layer. There are few alternatives for preventing or curing infections. This DNA technique has been important in the study for pinpointing how the pathogens enter and spread through plants and, then, developing control practices that prevent or minimize infection. It also helps in studying the pathogen's population structure. These species can produce new genetic types without a conventional sexual cycle. When two individuals meet, nuclei from one strain could invade and recombine with nuclei in the other fungus, giving rise to new genotypes with new and novel traits. (Source: www.physorg.com)

RECENT PUBLICATIONS

Environmentally Benign Polymeric Foams

Amid an industry-wide ban of toxic foaming agents such as hydrochlorofluorocarbons, this publication examines the fundamental properties, principles, and applications of foaming technology using environmentally neutral agents such as carbon dioxide and nitrogen. While Japan is considered a pioneer in this field, documentation and exposure is often hampered by language difficulties. Japan's foremost researchers provide very valuable insight to their most cutting-edge research and applications, including microcellular technologies and recently developed foaming resins. Enhanced by real-world examples and images, the book describes foaming phenomena, polymer-carbon dioxide/nitrogen system properties, and mathematical models used to predict and estimate changes in these properties.

Contact: CRC Press, United Kingdom. Tel: +44 (1235) 400524; Fax: +44 (1235) 400525; E-mail: book.orders@tandf.co.uk.

4th International Conference on Magnetic Refrigeration at Room Temperature

The proceedings of this 4th International Institute of Refrigeration (IIR) event dealing with cutting-edge magnetic refrigeration technology comprise: a welcome address on the state of the art, two presentations dealing with the IIR and the activities of its Working Party on Magnetic Refrigeration, 26 papers on magnetocaloric materials and experimental investigation, two papers on materials theory and modelling, 13 papers covering experiments on machines, and 14 papers on machines theory and modelling. The papers devoted to magnetocaloric materials deal with research on a very broad range of alloys.

Contact: International Institute of Refrigeration (IIR), 177, boulevard Malesherbes, 75017 Paris, France. Tel: +33 (1) 4227 3235; Fax: +33 (1) 4763 1798.

TECH EVENTS

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.

10-11 May
Duesseldorf
Germany

Blowing Agents & Foaming Processes 2011
Contact: iSmithers,
Shawbury, Shrewsbury, Shropshire,
SY4 4NR, United Kingdom.
Tel: +44 (1939) 250383, 252421;
E-mail: info@ismithers.net;
Website: www.ismithers.net.

06-08 Jul
Gangwon-Do
Rep. of Korea

International Conference on Air-Conditioning & Refrigeration
Contact: Society of Air-conditioning and Refrigerating Engineers of Korea,
SAREK, #902 Korea Science and Technology Centre (KSTC),
635-4, Yeoksam 1-dong,
Gangnam-gu, Seoul
Republic of Korea.
Tel: +82 (2) 554 8571, 554 8572;
Fax: +82 (2) 552 3929;
Website: www.sarek.or.kr/eng.

21-26 Aug
Prague
Czech Republic

23rd IIR International Congress of Refrigeration
Contact: Icaris Ltd.,
Conference Management Services,
Malé nám. 1, 110 00 Praha 1,
Czech Republic.
Fax: +420 (266) 312 113;
E-mail: icaris@icaris.cz.

12-16 Oct
Bangkok
Thailand

BANGKOK RHVAC '2011
Contact: Thai Trade Fair,
22/77 Rachadapisek Road,
Chatuchak, Bangkok 10900,
Thailand.
Tel: +66 (2) 511 6020;
Fax: +66 (2) 511 6008;
E-mail: titfd@depthai.go.th.

31 Oct-02 Nov
San Diego
United States

2011 Annual International Research Conference on Methyl Bromide Alternatives and 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.

PUBLICATIONS from APCTT

PERIODICALS

(Free access at 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*
❑ Managing Innovation for the New Economy: Training Manual, 2002 Volume 1: How to Guide & Quick reference materials Volume 2: Articles & Lectures	1,000.00	50.00
❑ Regional Capacity-building for the Adoption of ISO-14000 and Transfer of Environmentally Sound Technology: Training Manual, 2000	600.00	30.00
❑ Small Rural Industries in the Asia Pacific Region: Enhancement of Competitiveness of Small Rural Industries in a Liberalized Economic Environment and the Impact of Poverty Alleviation, 2000	600.00	30.00
❑ Technology Transfer and Technological Capacity-building in Asia and the Pacific		
❍ Volume 1: Big Countries and Developed Economies, 1999	600.00	30.00
❍ Volume 2: ASEAN, NIEs, SAARC and the Islamic Republic of Iran, 1999	600.00	30.00
❍ Volume 3: Least Developed and Pacific Island Countries and Economies in Transition, 1999	600.00	30.00
❍ Volume 4: Emerging Issues in Regional Technological Capability-building and Technology Transfer, 1999	600.00	30.00
❑ Rural Industrialization as a Means of Poverty Alleviation: Report of the Regional Seminar on the Enhancement of Partnerships among Governmental, Non-governmental and Private Sector Entities for the Promotion of Rural Industrialization for Poverty Alleviation, 1999	600.00	30.00
❑ Institutional Development for Investment Promotion and Technology Transfer, 1999	500.00	25.00
❑ Ozone Depletion Substances Phase-out Technologies: Problems & Issues on Technology Transfer, Absorption and Generation, 1998	300.00	15.00
❑ Development and Utilization of S&T Indicators: Emerging Issues in Developing Countries of the ESCAP Region, 1998	300.00	15.00
❑ ODS Phase-out: A Guide for Industry, 1998	500.00	25.00
❑ Proceedings of the Consultative Meeting on Technology Management 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.*