VATIS UPDATE

Ozone Layer Protection

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Highlights

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- World's first water vapour chiller with axial compressor
- Earth-friendly parts cleaning systems
- New canister for fire suppression
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- *Pasteuria* for nematode control

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

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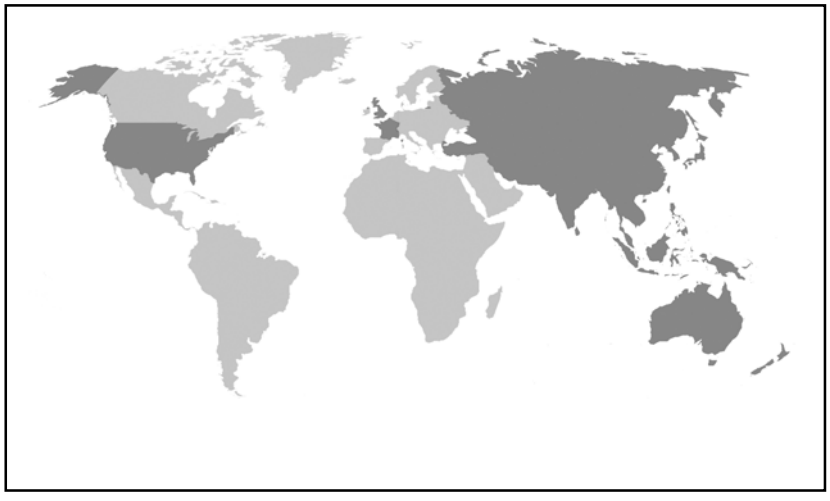
ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY

OZONE CELL
MINISTRY OF ENVIRONMENT AND FORESTS
GOVT. OF INDIA

The **Asian and Pacific Centre for Transfer of Technology (APCTT)**, a subsidiary body of ESCAP, was established on 16 July 1977 with the objectives: to assist the members and associate members of ESCAP through strengthening their capabilities to develop and manage national innovation systems; develop, transfer, adapt and apply technology; improve the terms of transfer of technology; and identify and promote the development and transfer of technologies relevant to the region.

The Centre will achieve the above objectives by undertaking such functions as:

- Research and analysis of trends, conditions and opportunities;
- Advisory services;
- Dissemination of information and good practices;
- 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

Vehicle compressor using hydrocarbon refrigerants

(Credit: OKA Australia)

VATIS* Update
Ozone Layer Protection
is published 6 times a year to keep the readers up to date of most of the relevant and latest technological developments and events in the field of Ozone Layer Protection. The Update is tailored to policy-makers, industries and technology transfer intermediaries.

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SCIENCE OF THE OZONE LAYER

First signs of ozone hole recovery spotted

Australian researchers report that the hole in the ozone layer over Antarctica is starting to heal. The team is the first to detect a recovery in baseline average spring time ozone levels in the region, 22 years after the Montreal Protocol to ban chlorofluorocarbons (CFCs) and related ozone-destroying chemicals came into force. Levels of anthropogenic ozone depleters detected in the region's stratosphere have been falling since around the turn of the millennium. However, detecting any corresponding ozone recovery has been difficult.

Mr. Murry Salby, an environmental scientist at Macquarie University in Sydney, Australia, and his colleagues have now shown how this annual fluctuation can be accounted for – and so removed from the data. They are left with the underlying systematic change in Antarctic ozone levels. Mr. Salby's calculations reveal that the levels are now rising. The team's breakthrough was in showing that annual swings in average spring time ozone levels are linked to changes in a particular pattern of stratospheric weather known as dynamical forcing. In years in which this phenomenon is strong during the winter, more cold air is trapped above the pole. As a result, there are more ice crystals in the atmosphere. These crystals form the surface on which chlorine destroys ozone, catalysed by sunlight during the spring.

Mr. Salby's results reveal a fast decline in ozone levels until the late 1990s, then a slow rebound that closely matches what theoretical calculations had predicted, observed Mr. David Karoly, a climate scientist at the University of Melbourne, Australia. "It is the sort of result that was expected, but is the first to provide detection of an increase in Antarctic ozone levels," he said. That the increase in ozone levels revealed by the calculations closely mirrors the decrease in the levels of anthropogenic chlorine in the region adds weight to Mr. Salby's argument. Mr. Salby's data reveal that average spring time Antarctic ozone levels have already recovered by 15 per cent since the late 1990s. However, natural weather-related fluctuations mean that even as late as 2085, ozone will still drop below 1980 levels for at least one year in every ten. A complicating factor in that prediction is the influence of climate change. (Source: www.nature.com)

Study on ozone recovery and greenhouse gases in the Southern Hemisphere

A new study looks at how the anticipated recovery of the ozone hole over Antarctica and simultaneous increase in greenhouse gas concentrations will combine to affect weather and climate in the Southern Hemisphere. It concludes that over the coming half century, ozone recovery will result in a nearly complete cancellation of the effects of increased greenhouse gases on atmospheric circulation. The Southern Hemisphere's prevailing atmospheric circulation pattern is the Southern Annular Mode (SAM), also called the Antarctic Oscillation. In SAM's positive phase, a stronger and more southerly vortex encircles the pole, leading to fewer intrusions of Antarctic air into the southern oceans. The negative phase features a more weak and variable vortex and a greater risk of Antarctic outbreaks of cold air heading north.

SAM has trended towards positive values since the 1960s, a development that scientists attribute to the effects of both stratospheric ozone depletion above Antarctica and increases in greenhouse gas emissions. The ozone hole stopped growing in about 2000, owing to a ban on ozone depleting substances. It is expected to recover totally sometime after the middle of this century, leaving scientists wondering whether atmospheric circulation patterns will return to conditions prior to the formation of the ozone hole, or if increasing greenhouse gas increases will counter the effects of the recovery. For the study, a team of scientists that included Ms. Clara Deser of the National Centre for Atmospheric Research (NCAR), the United States, used the Community Atmosphere Model (CAM), a component of NCAR's Community Earth System Model, to run different simulations for the period 2000-2060. The results have confirmed that ozone recovery and greenhouse gas forcing will have opposite effects, with the increase in

greenhouse gas concentrations countering ozone recovery and preventing SAM from returning to its pre-1960s patterns. (Source: www2.ucar.edu)

Ozone hole link to rain increase in the Southern Hemisphere

The hole in the ozone layer over Antarctica is a significant driver of climate change and rain increases in the Southern Hemisphere over the past 50 years, say scientists in the United States. The findings by a team at Columbia University's School of Engineering and Applied Science are the first to link ozone depletion in the polar region to climate change all the way to the equator. The researchers said the analysis should lead policy-makers to consider the ozone layer along with other environmental factors, such as Arctic ice melt and greenhouse gas emissions, when considering how to tackle climate change. "It is really amazing that the ozone hole, located so high up in the atmosphere over Antarctica, can have an impact all the way to the tropics and affect rainfall there," said Ms. Sarah Kang, lead author of the study. "It is just like a domino effect," she added.

"While the ozone hole has been considered as a solved problem, we are now finding it has caused a great deal of the climate change that has been observed," said co-author Mr. Lorenzo Polvani, senior research scientist at the Lamont-Doherty Earth Observatory. The study used two independently drawn climate models, the Canadian Middle Atmosphere Model and the United States' National Centre for Atmospheric Research (NCAR) Community Atmosphere Model. In four experiments comparing data on sea ice, surface temperatures, precipitation and the ozone hole, the study showed the hole was the main driver of heavy summer rains across an area comprising eastern Australia, the south-western Indian Ocean and the Southern Pacific Convergence Zone. (Source: www.google.com)

CFC Consumption Phase-out Video

This video 'CFC Consumption Phase-out' (in English) highlights the need to replace ozone depleting substances with ozone friendly alternatives. It was produced by the National CFC Consumption Phase-out Plan, India. For more information, access:

http://www.nccopp.info

ODS PHASE-OUT IN INDIA

Plans to set up hot air fumigation facilities

GT Pest Control Ltd. (GTPCL) plans to set up hot air fumigation facilities in Pimpri-Chinchwad and Khopoli in the state of Maharashtra, India. The announcement was made after the company introduced hot air treatment at its Ranjangaon facility in the state, doing away with the use of methyl bromide for fumigating pallets and boxes. "Pallets and boxes used to pack export products are generally fumigated using methyl bromide, which releases toxic gases. We have started using hot air treatment as an alternative. In the process, all containers that are to be exported get heated to about 56°C for 30 minutes, due to which they get completely sterilized and at the same time, no harm is caused to the environment," said Mr. Rajendra Gaikwad, Managing Director, GTPCL. (Source: www.indianexpress.com)

National CTC phase-out plan

The national carbon tetrachloride (CTC) phase-out plan in India has thus far achieved the following results in the relevant sectors.

In the textile industry:

- More than 25 potential substitutes have been assessed through laboratory tests and industry performance case studies;
- Information on available alternatives and their environmental, health and safety aspects has been published and disseminated through numerous seminars, articles, industry visits, etc.; and
- A partnership was established with the Cluster Development Initiative of IL&FS to train 500,000 workers in CTC-free stain removal techniques.

In the metal cleaning sub-sector:

- 10 industry sub-sectors have been identified for assistance;
- Alternatives for each sub-sector were assessed through laboratory tests and industry performance case studies; and

- Information on available alternatives and their environmental, health and safety aspects has been published and disseminated through numerous seminars, articles, industry visits, etc.

Information and awareness creation:

- Technical advisories on possible alternatives tailored to the needs of each industrial application;
- An extensive website set up to provide contextual information and technical options for industries, technical experts and scientists; and
- Training material for specific applications was developed.

(Source: www.gtz.de)

CFC production sector closure project

The global objective of India's chlorofluorocarbon (CFC) production sector closure project was to support the reduction and eventual stoppage of production of CFCs. India was the second largest CFC producer in the world after China, and the stoppage of CFC production from 1 August 2008, 17 months ahead of the agreed phase-out schedule, was a major milestone in helping restore the ozone layer. Project outcomes were monitored via independent verification of CFC production against a CFC production quota at individual plant levels and national aggregate levels.

The ODS III project has met its development objective of supporting the Government of India to meet its obligation under the Montreal Protocol to phase out production and consumption of CFCs. However, the 21st Meeting of Parties (MOP) held in November 2009, has approved 343.6 MT of CFCs for India for 2010, for manufacturing Metered Dose Inhalers (MDIs) under Essential Use Nomination (EUN) process of the Montreal Protocol. An independent technical audit for 2010 verified that Indian producers did not exceed the quota requirements, and were therefore in compliance with the obligations under the Montreal Protocol. Technical assistance (TA) activities have been implemented satisfactorily, with the support of the United Nations Environment Programme (UNEP). The project has been extended until December 2011 to allow for completion of TA activities and disbursement of all funds under the production sector component. (Source: www-wds.worldbank.org)

IN THE NEWS

A road show on ozone-friendly technologies

The Maldives hosted Asia's first-ever ozone- and climate-friendly technology exhibition, the "Ozone-2Climate Technology Road Show". The event was organized by the United Nations Environment Programme's OzonAction Programme, in association with the Government of the Maldives and the Indian High Commission in the Maldives and in partnership with GIZ on behalf of the Ministry of Environment, Germany, the Ministry of Economy, Trade and Industry (METI) of Japan, the United States Environmental Protection Agency (EPA) and the United States Department of State. The event was meant to not only support the initiatives of the Maldivian government but also to supplement global efforts by showcasing technological alternatives and knowledge that contribute to the achievement of the common goal of protecting the ozone layer and the climate system.

More than 20 leading manufacturers of refrigeration and air-conditioning products from around the world exhibited their equipment and technologies at the Road Show. In addition to the physical exhibition, the companies also participated in the first virtual exhibition for ozone- and climate-friendly technologies to showcase their products on-line. This virtual exhibition was launched by the Vice President of Maldives during the Road Show and by the State Secretary of the Serbian Ministry of Environment and Spatial Planning in Belgrade, at the Roundtable on Ozone- and Climate-Friendly Technologies in Refrigeration and Air-Conditioning. The Belgrade roundtable was organized by the Serbian Ministry of Environment and Spatial Planning together with the OzonAction Regional Ozone Network for Europe and Central Asia.

The event saw a demonstration of SolarChill, a vaccine cooler designed for remote areas where there is no access to grid power. SolarChill uses ozone- and climate-friendly hydrocarbon refrigerants and renewable energy, and avoids lead-acid battery. The SolarChill project, in common with the Road Show, bridges human welfare, development and environmental concerns. It proves that

it is possible to bring practical health benefits to people, through simple, cost-effective technologies that also protect the ozone layer and the global climate system. *Contact: Mr. Atul Bagai, Regional Coordinator (Networking), South Asia Network, Compliance Assistance Programme, OzonAction Programme, UNEP Regional Office, United Nations Building, Rajdamnern Nok Avenue, Bangkok 10200, Thailand. Tel: +66 2288 1662; Fax: +66 2288 3041; E-mail: atul.bagai@unep.org* (Source: www.unep.org)

Efforts to phase out use of CFC-based inhalers

Indian and Chinese officials met in New Delhi, India, from 23 to 26 May 2011 to seek the best solutions to ensure smooth transition from chlorofluorocarbon (CFC) based metered dose inhalers (MDIs) for asthma patients to CFC-free MDIs. As part of the South-South cooperation facilitated by the OzonAction's Compliance Assistance Programme at the Regional Office for Asia and the Pacific (CAP ROAP) of United Nations Environment Programme, officials from China's Foreign Economic Cooperation Office (FECO), Ministry of Environmental Protection (MEP), health officials and the MDI industry representatives are visiting the Ozone cell of India's Ministry of Environment and Forests (MoEF), and also meeting with the Ministry of Health, Drug Controller General of India, and Cipla India Ltd. to gain experience from India's phase-out approaches to CFC-based MDI.

"China's technology requirements for CFC phase-out and law for intellectual property are different from those of India. After discussion with officials from MoEF, Ministry of Health and Family Welfare, and Food and Drug Administration of India, we have understood India's strategies, policies and basic approaches on phase-out of CFC MDIs. The communication among central government, state governments and the MDI enterprises in India make the CFC substitution process conduct effectively. The experiences are useful for China's CFC MDI phase-out," stated Ms. Zhang Peipei, Deputy Director, Centre for Drug Evaluation (CDE) of State Food and Drug Administration (SFDA), China. Under the framework of the strategies, guidelines and technical requirements for CFC MDI phase-out, China is firming up communication with MDI industry, while putting CFC-free MDIs on fast track. (Source: www.unep.org)

Public and private sectors partner to tackle trade in ozone depleting chemicals

In Mongolia, representatives from the National Ozone Units, Customs administrations in Asia and the world's leading producers of refrigerants came together to renew their alliance to tackle illegal trade in chemicals that destroy the ozone layer and contribute to climate change. Twenty-one international delegates and 14 local experts met at the recent Summit with the Private Sector on Trade in Ozone Depleting Substances (Ulaanbaatar 2.0) organized by the Environmental Investigation Agency (EIA) and the United Nations Environment Programme (UNEP) in Ulaanbaatar.

In his inaugural speech at the summit, Mr. N. Batsuuri, State Secretary of Ministry of Nature, Environment and Tourism of Mongolia, called for defining the initial steps of the global action in joining the hands of public and private sectors on ODS trade. Mr. Atul Bagai, Senior Regional Coordinator UNEP's OzonAction Programme, said that the active participation of the private sector holds a key to successful of countries in meeting 2013 and 2015 compliance targets. Mr. Julian Newman, Campaigns Director of EIA, saw effective partnerships as vital in combating the illegal trade in ODS. *Contact: Mr. Atul Bagai, Regional Coordinator (Networking), South Asia Network, Compliance Assistance Programme, OzonAction Programme, UNEP Regional Office, United Nations Building, Rajdamnern Nok Avenue, Bangkok 10200, Thailand. Tel: +66 2288 1662; Fax: +66 2288 3041; E-mail: atul.bagai@unep.org.* (Source: www.eia-international.org)

Funding to Philippines for phasing out of CFC chillers

The World Bank and Global Environmental Facility (GEF) have provided a US$47.9 million grant to the Philippine government for the implementation of a 10-year programme that would replace inefficient and chlorofluorocarbon (CFC) based chillers in the country. According to Environment and Natural Resources Secretary Mr. Ramon Paje,

the Philippine Chillers Energy Efficiency Project (PCEEP) seeks to encourage industries to shift to new energy-efficient chillers to save on energy bills. The industries can avail themselves of incentives once they shift to new chillers. Mr. Paje expressed hope that the project will help reduce carbon dioxide or greenhouse gas emissions in the atmosphere by as much as 560,000 tonnes during 2011-2020. PCEEP also seeks to replace some 375 inefficient CFC-based chillers and non-CFC-based models.

To accelerate the conversion to new technologies, Mr. Paje said that chiller owners are given two options to enable them to obtain financial incentives under the project. The first option is to avail of the up-front subsidy equivalent to 15 per cent of the normal cost of new non-CFC-based energy efficient chillers, on the condition that the chiller owner agrees to relinquish future carbon finance revenues under the programme. The other option is not to use of the up-front subsidy but the chiller owner must surrender 20-25 per cent of the Clean Development Mechanism (CDM) revenues that will be obtained from selling carbon emission reductions (CERs) under the project. (Source: www.mb.com.ph)

High-grade pure hydrocarbon plant under way in Thailand

A production plant that will supply hydrocarbons (HCs) for use as refrigerants, aerosol propellants and foam blowing agents is currently being set up in Thailand. Having already received support from several governmental agencies, the project is now open to investors seeking active share in a project that will enable the establishment of HC technology in Asia. The proposed HC processing plant has the approval from Thailand's Board of Investment (BOI). Under the project, CEERD Co. Ltd. and EEEC Co. Ltd. will set up a HC plant that will be operated by Asian Green Fluids Co. Ltd. Initially the plant will be able to deliver 6,000 t/y (~18 t/d) by processing liquefied petroleum gas.

The plant, expected to be located at the eastern seaboard of Thailand, will manufacture and supply Asian countries with environmentally friendly high-grade pure HC products (99.5 per cent by volume) – namely propane, n-butane, isobutene and pentane – used as refrigerants, foam blowing agents or aerosol propellants. The full-feasibility study and engineering design for the project have been finalized and the management team is working to secure US$22 million, the estimated investment required. (Source: www.hydrocarbons21.com)

Tecumseh moves towards hydrocarbon refrigerants

Tecumseh Products Company, the United States, has launched its "Green Technology" initiative, by committing cross-functional resources to design, develop, manufacture and market compressors and condensing units that are optimized for use with low global warming potential (GWP) refrigerants. The company has taken another step in that effort by becoming a recent signatory for "The Natural Voice", a global call for action that points to the environmental, economic and social potential of natural refrigerants in heating, cooling and refrigeration. Tecumseh is keenly focused on developing compressors using hydrocarbon (HC) refrigerants R290 (propane) and R600a (isobutane), which have zero ozone depletion potential and a fraction of the GWP of the refrigerants they are intended to replace. HC refrigerants, already being utilized in many parts of the world, are expected to be authorized in the United States for use in commercial and residential refrigeration applications in 2011, following approval of the Significant New Alternatives Policy (SNAP) by the United States Environmental Protection Agency (EPA). (Source: contractingbusiness.com)

Sri Lanka launches 'ozone friendly' GI tea logos

Sri Lanka has launched new logos for Ceylon tea to protect the island's best known brand under the Geographical Indicators (GI) international trade regime and promote it as ozone-friendly. The US$ 1.5 billion Ceylon tea industry aims to use new logos to market the tea as a premium product – just like French champagne, Scotch whisky and Basmati rice – and use certification to prevent its misuse. The premium price that Ceylon tea commands has caused the frequent misuse of the name by overseas packers who package other teas as Ceylon tea, according to the Sri Lanka Tea Board. The Board decided to protect the name of Ceylon tea and seven major regional

tea growing areas – Nuwara Eliya, Dimbula, Uva, Udapussella, Ruhuna, Sabaragamuwa and Kandy in the central hills and southern region – as certification marks under the GI of the Trade Related Aspects of Intellectual Property Rights (TRIPS) regime of the World Trade Organization (WTO).

Mr. Hasitha De Alwis, the Board's Director of Promotion, claimed that Sri Lanka is the only country qualified to use the 'ozone friendly' logo for tea after it gave up using methyl bromide, an ozone depleting substance, in tea production. The ozone friendly label, along with the names and GI logos of seven tea-growing regions, would help protect and add value to Ceylon tea, he said. The Tea Board intends to apply for international recognition for the logos this year and initially register them in 30 tea markets. As a prerequisite for international recognition, the logos and certification marks have been registered in Sri Lanka. (Source: www.lankabusinessonline.com)

R290 demonstration project in China passes technical review

In China, a project funded by the Multilateral Fund (MLF) for the conversion of a compressor production line to R290 (propane) has successfully passed the first technical evaluation phase. The project aims to remedy the low global availability of R290 compressors – one of the main barriers to the large-scale manufacturing of hydrocarbon air-conditioners. Officials from the National Environmental Protection Department in China and technical experts reviewed the project progress in November 2010. The project passed Phase 1 review, which included inspection of the production line equipment at Guangdong Meizhi Co. and the assessment of technical and financial data.

The 61st meeting of the Executive Committee to the MLF for implementation of the Montreal Protocol had approved the demonstration project for the conversion of a compressor production line with an annual capacity of 1,830,000 units at Guangdong Meizhi Co. to R290 refrigerant. The compressor production line is set to undergo significant modification and optimization, owing to the change of working pressure and temperature and additional explosion-proof requirements. The structure of the compressor will undergo a re-design to minimize the vapour volume containing R290. In addition, new equipment will be introduced for lubricant handling, safety control and enhanced ventilation and performance testing with R290. Besides the redesign and testing, the project also covers the training of personnel. The project is expected to be completed by the end of 2012. (Source: www.hydrocarbons21.com)

New refrigerant management decree and regulations

Fiji's Cabinet has approved the amending of the Ozone Depleting Substances (ODS) Act 1998 and Ozone Depleting Substances Regulations 2010. The Cabinet has also approved the drafting of a new Refrigerant Management Decree and Regulations. The Cabinet based its decision on a submission by the Minister for Local Government, Urban Development, Housing and Environment. The Minister explained that the ODS Act and Regulations were gazetted in 1998 and 2010, respectively, to regulate the import, export, sale, storage and use of ODSs as well to give effect to Fiji's obligations under the Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that deplete the Ozone Layer. He added that over 10 years of implementation, the Department of Environment, through the ODS Unit, hopes to strengthen its inspectorate powers and penalties and update interpretation through amendments to the Act and Regulations. For example, the fees schedule would reflect new VAT component (15 per cent), and there would be a rephrasing of schedules and classifications of licences and permits. The Department of Environment regulates only ODS that is used in refrigerators, air-conditioning units and fumigation sectors, the Minister said.

The new Refrigerant Management Decree and Regulations is proposed to curb non-companies and individuals dealing with ODS, prevent companies operating their businesses using ODS under the name of refrigerants, and have a proper criterion for technicians to gain licence for refrigerant handling and thus avoid leakage of refrigerants into the atmosphere. Once drafted, the Refrigerant Management Decree and Regulations, and the amendments to the ODS Act 1998 and the ODS Regulations 2010 will be brought back to Cabinet for its approval. (Source: www.thejetnewspaper.com)

Evaluation programme for alternative refrigerants

In response to environmental concerns raised by the use of high global warming potential (GWP) refrigerants, the Air-Conditioning, Heating and Refrigeration Institute (AHRI), based in the United States, has launched an industry-wide cooperative research programme to identify and evaluate promising alternative refrigerants for major product categories such as air-conditioners, heat pumps, dehumidifiers, chillers, water heaters, ice makers and refrigeration equipment. Referred to as the Low GWP Alternative Refrigerants Evaluation Programme (Low GWP AREP), the programme will help the industry to assess its research needs, accelerate its response to environmental challenges raised by the use of refrigerants with high global warming potential (GWP), as well as avoid duplicative work.

The programme will cover compressor calorimeter testing, system drop-in testing, soft-optimized system testing and heat transfer testing. All tests except heat transfer coefficient measurements are expected to be performed at participating companies' laboratories, using their own resources and at their own expense. The heat transfer coefficient measurements will be contracted out on a competitive basis to universities and private research laboratories. The programme will be managed by a technical committee that will be responsible for developing detailed test protocols, prioritizing testing tasks and ensuring quality of the results to be published. Once the technical committee is formed, an open solicitation will be made to companies to participate in the testing programme. AHRI expects to begin testing new low GWP alternative refrigerants in July 2011. (Source: www.hvacrbusiness.com)

OzonAction Communication Strategy

OzonAction Communication Strategy for Global Compliance with the Montreal Protocol presents a path by which the Clearinghouse will develop and deploy new and efficient strategic approaches for Information, Communication and Education (ICE) delivery to the Article 5 countries. For more information, contact:

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REFRIGERATION/ AIR-CONDITIONING

New hydrocarbon screw compressor series

The new oil injection type screw compressors series GH from Mayekawa, Japan, is capable of running continuously at a discharge pressure of 5.0 MPaG (50 bar). The GH series achieves a high efficiency and coefficient of performance (COP) by employing a special rotor profile. The compressors are designed for various gases, including hydrocarbons, carbon dioxide, ammonia, helium and hydrogen. The GH series uses forged steel for the rotors and tilting pads for the thrust bearings, resulting in less maintenance and lower running costs. Features of the four units in this series (160GHS, GH250S, GH250L, GH320S) include:

- 570-5,000 kg in weight;
- 510-1,095 mm in width;
- 1,021-1,938 mm in length and 510-970 mm in height;
- Suction pressure of 0.55 to 3.0 MPaG (= up to 30 bar);
- Discharge pressure of 3.7 to 5.0 MPaG (= up to 50 bar); and
- Maximum allowable discharge temperature of 100°C.

Contact: Mr. Kuniaki Kawamura, Mayekawa Mfg. Co. Ltd., 3-14-15 Botan Koto-ku, Tokyo 135-8482, Japan. Tel: +81 (3) 3642 8181; Fax: +81 (3) 3643 7094; E-mail: public@mayekawa.co.jp. (Source: www.hydrocarbons21.com)

Hydrocarbon replacement for R22 offers energy savings

In the United States, Jerico Energy has conducted tests to quantify the amount of energy saved by switching from HCFC-22, also known as R22, to HCR-188C2, a pure hydrocarbon (HC) formulation developed by inventor and entrepreneur Mr. Richard Maruya of A.S. Trust & Holdings. Performance data were collected from the mutually

exclusive operation of the HC circuit and the R22 circuit, both in operation in comparable heat load conditions. The tests took place using two compressor systems of a Carrier 50D104 Weathermaker IV chiller. The test results to date substantiate the compatibility of HCR-188C2 as an energy-efficient replacement refrigerant for R22 charged systems. The Weathermaker IV system was charged with 58.5 kg of R22 refrigerant in one circuit and the second circuit was evacuated and charged with approximately 22.2 kg of HC188C2, only 38 per cent of the original R22 by weight. Results show a -15.55°C improvement in cooling of HCR-188C2 over R22. With just R22 in the circuit the air temperature differential at the evaporator was -12.77°C, but when just HCR-188C2 was in the circuit, the temperature differential was -10.55°C. Moreover, power usage (kW) efficiency of the HC188C2 charged system was 9 per cent more than that of the system using R22. At the same time, an improvement in energy efficiency rating (EER) of 5 per cent showed that the power usage efficiency is not at the expense of cooling capacity. Jerico believes that with some hardware changes, even greater system performance improvements and reduced power usages could be achieved. (Source: www.hydrocarbons21.com)

Propene and propane for cooling systems

Waitrose, a food retailer in the United Kingdom, makes use of integral refrigerated cases running on the hydrocarbon (HC) propene (R1270), using chilled water/glycol as the condensing medium. This is supplied by roof-top-mounted Geoclima chillers based on Frascold compressors running on R290 (propane). The Geoclima chillers use a combination of liquid pressure amplification (LPA) technology with a floating head pressure, high-efficiency aluminium coils and glycol-based free cooling to significantly increase operating efficiency. The roof-top-mounted chillers provide a supply of chilled water or glycol mixture at 10°C to 18°C, with a typical return temperature 6°C higher, ensuring optimum performance and efficiency of both integral cases and chiller.

The Frascold compressors at the heart of the propane chiller were selected after evaluation trials with machines from a number of manufacturers. Winning features included the resilience of the compressor to liquid return and the availability of a variable-speed option that further improves efficiency and compressor control. Frascold has also modified the position of the pressure transducer, which is now mounted on the body of the compressor itself rather than located remotely, reducing pipe work and connections and further improving safety and reducing the potential for leaks. Waitrose reports zero leakage in the trial supermarket set-up monitoring the performance of the system. Overall, the use of HC refrigerants has improved the energy efficiency of individual systems by 10-20 per cent, with further gains of around 10 per cent delivered as a result of heat recovery and store-wide integration. When added to the 100 per cent containment of refrigerant, the carbon dioxide emissions reduction in stores to date is running at around 32 per cent. (Source: www.hydrocarbons21.com)

Green chilling programme

In the United States, the general goods retailing chain Target is trying out a more energy-efficient refrigerant in its efforts to go green. Target and (other grocers, including Supervalu) are testing a new type of refrigerant designed to reduce the leakage from coolers and freezers, lower greenhouse gas emissions and, eventually, reduce the cost of operations. Target is testing the refrigerant in 11 of its stores in six states with the help of the Environmental Protection Agency (EPA), which calls the programme “GreenChill”. The technical name of the new refrigerant is 1,1,1,2-tetrafluoroethane (R134a). It is a high-temperature refrigerant gas less prone to leakage and more energy efficient. It is also used in automobile air-conditioners.

In December 2010, Target joined the GreenChill programme that fit into the chain’s intention to use resources responsibly and reduce the company’s carbon footprint. The EPA estimates that refrigerant usage by GreenChill participants is 50 per cent below the industry average. If all grocers switched to the new gas, the industry would save US$100 million a year in refrigeration costs while cutting annually carbon dioxide emission by 22 million tonnes and ozone depleting substances by 240 tonnes. The GreenChill programme at present includes 7,000 supermarkets operating

in 50 states. Chains include Food Lion, Publix, Whole Foods and Hy-Vee as well as all Supervalu's banners including Jewell, Albertson's and Cub divisions. (Source: www.startribune.com)

World's first water vapour chiller with axial compressor

In Japan, Kobe Steel Ltd., The Tokyo Electric Power Co. Inc., Chubu Electric Power Co. Inc. and The Kansai Electric Power Co. Inc., have completed a prototype of the world's first water vapour chiller. The chiller incorporates an axial compressor that uses water as the refrigerant and can be applied to various applications such as for air-conditioning and cooling processes at buildings and factories. The prototype was developed with the help of the Danish Energy Agency and in cooperation with the Central Research Institute of Electric Power Industry, Japan, Danish Technological Institute and Johnson Controls Denmark ApS. This has marked a big step towards the practical use of water vapour chillers. The main characteristics of the water vapour chiller are:

- Use of water, the ultimate natural refrigerant: Using water as a refrigerant solves the issues of ozone depletion, global warming, inflammability and toxicity. Water is also used as the bearing lubricant in the compressor;
- With the development of the axial compressor, the current prototype has achieved significant downsizing and has a footprint approximately one-third (or one-half for the indirect heat exchanger) that of a conventional water vapour chiller with a centrifugal compressor;
- Comparable performance to fluorocarbon refrigerant chillers – The cooling performance target is around 5.4 (4.8 for the indirect heat exchanger type) in coefficient of performance (COP), and an inverter control system was adopted to enhance the part load condition; and
- Adaptable to various needs, thanks to the development of the indirect heat exchanger for applications combined with other chillers, and the direct heat exchanger for standalone operations.

Contact: Central Research Institute of Electric Power Industry, Ohtemachi Building, 1-6-1 Ohtemachi, Chiyoda-ku, Tokyo 100-8126, Japan. Tel: +81 (3) 3201 6601. (Source: www.chuden.co.jp)

SOLVENTS

Environmentally friendly paint and powder stripper

Dynamix Inc., the United States, offers an environment-friendly paint and powder coating stripper that safely, effectively and quickly removes difficult-to-strip paint from ferrous and non-ferrous substrates at ambient temperature. Dynastrip RT is non-fuming, does not contain ozone depleting or carcinogenic compounds, is 450 times less volatile than methylene chloride and is 100 per cent biodegradable. It removes paint by breaking the chemical bonds that hold paint molecules together. *Contact: Dynamix Inc., 91 Esna Park, Unit 7, Markham, ON L3R 2S2 CA, United States of America. Tel: +1 (905) 4770 900; Fax: +1 (905) 4770 600.* (Source: www.pfonline.com)

Earth-friendly parts cleaning systems for washers

ChemFree Corp., the United States, manufactures a patented non-hazardous bioremediating parts washing system (SmartWasher® parts washer), OzzyJuice degreasing solutions and OzzyMat, a microbe-impregnated particulate trap. OzzyJuice degreasing solutions have Clean Air Solvent (CAS) certificate from Air Quality Management District (AQMD). The SmartWasher combines a powerful, aqueous-based, surfactant, degreasing solution with a microbial impregnated filter. The OzzyJuice solutions clean dirty parts; the microbes on the OzzyMat break down grease, oil and other contaminants out of the OzzyJuice and turn them into harmless carbon dioxide and water – the contaminants evaporate into the air. The SmartWasher eliminates hazardous air pollutants and volatile organic compounds emitted from solvent parts washers. There are no ozone depleting substances and because the microbes clean out the fluid the need to dispose of dirty fluid is eliminated. Over 25,000 SmartWasher machines are installed across the world. *Contact: Ms. Melissa Page-Hale, ChemFree Corp., 8 Meca Way, Norcross GA 30093, United States of America. Tel: +1 (770) 564 5589; Fax: +1 (770) 564 5533; E-mail: mpage@chemfree.com.* (Source: www.aboutus.org)

Method of dry cleaning using a highly fluorinated organic liquid

Entropic Systems Inc., the United States, has taken patent on dry cleaning liquid formulations, which comprise a highly fluorinated organic solvent, and methods for their usage. A compound in which fluorine atoms constitute at least one-half of the non-carbon substituents on the carbon atoms in the molecule, or a compound in which the total atomic weight of the fluorine in the molecule contributes greater than 50 per cent of the molecular weight of the compound is termed as "highly fluorinated". In particular, the formulations of the invention comprise a highly fluorinated hydrocarbon containing at least one hydrogen atom per molecule (HFC) or a highly fluorinated ether containing at least one hydrogen atom per molecule (HFE). In a preferred embodiment, the cleaning liquid contains an HFC or HFE in combination with dichloroethylene. The dry cleaning liquid formulations can be applied to fabric without creating a mixed waste. Thus, the handling of the effluent produced by the cleaning method of the invention is much simpler than that required for conventional dry-cleaning or laundering techniques. The use of HFCs and HFEs has several advantages: they are not inflammable and do not deplete the ozone layer or contribute significantly to global warming. (Source: www.patentstorm.us)

Ozone layer-safe solvent

Safety Solvent #1-P from Shore Chemical Co., the United States, is an all-purpose, chlorinated safety solvent and degreaser. The product can be used in cleaning and degreasing applications without fear of depleting the ozone layer. Safety Solvent #1-P is a stable, colourless liquid with a mild odour. It has a density of 1.62 kg/litre and medium toxicity if breathed in. It has zero flash point and evaporates completely without leaving any trace. The product works rapidly for general maintenance and cleaning jobs including auto equipment, telephone parts, office equipment, business machines, appliances, printing presses and equipment, immersion of mechanical or electronic parts. It can also be used on silicone and wax moulds, for spot cleaning grease, and as fresh paint overspray. *Contact: Shore Chemical Co., 2917 Spruce Way, Pittsburgh, PA 15201-1530, United States of America. Tel: +1 (412) 471 3330; Fax: +1 (412) 471 3260; E-mail: manager@shorechemical.com.* (Source: www.shorechemical.com)

Monochlorotrifluoropropene compounds and compositions

Honeywell International Inc., the United States, has applied for a patent related to various uses of monochlorotrifluoropropenes, in combination with one or more other components, in a variety of applications, including as cleaning solvents and blowing agents. The components include other fluoroalkenes, hydrocarbons, hydrofluorocarbons, ethers, aldehydes, ketones, alcohols, trans-1,2-dichloroethylene, methyl formate, formic acid, water, carbon dioxide and combinations of any two or more of these. The patent application also pertains to methods and systems that utilize the invented compositions. In one aspect, it covers methods and systems for heat transfer, for retrofitting existing heat transfer equipment and for replacing the existing heat transfer fluids in an existing heat transfer system. In other aspects the present compositions are used in connection with flavour and fragrance extraction and delivery, aerosol generation, and as inflating agents and non-aerosol propellants. *Contact: Honeywell International Inc., 101 Columbia Road, Morristown, New Jersey, NJ 07962, United States of America.* (Source: www.sumobrain.com)

Risk Assessment on Illegal Trade in HCFCs – a UNEP Report

United nations Environment Programme (UNEP) has released of a new report entitled "Risk Assessment on Illegal Trade in HCFCs". The document takes a holistic approach analysing numerous factors contributing to black market trade, historical information and recent case studies. It analyses the risk and scale of future hydrochlorofluorocarbon (HCFC) smuggling and proposes targeted recommendations to mitigate these risks.

For more information, contact:

OzonAction Programme
United Nations Environment Programme
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15, rue de Milan, 75009 Paris, France
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E-mail: ozonaction@unep.org

HALONS

Environmentally friendly extinguishing system

Sinorix™ 1230 from Siemens Industry Inc., the United States, is a green fire extinguishant based on Novec™ fire protection fluid from 3M, the United States. The sustainable technology reportedly has one of the highest safety margin among chemical clean agents and ensures rapid extinguishing in mission-critical areas without negative impact on the environment. Sinorix 1230 has a global warming potential (GWP) of 1 (the lowest for any chemical agent) and zero ozone depletion.

Safe and effective, Sinorix 1230 is a non-toxic, non-inflammable and non-conductive solution that requires no clean-up after discharge. Designed to interrupt combustion process at its earliest stages, the agent suppresses fire before there is enough heat to damage adjacent equipment or ignite other potentially combustible materials. At room temperature, Sinorix 1230 remains a liquid but behaves like a gas when activated in the fire protection system. (Source: www.buildingtechnologies.siemens.com)

New canister for fire suppression

Eclipse Aerospace, the United States, has earned Federal Aviation Administration (FAA) certification for a new canister for the PhostrEx fire suppression system used in the company's EA500 twinjet. The canister stores the fire suppressant gas at a lower pressure, which eliminates the leakage problems linked with Eclipse's earlier 'fire bottles'. "With its low weight, low cost and maintenance-free design, PhostrEx will quickly become the halon alternative of choice not only for aviation but for many other industry applications," said Mr. Mason Holland, CEO and Chairman of Eclipse Aerospace. PhostrEx was approved as a halon replacement by the United States Environmental Protection Agency (EPA). One Eclipse engine can be protected with an entire PhostrEx system weighing as little as 300 g. The system is designed to be replaced after eight years. The new canisters are expected to be available for purchase beginning in August 2011. (Source: www.aopa.org)

Retrofitted non-halon fire suppression system

Fike Corp., the United States, is patenting an invention related to a method of converting halon-based fire suppression systems to HFC-125 systems without the need for changing the existing distribution piping. An amount of HFC-125 greater than the amount of halon utilized in the fire suppression system is provided, and subjected to a pressure to effect exhaustion of the HFC-125 from the system within a time range of about 10-25 s, which meets the Class A and Class B standard fire extinguishing requirements. An existing fire suppression system is analysed for flow characteristics to find the total discharge time (T_D) of that system. The additional percentage on a weight basis of HFC 125 required (C_+) for the retrofitted system is determined by the formula:

$$C_+ = ((T_D - 10) \div (2 \times T_{CRIT}) - T_D \times 100)$$

wherein T_{CRIT} is the critical average time span needed for the material to be extinguished. The method may also be utilized to determine the amount of HFC-125 required for a retrofitted fire suppression system. (Source: www.google.co.in)

New fire suppression systems

Koetter Fire Protection, the United States, offers Ansul Sapphire fixed-nozzle, fire suppression systems that employ Novec™ 1230 fluid from 3M, the United States. The fluid offers a sustainable technology that has the highest safety margin, the lowest global warming potential (GWP) for halocarbon alternatives and zero ozone depletion potential (ODP). Novec 1230 fire protection fluid for total flooding applications has an atmospheric lifetime of just five days. Ansul Sapphire Novec 1230 fire protection fluid has been developed as a halon 1301 replacement and an alternative to hydrofluorocarbons (HFCs), hydrochlorofluorocarbons (HCFCs) and perfluorocarbons (PFCs) in special hazard, high-value applications. Novec 1230 fluid is low in toxicity and environment impact. It is a liquid at room temperature, with a low vapour pressure, allowing for ease in handling, storage and shipping. The Ansul Sapphire system provides the ideal solution for facilities seeking to protect critical assets that could be damaged by ordinary fire suppression systems. The system

is able to detect fire at invisible levels, identifying particles of combustion before they develop into damaging flames. *Contact: Koetter Fire Protection LLC, 10351 Olympic Drive, Dallas, Texas 75220, United States of America. Tel: +1 (214) 3583 593; Fax: +1 (214) 3509 930.* (Source: www.koetterfire.com)

Water mist innovation to cut down bus fires

A study by SP Technical Research Institute of Sweden has unveiled that the majority of all fires in buses in that country and Norway over a decade till 2007 started in the (rear) engine compartment or in its vicinity. The increasing demands for lower noise and reduced exhaust gas emissions have meant higher fuel pressures and better insulation of the engine compartment, resulting in higher temperatures in the engine compartment, and, consequently, a greater risk of fires. The most effective solution to extinguishing engine compartment fires is to use a fixed, fully automatic system that both detects and suppresses the fire before it gets out of control. A water mist system from Fogmaker International AB, Sweden, works independent of a vehicle's power supply, is environmentally harmless, and causes little damage to the engine and sub-systems.

Water mist is up to three times more effective than powder- or gas-based extinguishers, says Mr. Andreas Svensson, Fogmaker's Managing Director. The system uses pressurized water (at 100 bar) to generate, via a system of nozzles, a fine mist with an average droplet size of 50 µm that extinguishes the fire completely and brings the temperature down by 750°C in just 10 s. This extinguisher uses three mechanisms to attack the three essential elements of the fire – heat, oxygen and fuel. First, by evaporating, the water mist cools the burnt gases and hot parts in the engine compartment. As turning water to vapour takes a lot of heat, this contributes to the rapid extinguishment and reduces the risk of re-ignition. Second, droplets evaporate quickly, expanding to 1,640 times their volume. The vapour increases moistens the air and prevents supply of oxygen to the fire. Finally, the water mist produces a film-forming foam that covers any inflammable pool of oil products that may have formed in the engine compartment. (Source: autocarpro.in)

FOAMS

Blowing/foaming agents

A researcher in Australia has applied for a patent on compositions for use as environmentally acceptable foaming/blowing agents for preparing polymeric foams and to articles made from such foams. The invented compositions comprise dichloroethylene and a suitable fluorinated ether or preferably an alkoxy-substituted perfluoro compound. The fluorinated ether helps minimize the flashpoint of 1,2-dichloroethylene. Highly suitable compositions include trans- 1,2-dichloroethylene and 1-ethoxy-nonafluorobutane, such as HFE-7200. The use of fluorinated ethers like HFE-7200 is advantageous, as they are not classified as hazardous substances. Further, their ozone depletion potential (ODP) is low and global warming potential (GWP) is 55 times that of carbon dioxide, which is not high in comparison with many commercial fluorinated hydrocarbons. The compositions have little inflammability, low ODP, a low or minimal flashpoint and low or minimal GWP. They also show unexpected compressive strength properties. *Contact: Mr. Barry Walker, 77 Bassett Street, Mona Vale, New South Wales, NSW 2103, Australia.* (Source: www.sumobrain.com)

GE's plant switches over to cyclopentane as blowing agent

GE Appliances & Lighting's plant in Decatur, the United States, is currently making the transition to using cyclopentane as its foam blowing agent in top-freezer refrigerators in 16, 17, and 18 ft^3 sizes. The change will make GE the first full-line appliance manufacturer to use cyclopentane as an insulation foam blowing agent in household refrigerators. A hydrocarbon (HC), cyclopentane has significant environmental benefits such as zero ozone depletion potential (ODP) and very low global warming potential (GWP). According to GE, cyclopentane will help reduce its plant's greenhouse gas (GHG) emissions from the foam blowing process by 99 per cent.

GE had been using HFC-134a as blowing agent. HFC-134a and other hydrofluorocarbons (HFCs) have zero ODP but a high GWP. GE estimates

that the change will reduce Decatur plant GHG emissions from the foam insulating process by more than 400,000 tonnes of carbon dioxide (CO_2) equivalent annually. GE says this is equal to the annual emissions of 78,000 cars on United States roads, and about the same as the annual CO_2 absorbed by more than 100,000 acres of forest in south-eastern United States. Initial GE tests indicate the new blowing agent increases the efficiency of the insulating foam compared with HFC-134a. (Source: www.appliancemagazine.com)

Live demonstrations of state-of-the-art PU foam machinery

The successful completion of 'Innovative Low-Cost Hydrocarbon Technologies', a pilot project allowing for more cost-effective and lower environmental impact solutions to polyurethane (PU) production, was marked with a demonstration of the state-of-the-art technology by Egypt-based Dow Mideast Systems, a wholly owned subsidiary of the Dow Chemical Co. of the United States. The search for low-cost hydrocarbon technologies comes within the framework of cooperation between the Egyptian Environmental Affairs Agency (EEAA) and the United Nations Development Programme (UNDP) on phasing out ozone depleting substances (ODS).

From 2010, Dow Mideast Systems has been taking part in this turnkey pilot project as the host and testing facility of the newly designed machine, allowing for the use of a technical and economical solution for blowing agents in PU foams. The main objective of the project is to replace the use of ozone depleting hydrochlorofluorocarbons (HCFCs) as blowing agents for PU production. The machine was developed by SAIP, an Italian equipment designer and manufacturer for the PU industry.

UNDP is assisting EEAA to phase out HCFC by 2030. The completion of the pilot project marks the beginning of more projects to meet this deadline. More than 20 machine trials were completed by mid-2011, to validate the use of hydrocarbon-based blowing agents and a different blending concept. The pilot project results showcased the means for a safe and economical switch to the use of hydrocarbons, reducing impact on the environment. (Source: www.ameinfo.com)

FUMIGANTS

Researchers investigate alternatives to methyl bromide

Ongoing research at Washington State University (WSU), the United States, into antifungal plant species and a diagnostic test could help growers phase out their use of methyl bromide (MBr), a soil fumigant that kills fungal pathogens. At the WSU Centre for Sustaining Agriculture and Natural Resources, Ms. Catherine Crosby, a doctoral student working with soil scientist Ms. Lynne Carpenter-Boggs, is examining the effectiveness of certain kinds of mustard, of the *Brassica* genus, as an MBr alternative. "*Brassica* seed meal and cover crops have antifungal properties that either kill or inhibit the growth of many organisms," said Ms. Crosby. The application process for *Brassica* seed meal would be similar to that currently used to apply MBr.

Another research component has just begun at the molecular level to detect the actual amount of harmful fungi in soil. Ms. Anna Leon, a plant pathology doctoral student, is working with Mr. Gary Chastagner, WSU conifer expert and plant pathologist, to develop a quick diagnostic test that can determine the level of a specific soil pathogen, *Fusarium commune,* in nursery soil. A second part of this research includes pathogenicity trials to establish a threshold level at which *F. commune* causes disease. If growers can test for the number of fungal spores in soil, they can potentially reduce or eliminate fumigant applications. (Source: cahnrsnews.wsu.edu)

Alternatives for control of soil-borne pathogens and weeds

New research is being conducted in California, the United States, to evaluate emerging chemical alternatives to methyl bromide (MBr). The San Joaquin Valley Agricultural Sciences Centre of the United States Department of Agriculture's Agricultural Research Service (USDA-ARS) conducted two field trials to test several emerging chemicals in combination with metam sodium as MBr replacements. Emerging chemicals included 2-bromoethanol, dimethyl disulphide, propylene

oxide, furfural and sodium azide. Pathogen and weed populations were measured after chemical application, and seed viability was assessed from weed seed previously buried in the plots. In the first trial, the emerging chemicals did not improve pest control compared with metam sodium alone. However, in the second trial, several of these chemicals did improve the pest control performance of metam sodium.

The research concluded that emerging alternative chemicals have the potential to provide better control of soil-borne pathogens and weeds when used with metam sodium than metam sodium alone. Registration of these materials could provide California growers of high-value crops with a broader choice of tools compared with the limited MBr alternatives currently available. *Contact: Mr. James Gerik, San Joaquin Valley Agricultural Sciences Centre, Agricultural Research Service, United States Department of Agriculture, Parlier, CA, United States of America. E-mail: james.gerik@ars.usda.gov.* (Source: www.ncbi.nlm.nih.gov)

Methyl bromide alternatives in cucumber crops

Researchers in China have 1,3-dichloropropene (1,3-D) as a potential alternative for the widely used soil fumigant methyl bromide (MBr) in crops of cucumber *(Cucumis sativus)*. Six treatments were replicated five times in a randomized complete block design: fumigation with MBr (400 kg/ha), three 1,3-D doses (90, 120, and 180 l/ha), an avermectin dose (7.5 l/ha) and an un-treated control. Results consistently indicated that MBr was generally superior to the treatments involving 1,3-D and avermectin, which in turn were superior to the control, for improving cucumber yield and controlling nematodes and weeds. In two successive seasons, 1,3-D at a dose of 180 l/ha was as effective as MBr in increasing plant height, vigour and yield, and in nematode control, though poor potency in weed control. The research data support the conclusion that 1,3-D is a promising MBr alternative for nematode and weed control in cucumber crops, especially in integrated pest management. *Contact: Mr. Kaiyun Wang, Department of Plant Protection, Shandong Agricultural University, Tai'an, Shandong 271018, China E-mail: kywang@sdau.edu.cn.* (Source: pubs.acs.org)

Pasteuria for nematode control

Microbial pesticides have specific advantages over fumigants in the control of nematodes. However, many microbial pesticides depend on the nematode consuming the microbe. This can be a challenge because plant pathogenic nematodes are generally herbivores. More than 50 years ago, academic and United States Department of Agriculture (USDA) researchers discovered a genus of bacteria called *Pasteuria* to be a promising alternative for nematode control: it does not need to be eaten by the nematode to be effective. Its spores are applied to the soil, and as a nematode passes, they stick to the nematode's outer cuticle. The spores germinate and enter the nematode's body causing death, and spreading new spores into the soil. The technical challenge for commercialization of *Pasteuria* was the development of an economically viable large-scale manufacturing process. The challenge was recently overcome by finding a way to grow the bacteria *in vitro* outside of a living host. A new patented process allows fast and effective growth of multiple strains of *Pasteuria penetrans* in traditional commercial fermentation tanks. This process has reduced the cost of production, making the product economically viable. (Source: advancinggreenchemistry.org)

Non-methyl bromide fumigation system demonstrated

Bioglobal, Australia, has successfully demonstrated an alternative to methyl bromide (MBr) fumigation at Al Hasa, Saudi Arabia. The safe, environmentally friendly alternative fumigant is ethyl formate (EF) and is as effective as MB. The key to its use is the development of customized gas delivery systems that Bioglobal has developed for processing dates. Bioglobal's system has been successful in achieving a 100 per cent kill rate for storage moth pest and larvae in three tests carried out in June 2011 at Al Hasa with monitoring by the Ministry of Agriculture and King Faisal University. This result is a major advancement in deploying this post-harvest technology. The next step is further testing by the Ministry of Agriculture to replicate the results, and refining the business model for this MBr fumigation alternative to penetrate the marketplace. (Source: www.bioglobal.com.au)

RECENT PUBLICATIONS

Blowing Agents and Foaming Processes 2011 Conference Proceedings

As raw material costs continue to pose a significant economic challenge to manufacturers in high-volume markets, end users are increasingly sourcing novel materials that represent cost-effective alternatives to traditional choices. This technical briefing, in response to the needs of the polymeric foam industry, provides a forum and ample networking opportunities for industry experts to showcase, and delegates to discover new materials and processing technologies that will improve current application performance – focusing on the industry demand for higher performance and lower costs.

Contact: iSmithers, Shawbury, Shrewsbury, Shropshire, SY4 4NR, United Kingdom. Tel: +44 (939) 250 383; E-mail: info@ismithers.net; Website: www.ismithers.net.

Refrigeration: Theory, Technology and Applications

The primary purpose of refrigeration is lowering the temperature of an enclosed space or substance and then maintaining that enclosed space or substance at that lower temperature. This book, part of the Mechanical Engineering Theory and Applications Series, reviews previous and current research on refrigeration. It includes an overview of up-to-date developments and technology in the fields of: industrial drying heat pumps; magnetic refrigeration at room temperature; an alternative approach based on artificial neural networks to determine thermodynamic properties of refrigerants; solar-powered sorption refrigeration and air-conditioning; the modelling of chilling and freezing processes and others.

Contact: Nova Science Publishers Inc., 400 Oser Avenue, Suite 1600, Hauppauge, NY 11788-3619, United States of America. Website: www.novapublishers.com.

TECH EVENTS

07-09 Jul
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India

NCRAC-2011 – National Conference on Refrigeration and Air-Conditioning
Contact: Prof. M.P. Maiya,
Chairman, NCRAC-2011,
Indian Institute of Technology Madras,
Chennai 600036, India.
Tel: +91 (44) 2257 4665, 2257 5720;
Fax: +91 (44) 2257 4652, 2257 0545;
E-mail: NCRAC2011@iitm.ac.in.

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 Intl. 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.

09-11 Nov
HCM City
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REVAC VIETNAM 2011
AMB Events Sdn Bhd,
Suite 1701, 17th Floor Plaza Permata,
6, Jalan Kampar, Off Jalan Tun Razak,
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14-18 Nov
Bali
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Joint 9th Conference of the Parties to the Vienna Convention and 23rd Meeting of the Parties to the Montreal Protocol
Contact: Ozone Secretariat, United
Nations Environment Programme,
United Nations Avenue, Gigiri,
Technology Centre (KSTC),
P.O. Box 30552, Nairobi 00100,
Kenya.
Tel: +254 (20) 762 3851/3611;
Fax: +254 (20) 762 46 91/92/93;
E-mail: ozoneinfo@unep.org.

PUBLICATIONS from APCTT

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BOOKS	Indian Rupees* (India, Bhutan and Nepal)	US Dollars*
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❑ 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.*