VATIS UPDATE

# Ozone Layer Protection

Vol. 4 No. 118 • May - Jun 2013
ISSN 0971-5657

## Apprise yourself with the latest technological innovations

### Highlights

- Sunlit snow triggers atmospheric cleaning
- Successful trials of new low-GWP refrigerant
- Methyl soyate: an eco-friendly solvent
- CFC-free, stable inhalation formulation
- Low-GWP liquid blowing agent for foam insulation
- Pressurized disinfestation with carbon dioxide

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific
Asian and Pacific Centre for Transfer of Technology (APCTT)

Ozone Cell
Ministry of Environment and Forests
Government 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**

A scientist conducts a snow-chamber experiment in Alaska (see page 5 for details).

*(Credit: Dr. Paul Shepson, Purdue University, the United States)*

**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.

***Website: http://www.techmonitor.net***



**ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY**
Adjoining Technology Bhawan
Qutab Institutional Area
Post Box No. 4575
New Delhi 110 016, India
Tel: (91) (11) 3097 3700
Fax: (91) (11) 2685 6274
E-mail: postmaster.apctt@un.org
Website: http://www.apctt.org

**OZONE CELL**
Ministry of Environment and Forests
Government of India
Zone IV, East Court, 2nd Floor
India Habitat Centre, Lodhi Road
New Delhi 110 003, India
Tel: (91) (11) 2464 2176
Fax: (91) (11) 2464 2175
Telegram: PARYAVARAN NEW DELHI
E-mail: ozone-mef@nic.in
Website: http://www.ozonecell.com



*** Value Added Technology Information Service**

# CONTENTS

Vol. 4 No. 118 May - Jun 2013

## NASA's SAGE III to monitor the Ozone Layer

*This image illustrates the fragility of the Earth's atmosphere, the thin blue band fading into darkeness*

To keep track of the Earth's fragile ozone layer, the National Aeronautics and Space Administration (NASA) of the United States is all set to launch the most sophisticated space-based ozone sensor ever: Stratospheric Aerosol and Gas Experiment (SAGE) III, slated for installation on the International Space Station (ISS) in 2014. "The ISS is in perfect orbit for SAGE III," says Dr. Joe Zawodny, Project Scientist for the instrument at the Langley Research Centre. "It will be able to monitor ozone all around the Earth during all seasons of the year."

SAGE III works by using the Sun and the Moon as light sources. When either one rises or sets behind the edge of the Earth, SAGE III analyses the light that passes through the Earth's atmosphere. Ozone and other molecules absorb specific wavelengths, which reveal their density, temperature and location. "SAGE III is, essentially, analysing the colours of the sunset to track ozone," says Dr. Zawodny. "It sounds romantic, but this is hard science." When SAGE III reaches the space station, it will measure ozone deeper into the atmosphere than ever done before, reaching all the way down into the troposphere. "From ISS, SAGE III will get a global picture of tropospheric ozone," says Dr. Zawodny.

*Source: www.clarksvilleonline.com*

## Revised SCAR report highlights ozone depletion

West Antarctica remains the most climatically dynamic region of the southernmost continent, which continues to be largely shielded from the effects of global warming thanks to the persistence of the ozone hole. But that is likely to change before the end of the century, according to the most recent update of Antarctic Climate Change and the Environment (ACCE) report by the Scientific Committee on Antarctic Research (SCAR). Dr. John Turner, a scientist with the British Antarctic Survey and the Chair of the ACCE expert group for SCAR, revealed in a brief video statement that the scientific community has reached consensus on a number of issues, such as the fact that West Antarctica is contributing "significantly" to sea-level rise. In particular, the retreat of Pine Island Glacier, an area under intense study in recent years, accounts for about 10 per cent of total glacial melt into the ocean.

The ocean around the Antarctica and regions to the north are warming. The resulting temperature differential has intensified westerly winds around the Southern Ocean by 15 to 20 per cent, effectively shielding much of the continent from the intrusion of warmer air originating in lower latitudes. The updated ACCE report noted that ozone depleting substances (ODS) in that stratosphere are decreasing by 1 per cent per year. By mid-century, springtime ozone levels are expected to recover significantly, with stratospheric ozone concentrations predicted to return to pre-1980s levels year-round by the end of the 21st century. In effect, Antarctica's added protection from warmer temperatures thanks to those intensified westerly winds might dissipate should the circulation patterns also return to pre-1980s levels.

The report also takes into account recent research that suggests that warming across parts of the Antarctic Peninsula and West Antarctica is being influenced by warmer sea surface temperatures in the tropical Pacific, particularly during certain months of the year. The updated ACCE report also highlighted changes in the marine ecosystem, such as the shift of both phytoplankton and bacterioplankton from larger to smaller species, which may affect food availability for grazing animals.

*Source: antarcticsun.usap.gov*

## Sunlit snow triggers atmospheric cleaning

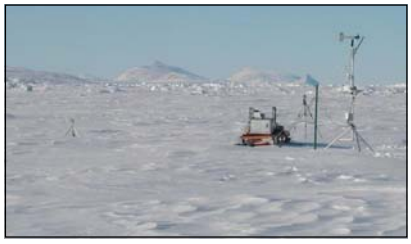
Researchers at Purdue University, the United States, have discovered that sunlit snow is the major source of atmospheric bromine in the Arctic, the key to unique chemical reactions that purge pollutants and destroy ozone. The new research also indicates that the surface snow pack above Arctic sea ice plays a previously unappreciated role in the bromine cycle and that the loss of sea ice, which has been occurring at an increasingly rapid pace in recent years, could have extremely disruptive effects in the balance of atmospheric chemistry in high latitudes.

The team's findings suggest the rapidly changing Arctic climate – where surface temperatures are rising three times faster than the

global average – could dramatically change its atmospheric chemistry, said Dr. Paul Shepson, who led the research team. Interactions between sunlight, ozone and water vapour create an oxidizing agent that scrubs the atmosphere of most of the pollutants human activity releases into it, Dr. Shepson said. Polar temperatures are too cold for the existence of much water vapour, and in the Arctic this cleaning process appears instead to rely on reactions on frozen surfaces involving molecular bromine, a halogen gas derived from sea salt. This gaseous bromine reacts with and destroys the ozone in the atmosphere. This aspect of the bromine chemistry works so efficiently in the Arctic that ozone is often entirely depleted from the atmosphere above sea ice in the spring.

"Bromine chemistry mediates the amount of ozone, but it is dependent on snow and sea ice, which means climate change may have important feedbacks with ozone chemistry," Dr. Shepson said. "Sea ice had been thought to be the source of the gaseous bromine," said Dr. Kerri Pratt, a postdoctoral researcher in the team. "We had an 'of course!' moment when we realized it was the snow on top of the sea ice. The snow is what is in direct contact with the atmosphere. Sea ice is critical to the process, though. Without it, the snow would fall into the ocean, and this chemistry would not take place. This is among the reasons why the loss of sea ice in the Arctic will directly impact atmospheric chemistry," Dr. Pratt added.

The team also discovered that sunlight triggered the release of bromine gas from the snow and the presence of ozone increased the production of bromine gas. "Salts from the ocean and acids from a



*Experiments in progress in the Arctic*

layer of smog called Arctic haze meet on the frozen surface of the snow, and this unique chemistry occurs," Pratt said. "It is the interface of the snow and atmosphere that is the key." A series of chemical reactions that quickly multiplies the amount of bromine gas present, called the "bromine explosion", is known to occur in the atmosphere. This also occurs in the spaces between the snow crystals and wind then releases the bromine gas up into the air above the snow, the research team suggests. The team also measured the levels of bromine monoxide, formed from the reaction of bromine atoms with ozone, through flights of the Purdue Airborne Laboratory for Atmospheric Research.

*Source: www.sciencedaily.com*

## Interannual variability of stratospheric ozone (1995-2011)

Jet Propulsion Laboratory (JPL) of the California Institute of Technology, the United States, has been measuring vertical profiles of stratospheric ozone routinely – using lidars at the Mauna Loa Observatory (MLO, 19.5° N, 155.6° W) in Hawaii and the JPL Table Mountain Facility (TMF, 34.5° N, 117.7° W) – for several decades. JPL scientists, led by Mr. Guillaume Kirgis, investigated the interannual variability of ozone above MLO and TMF using multi-linear regression analysis on the deseasonalised monthly mean lidar and satellite time-series at 1 km intervals between 20 and 45 km from January 1995 to April 2011, a period of low volcanic aerosol loading. Explanatory variables representing the 11 year solar cycle, the El Niño Southern Oscillation, the Quasi-Biennial Oscillation, the Eliassen-Palm flux, and horizontal and vertical transports were used. The mid-latitude Ozone Depleting Gas Index, a new proxy that shows a decrease with time as an outcome of the Montreal Protocol, was introduced and compared to the more commonly used linear trend method. The analysis also compared the lidar time-series and a merged time-series obtained from Stratospheric Aerosol and Gas Experiment (SAGE) II, Halogen Occultation Experiment, and Aura-Microwave Limb Sounder instruments.

The results from lidar and satellite measurements are consistent with recent model simulations that propose changes in tropical upwelling. Additionally, at TMF, the Ozone Depleting Gas Index explains as much variance as does the Quasi-Biennial Oscillation in the upper stratosphere. Over the past 17 years, a diminishing downward trend in ozone was observed before 2000 and a net increase, and sign of ozone recovery, is observed after 2005. The results, which include dynamical proxies, suggest possible coupling between horizontal transport and the 11 year solar cycle response, although a dataset spanning a period longer than one solar cycle is needed to confirm this result. *Contact: Mr. Guillaume Kirgis, Jet Propulsion Laboratory, California Institute of Technology, Table Mountain Facility, Wrightwood, California, United States of America. E-mail: kirgis @tmf.jpl.nasa.gov.*

*Source: www.atmos-chem-phys.net*

## Policy changes on import of certain ODS items

The Government of India has made some amendments in the Indian Trade Classification (ITC) Harmonised System (HS) 2012, Schedule 1 (Import Policy). Following a review, import policy on certain items in Chapter 29 and Chapter 38 is revised from 'restricted' to 'free' as these items are not ozone depleting substances (ODS), while certain other items were moved from 'free' to 'restricted', as they are ODS.

Import of 1,1,1-trichloroethane (code 2903 19 20) is permitted only if it is in accordance with the provisions of the 'Manufacture, Storage & Import Hazardous Chemicals Rules, 1989' (policy condition 1). Import of the following items is permitted only if it is by actual users against a licence from a country that is a party to the Montreal Protocol on Substances that Deplete the Ozone Layer (policy condition 3):

- Methyl bromide (3808 91 22);
- Items containing CFCs – whether or not containing hydrochlorofluorocarbons (HCFCs), PFCs or HFCs – (3824 71 00);
- Items containing bromochlorodifluoromethane, bromotrifluoromethane or dibromotetrafluoroethanes (3824 72 00);
- Items containing hydrobromofluorocarbons (HBFCs) (3824 73 00);
- Items containing HCFCs whether or not containing PFCs/HFCs, but not containing CFCs – (3824 74 00);
- Items containing carbon tetrachloride (3824 75 00);
- Items containing 1,1,1-trichloroethane (methyl chloroform) (3824 76 00); and
- Items containing bromomethane (methyl bromide) or bromochloromethane (3824 77 00).

This notification (No. 9) from the Directorate General Foreign Trade (DGFT) also inserts and appends to Chapter 38, Schedule 1 (Import Policy) as Policy Condition 3 the need for the import to be "by actual users against a licence from a country which is a party to the Montreal Protocol". The condition prohibits import from countries that are not parties to the Montreal Protocol. The notification also updates the list of countries that are parties to the Montreal Protocol.

*Source: taxguru.in*

## Conversion of AC production to hydrocarbon technology

Propane (R290), a natural hydrocarbon (HC) refrigerant is an excellent alternative to climate-damaging hydrochlorofluorocarbons (HCFCs), which are being phased out from 2013 onwards under the Montreal Protocol, for use in environment-friendly cooling. Not only does it result in significantly reduced direct emissions, but also increases energy efficiency. In the year 2008, the International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) commissioned a project to introduce R290-driven split and window-type room air-conditioners (ACs) to the Indian market. The Ozone Cell of the Indian Ministry of Environment and Forests (MoEF) was the lead executing agency of the project that will conclude in 2013. A local partner – Godrej & Boyce Mfg. Co. Ltd. – is installing a production line for R290 room ACs, while taking the necessary safety procedures to counter the risks attached to the inflammable HC-based technology. Product certification and technicians' training are important parts of the project.

The results of the project are also being shared with these and other AC manufacturers to promote the technology throughout India and in other markets. The project is also helping to strengthen India's overall capacity to adopt environment-friendly technologies in accordance with international environmental agreements. Gesellschaft für Internationale Zusammenarbeit (GIZ) was involved in the project as part of the German Government's International Climate Initiative.

The production line at the Godrej & Boyce factory in Shirwal, Maharashtra, was installed in March 2012 and the first batch of the new ACs has already been sold in the market, reducing India's consumption of climate-damaging HCFCs. The new ACs have been designed based on European safety regulations and have the highest energy efficiency in their class, reducing electricity costs as well as indirect emissions. One production line can produce around 180,000 AC units per year. When compared with previous models using fluorinated gas refrigerants and the savings in indirect emissions related to energy consumption, the direct emissions saved by these units amount to about one million tonnes carbon dioxide equivalent (based on a product lifetime of ten years).

*Source: www.giz.de*

**Montreal Protocol e-Learning Module**

UNEP DTIE's OzonAction Branch and the World Customs Organization (WCO) jointly developed the Montreal Protocol e-learning module, an interactive online training module. To register, customs and enforcement officers may contact their national coordinator for WCO or the WCO E-learning team: elearning@wcoomd.org.

## UNIDO introduces natural refrigerant projects

The United Nations Industrial Development Organization (UNIDO) is implementing projects with natural substances as hydrochlorofluorocarbon (HCFC) replacements in developing countries, from China and the Gulf countries to Gambia and Viet Nam. On 3-4 June 2013, UNIDO shared knowledge acquired with regards to the implementation of such projects with the 150 participants gathered in Vienna for the two-day "UNIDO ATMOsphere Technology Summit". Introducing the underlying rationale for organising the Summit at the opening session on 3 June 2013, Mr. Sidi Menad Si Ahmed, Director of Montreal Protocol Branch, UNIDO, said that it was the agency's "duty and mandate to promote new technologies for the benefit of the developing countries".

Mr. Ákos Kõszegváry, Industrial Development Officer at UNIDO's Montreal Protocol Branch, provided an overview of the organisation's activities as an Implementing Agency of the Multilateral Fund for the Implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer. UNIDO currently has ongoing projects in 76 countries across Africa, the Arab region, Asia-Pacific, Europe and the Newly Independent States. Mr. Kõszegváry reminded participants of the decision of the Meeting of the Parties to the Montreal Protocol according to which projects should maximize the climate benefit, utilizing replacement technologies that utilize alternatives with low global warming potential (GWP) wherever available/applicable. Mr. Kõszegváry reported that a number of ongoing projects are focused on using natural alternatives such as R290 (propane) and R717 (ammonia) in the refrigeration and air-conditioning (RAC) sector.

Mr. Jürgen Hierold, the Global Environment Facility (GEF)-Coordinator facilitating the UNIDO-GEF portfolio of UNIDO, discussed the potential synergies between the two public funds and new possibilities for innovative funding solutions. The scope of UNIDO-GEF cooperation could be expanded by, for example, combining the phase-out of ozone depleting substances (ODS) with the improvement of energy efficiency in the RAC sector with the objective of reducing greenhouse gas emissions. Projects to improve energy efficiency can be linked to the replacement of HCFC-based installations and introduction of alternatives with low GWP. Through the promotion of updated non-ODS technologies with low-GWP, UNIDO is supporting the recipient countries in achieving the targets of both the United Nations Framework Convention on Climate Change (UNFCCC) and Montreal Protocol.

*Source: www.hydrocarbons21.com*

## United Nations to help China end ODS production

The Executive Committee of the Multilateral Fund of the Montreal Protocol on Substances that Deplete the Ozone Layer has announced that it would provide China, the largest global producer and consumer of hydrochlorofluorocarbons (HCFCs), with up to US$385 million for the eradication of ozone depleting substances (ODS) production as well as for retiring its unutilized surplus production capacity.

With this support, the Government of China has agreed to completely eliminate its industrial production of ODS and HCFCs by 2030. "China will close and dismantle its production lines producing only HCFCs for uses controlled under the Montreal Protocol and ensure that any HCFC plants that will receive funding do not switch to producing HCFCs as industrial feedstock," according to a press statement released by the United Nations Environment Programme (UNEP), which oversees the Montreal Protocol. "China will also coordinate with stakeholders and make best efforts to manage HCFC production and associated by-product production in HCFC plants in accordance with best practices to minimize associated climate impacts."

According to UNEP, China produces 92 per cent of the total HCFC production of developing countries with most of the chemicals supplied to the world's refrigeration, air-conditioning and foam manufacturing sectors but also utilized for fire protection, solvents and the sterilization of medical devices. Over the coming four years, China will receive US$95 million to cover the first stage of its HCFC production phase-out to achieve the freeze in HCFC production by 2013 and the reduction by 10 per cent by 2015 as mandated by the Protocol. The Government of China estimates that the total amount of HCFCs to be eliminated by this new initiative will prevent the emission of over 4.3 billion tonnes of carbon dioxide equivalent greenhouse gas (GHG) emissions.

*Source: www.un.org*

## Scientist who helped find ozone hole dies

The British Antarctic Survey (BAS) scientist who helped identify the hole in the ozone layer over the southern pole, Dr. Joe Farman (82), passed away on 11 May 2013. Dr.

Farman published the discovery along with Dr. Brian Gardiner and Dr. Jon Shanklin in May 1985. The research prompted the Montreal Protocol, an international agreement that controls chlorofluorocarbon (CFC) production across the globe.

After graduating from Cambridge University in the United Kingdom, Dr. Farman was appointed as a scientific officer at the Falkland Islands Dependency Survey, the predecessor of BAS, in 1956. After serving as the head of the Falkland Islands Dependencies Survey's Physics Unit at the University of Edinburgh from 1969, he returned to BAS in 1976 to head its physics section in Cambridge. It was then that Dr. Farman turned his attention to Antarctic ozone monitoring. His last research trip to Antarctica was in 1990, just before he retired.

Dr. Farman received many awards in recognition of his discovery, including the Society of Chemical Industry (SCI) Environment Medal, the Chree Medal and Prize, and membership of the Global 500 Roll of Honour. Prof. Alan Rodger, Interim Director of BAS, said: "Joe was an excellent physicist and his work changed the way that we view the natural world. After making the discovery of the ozone hole he became an energetic ambassador for our planet."

*Source: www.bbc.co.uk*

## Refrigerant market to be worth US$15.7 billion by 2018

The global refrigerant consumption will grow from an estimated US$ 10.5 billion (equivalent to about 1.2 million metric tonnes) in 2012 to US$15.7 billion by 2018, at a compound annual growth rate (CAGR) of 6.9 per cent from 2013 to 2018, according to the report "Refrigerant Market – Hydrochlorofluorocarbons (HCFC), Hydrofluorocarbon (HFC), Hydrocarbon (HC), Inorganic (Ammonia, Carbon Dioxide) - Trends & Forecasts to 2018". The report is issued by MarketsandMarkets, a global market research and consulting firm based in the United States.

The rapid economic growth in most of the emerging countries (such as China and India) in the recent years resulted in rampant growth of commercial, industrial and automotive sector, which in turn created significant demand for refrigerants. Among all the geographies, Asia-Pacific accounted for largest portion of refrigerant demand in 2012, totalling just around half of the global market. The rise in regional demand is mainly due to rising demand for cooling products primarily driven by increasing middle class population in the developing countries such as China and India.

With HCFC being phased out under the Montreal Protocol and the use of HFCs beginning to come under strict regulations, consumer preferences are shifting towards natural refrigerants – ammonia, carbon dioxide, propane and isobutane – and the demand for natural is increasing tremendously. The report forecasts volume and revenue of the global refrigerant market and its various sub-markets with respect to different regions. It also focuses on market share analysis, and market metrics such as drivers, restraints, opportunities, critical issues and winning imperatives. *Contact: Mr. Rohan, Marketsand Markets, North - Dominion Plaza, 17304 Preston Road, Suite 800, Dallas, Texas, TX 75252, United States of America. Tel: +1 (888) 6006 441; E-mail: sales@marketsandmarkets.com.*

*Source: www.prnewswire.com*

## Partnerships for elimination of HCFCs in Asia-Pacific

National Ozone Officers representing 36 developing countries in the region, together with international, regional and industry representatives, is being convened in the Gold Coast, Australia, from 6 to 9 May 2013 for a four-day Joint Network Meeting of Ozone Officers of Asia and the Pacific on the theme "Partnership on HCFC Phase-out in Asia and the Pacific". The event is jointly organized by the Ozon-Action programme of the United Nations Environment Programme (UNEP) Division of Trade, Industry and the Environment (DTIE) and the Government of Australia's Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC), with support from the Multilateral Fund (MLF) for the Implementation of Montreal Protocol and the United States Environmental Protection Agency (EPA). It aims to provide a platform for information exchange on national policies and strategies to achieve compliance to the Montreal Protocol on Substances that Deplete the Ozone Layer.

The meeting will focus particularly on the developing countries' commitment to phase-out production and consumption of hydrochlorofluorocarbons (HCFCs). The meeting's participants will have a first-hand opportunity to benefit from Australia's extensive experience with its own HCFC phase-out, effective institutional approach, private sector involvement and expertise in the implementation of the Montreal Protocol. Using lessons learnt, Australian experts will present effective and sustainable approaches to the phase-out of HCFCs and other ozone depleting substances (ODS) under the mandate of the

Montreal Protocol and as a developed country Party to the Montreal Protocol within the North-South Cooperation Framework.

Some of the key topics to be discussed in the meeting include alternative technologies and market trends in the refrigeration and air-conditioning (RAC) sector, including the linkage with energy efficiency and climate benefits and industry standards, opportunities and approaches to resource mobilization in support of the HCFC phase-out and information-sharing on the progress of project implementation, ODS data management and awareness raising. Further, a one-day Symposium on the last day of the meeting will discuss Standards for the Adoption of HCFC Alternatives. *Contact: Mr. Atul Bagai, Senior Regional Network Coordinator, Ozon-Action Programme, UNEP Regional Office for Asia and Pacific, Bangkok, Thailand. Tel: +66 (2) 2881662; Fax: +66 (2) 2883041; E-mail: atul.bagai@unep.org.*

*Source: www.unep.org*

## Philippines revises code for RAC industries

The Department of Environment and Natural Resources (DENR), the Philippines, has launched a new code that sets environment-friendly standards and practices for manufacturers, dealers and sellers of refrigeration and air-conditioning (RAC) equipment in the country. The new code of practice for the refrigeration RAC sector is a revision of the original code drafted in 2002, incorporating new practices and technologies that leave less carbon footprint on the environment, DENR said.

The 2002 code was revised to guide the RAC industry on updated procedures and complement shifting technologies, said Mr. Juan Miguel Cuna, Director of the Environmental Management Bureau (EMB) of DENR. EMB introduced the new code in a ceremony attended by participants from the industry, including manufacturers, importers, dealers, sellers and service providers of RAC equipment. A core group of technical experts, who worked on the revisions, presented the salient points of the revised code at the launch.

The revised code contains the new standard practices on conversion of refrigerants and use of alternatives to CFCs and other ozone depleting substances (ODS), as well as on handling, storage, recovery, recycling, collection, transport and disposal of refrigerants. The Philippines has been implementing the total phase-out of ODS in refrigeration RAC systems. By 2010, the country had completely phased out production and consumption of seven out of eight ODS, including CFCs which are widely used as refrigerants.

*Source: newsinfo.inquirer.net*

## Japan moves to phase-down HFCs

On 19 April 2013, the Japanese Cabinet approved the revision of its fluorocarbon regulations that will fundamentally change the way high global warming fluorocarbons are produced, used and disposed in Japan. The approval would lead also to a phase-down of hydrofluorocarbons (HFCs), the "super" greenhouse gases (GHGs) that are hundreds to thousands times more damaging to the global climate than carbon dioxide ($CO_2$). Japan's "Act for Partial Revision of the Act on Ensuring the Implementation of Recovery and Destruction of Fluorocarbons concerning Designated Products" requires, among others, entities that manufacture and import refrigeration and air- conditioning (RAC) units to transit to either fluorocarbon-free refrigerants or low global warming fluorocarbons by certain target years. Japan has been a consistent supporter of a global phase-down of HFCs under the Montreal Protocol, and the new revision of its fluorocarbon regulations allows it to join ranks with the European Union and Australia in reducing the use of these potent gases domestically.

*Source: www.prnewswire.com*

## Meeting in Indonesia discusses protection for ozone layer

The Office of the Indonesian Minister for Environment held an ozone layer protection technical meeting on 30 April 2013 to discuss efforts to control circulation of ozone depleting substances (ODS) on islands and in state borders. The meeting was aimed at increasing the capability of regional government officials to control the circulation and use of ODS. Mr. Arief Yuwono, the Deputy Minister for Environment Control and Climate Change, said that as a state signatory to the Montreal Protocol, Indonesia has the obligation to phase out ODS gradually, report data on its consumption and control the use of ODS. "But the central government cannot carry out the supervision alone. It needs the active participation of regional governments, which have the roles in developing businesses in the region," he said. His office has set a target to reduce ODS by up to 75 per cent in 2030. The technical meeting was attended by representatives of 33 provincial and city governments, and their agencies.

*Source: www.antaranews.com*

## Alternative cooling solution to replace HCFC equipment

*A Turbocor system installed by ICS Cool Energy*

Temperature control specialists, ICS Cool Energy Ltd. based in the United Kingdom, is advising companies to find alternative solutions – such as energy efficient Turbocor systems – to their existing R22 systems, as hydrochlorofluorocarbons (HCFCs) are being phased out. ICS Cool Energy recommends an upgrade to a system that uses non-ozone depleting refrigerants, such as R410A and R134a. Replacements could range, depending on the existing system, from a simple retro-fill operation, carried out during a standard service drop-in, to comprehensive modifications, which may require a new oil type, an additional compressor and/or a heat exchanger.

To replace equipment containing HCFCs, ICS Cool Energy recommends Turbocor compressors – an energy-saving system that they supply and instal. Explaining how the Turbocor units work, Mr. Adam Spolnik, HVAC Director at ICS Cool Energy, said: "The Turbocor compressor uses a digital rotor speed control that allows high partial load efficiencies of 60 per cent higher than European seasonal energy efficient ratio (ESEER) values, to be achieved." Further, because of magnetic levitation employed in the compressor, there are no moving parts and noise is reduced by up to 8 dB(A). For certain applications, the units can use high condensing temperatures, enabling recovered heat to be used elsewhere onsite.

ICS Cool Energy recently installed Turbocor chillers at Pinners Hall, the United Kingdom, as part of the phase-out and replacement of R22. The new installation included three water-cooled 562 kW Turbocor chillers and an intelligent management system that regulates the units, ensuring optimum coordination of working times and cooling capacities. It also uses a logical strategy among pumping units, providing superior reliability and maximum energy efficiency. The unit has a compact size-to-weight ratio that makes it ideal for simplified site operations and space optimization. Weighing less than 136 kg, the unit is only a fraction of the weight of a conventional compressor.

*Source: www.pandct.com*

## 'Technically credible refrigerants' for automobiles

SAE International's research group has reported that Mexichem's AC6 blend, based on HFO 1234ze and carbon dioxide ($CO_2$), "offers risk profile equal or better than HFO 1234yf in all respects". The Co-operative Research Programme (CRP), put together to investigate the potential of blended refrigerants to meet the European Commission's Mobile Air-conditioning (MAC) Directive, has released its latest report, confirming that the AC5 and AC6 blends from Mexichem, based in Mexico, continue to offer potential as an alternative to HFO 1234 yf. CRP said that it had elected to publicise its latest results, where more in-depth research into the two blends confirmed previous findings, to add to the current debate over low-GWP alternatives for the MAC Directive.

CRP said it wanted to ensure that the information that it has generated regarding the performance, inflammability and risk assessment of the two blended refrigerants with low global warming potential (GWP) is available to be included in the important discussion regarding replacement of MAC system refrigerant. "Based on a detailed fault-tree analysis, AC6 offers a risk profile that is equal to or better than that of R1234yf in all significant respects. AC5 is comparable to R-1234yf," CRP reported. The AC6 blend, which distinctively contains $CO_2$, has a GWP of 130, compared with HFO 1234yf's GWP of 4. The blend has been found to have an "extremely low level of risk for vehicle operators and repair workers," the CRP report said. It has zero inflammability below 50° C, but is set to be classified in the A2L inflammability category.

*Source: www.racplus.com*

## Low-temperature freezers with natural refrigerants

At the BIOtech 2013, held in Japan in May 2013, several suppliers showcased low- and ultra low-temperature freezers using refrigerants ranging from 100 per cent hydrocarbon (HC) blends to HC blends with synthetic additives to achieve negative temperatures as low as -90°C. Although scientific laboratories preserving various biomaterials have been identified as the main market for low temperature freezers, these are also used in preserving food, in particular fish products.

Kanou Reiki, Japan, exhibited its low-temperature freezer models using HC blend refrigerants. The

OF series of freezers for temperatures that reach -60°C, available in capacity ranging from 130 to 480 litres, is a popular solution for restaurants storing fish at very low temperature. The freezers use a refrigerant consisting of isobutene and ethylene or ethane and isobutene. Kanou also has freezers that reach -80°C and -85°C with capacities from 65 to 365 litres for biological laboratories. Kanou's LAB series of ultra low-temperature freezers use natural blend refrigerants comprising isobutene, ethylene and methane.

Hankook Freezers (HKF) from the Republic of Korea showed its upright ultra low-temperature HKF-Cryo freezers. According to HKF's President, Mr. Hye Hyun Chung, it is still difficult to reach ultra low temperatures with 100 per cent natural refrigerants – however, this will change in coming 2-3 years with progress in the development of high efficiency heat exchangers and other key components.

*Source: www.hydrocarbons21.com*

## Environment-friendly thermoregulation units

The Huber Petite Fleur, Ministat and Minichiller from Peter Huber Kältemaschinenbau GmbH, Germany, are environmentally friendly thermoregulation solutions with low running costs. They are offered with the natural hydrocarbon refrigerant R290 (propane), which has no significant global warming potential (GWP) or ozone depletion potential (ODP). Notably, the refrigerant has the same performance as synthetic, conventional refrigerants.

The Ministat is claimed to be the smallest cooling circulator in the world. It allows temperature control of objects directly in the bath or to thermoregulate "external" applications. It has enough power to thermoregulate photometers, viscometers, refractometers, distillation apparatus, reactor vessels and mini plants. Three models are available with working temperatures from -45°C to +200°C. The Minichiller is a space-saving, compact cooling solution for laboratory applications. It is suitable for cooling of reactor blocks, vapour traps, vacuum pumps, rotary evaporators and heat exchangers. It is designed for continuous, constant temperature operation in ambient temperatures up to +40°C. The Petite Fleur with a working temperature of -40°C to +200°C is a compact, hydraulically sealed dynamic temperature control system, ideally suited to control small research reactors. The Petite Fleur has unique thermodynamic properties and the unit is unrivalled, in comparison with other machines, when it comes to responsive temperature control.

These machines require minimal installation space and are suited to be placed on the lab bench or cabinets, or for integration into automated systems. They are all fitted with the new touchscreen controller Pilot ONE. Operation is via a colour 5.7 inch TFT display with intuitive menu icons, prompts and full text menu guidance in 11 languages. *Contact: Peter Huber Kältemaschinenbau GmbH, Werner von Siemens Straße 1, 77656 Offenburg, Germany. Tel: +49 (781) 9603-0; Fax: +49 (781) 57211; E-mail: info@huber-online.com.*

*Source: www.selectscience.net*

## Successful trials of new low-GWP refrigerant

Precision Refrigeration, a foodservice equipment manufacturer in the United Kingdom, is trialling a new low-global warming potential (GWP) HFO refrigerant blend in high-temperature refrigerated display units. The company has been working with N40, one of Honeywell's prototype low-GWP blend replacements for R404A. The system in the display unit was initially developed using R404A, but was converted to N40 and retested in Precision Refrigeration's test labs. The results are said to have shown better energy efficiency than the previous R404A refrigerant.

Solstice N40 is one of a number of low-GWP blends that Honeywell, the United States, is developing. Compared with R404A (GWP of 3,922 and likely to come under strict controls under future F-gas regulations) N40 has a GWP of around 1,300 and is classified as non-inflammable. While Honeywell would not confirm the exact components of the blend, N40 could be a mixture of R32, R125, R134a and R1234yf. It is one of two proposed Honeywell refrigerants for the replacement of R404A. The other gas – Solstice L40 – has a GWP less than 300 but is mildly inflammable.

The effectiveness of the new N40 blend was demonstrated in a previous in-house trial in a standard Precision Refrigeration's LCU323 three-door freezer counter cabinet. The objective was to evaluate the temperature performance and energy consumption using R404A as baseline compared with L40, N40 and R290 at climate class 4. It was found that Solstice N40 offers better refrigeration performance than R404A with a lower energy consumption. Solstice N40 also exhibits lower recovery time after defrost and significantly better pull-down time alongside a reduction of about 65 per cent in GWP over R404A.

*Source: www.acr-news.com*

## Methyl soyate: an eco-friendly solvent

Methyl soyate, a methyl ester derived from soybean oil, is the key ingredient in low-cost, eco-friendly, readily biodegradable solvent mixes that could replace some of the 208 million kilograms of traditional chlorinated and petroleum solvents. Methyl soyate has a high solvency with a Kauri-butanol (KB) value of 58, a low toxicity when compared with other common substances, higher storage and handling safety owing to its high flashpoint of more than 100°C, and high boiling point of 216°C. Methyl soyate is not an ozone-depleting chemical, a hazardous air pollutant or a volatile organic compound.

An increasing number of companies are beginning to offer multiple formulations of methyl soyate. For example, Soy Technologies from the United States offers SoyFast, SoyGreen 5000 and SoyGreen 6000, industrial cleaners and strippers that use methyl soyate. In testing, these products have demonstrated effectiveness equal to or exceeding their petrochemical counterparts. Methyl soyate is not limited to replacement of regulated industrial cleaning solvents; it can be used to also clean up and recover spilled petroleum products from shorelines and streams. The United States Environmental Protection Agency (EPA) has listed a methyl soyate as a biosolvent on the National Contingency Plan product schedule for oil spills.

Beside as an ingredient in cleaners and strippers to replace chlorinated or petroleum products, methyl soyate could find increased use as a carrier solvent. Solvents used as carriers and diluents in a number of alkyd coatings and adhesives include methyl ethyl ketone peroxide (MEK), toluene and xylene for coatings and methylene chloride and MEK for adhesives. Formulated consumer products ranging from hand cleaners to auto-care to personal care products that utilize methyl soyate are already being produced and marketed. Furthermore, the expanding utilization of methyl soyate-based co-solvents with ethyl lactate and d-limonene (citrus extract) in products show promise. Other new emerging applications for soy-based solvent products and processes include bioremediation, paper pulp cleaning and highway paving materials that replace asphalt.

*Source: www.soynewuses.org*

## Super-heated ultrasonic vapour degreaser

The F-300 Series super-heated ultrasonic vapour degreaser from e-Chem Inc., the United States, contains dual solvent immersion tanks with the patented Crest 40, 58, 132 or 192 kHz ultrasonics. The ceramically enhanced ultrasonics product provides thorough cleaning using hydrofluorocarbon (HFC), hydrofluoroether (HFE), n-propyl bromide (nPB) and hydrochlorofluorocarbon (HCFC) solvents. The F-300 Series has the following features:

- Closed-loop hot water;
- Heating of solvent and vapour;
- Dual compressor refrigeration;
- Programmable logic control with automation capability;
- 120 per cent freeboard ratio to limit solvent consumption;
- True superheat for rapid part drying;
- Re-circulation with cartridge filtration;
- Two gravity water separators with molecular sieve capability;
- Compact foot print for easy integration in production flow; and
- Stainless steel fabrication of condenser, chiller coils and process tanks.

The product comes with a number of safety features such as refrigeration temperature monitoring, low level control and over temperature signal for boiling tank, solvent replacement warning, and vapour level control with reset. *Contact: eChem Inc., 4891 E. Maychelle, Anaheim, Orange County, California, CA 92807, United States of America. Tel: +1 (714) 573 4020; E-mail: support@echemproducts.com.*

*Source: www.echemproducts.com*

## Eco-friendly solvent for flushing

From time to time, refrigeration and air-conditioning systems suffer failures that result in contamination. The most common such failure is a compressor burnout. During such an event, the refrigeration system becomes contaminated with large quantities of unwanted particulate, sludge, acids, carbon residues and possibly moisture. All these contaminants must be removed before the system can be returned to duty.

Rx11-flush from NuCalgon, the United States, is a unique solvent engineered for flushing refrigeration and air-conditioning systems. Its patented hydrofluorocarbon (HFC)-based solvent formulation is powerful enough to flush away sludge, carbon residue, oils, acids, water and other particulate. This makes it ideal for system flushing after burnouts, retrofits and for flushing line sets for R-410A conversions. It is non-toxic, non-flammable and is non-ozone depleting. *Contact: NuCalgon, 2008 Altom Court, St. Louis, MO 63146, United States of*

*America. Tel: +1 (800) 554 5499; Fax: +1 (800) 221 6302; E-mail: info@nucalgon.com.*

*Source: www.nucalgon.com*

## Super HFE electronics cleaner

MG Chemicals, Canada, has reformulated its existing hydrofluoroether (HFE) blends with a newly developed solvent that allows it to maintain the cleaning power, non-inflammability, non-conductivity and environmental friendliness, while dramatically reducing the cost. The new blends remove flux, greases, oils, oxides, silicones, carbon, dirt, smoke film and grime, but their plastic compatibility needs to be tested before use. These environmentally friendly products are 100 per cent ozone-safe and claimed to be perfect replacements for hydrochlorofluorocarbon (HCFC) 141b. They are fast drying, without leaving a residue, and have excellent cleaning strength. The blends are said to be significantly lower in cost compared with standard HFE blends. *Contact: MG Chemicals, 9347 – 193rd Street, Surrey, B.C., Canada V4N 4E7. Tel: +1 (604) 888 3084; Fax: +1 (604) 888 7754.*

*Source: www.mgchemicals.com*

## Eco-friendly polymer coating system

Geotechnical specialist Maccaferri SpA, based in Italy, has launched a novel, environmentally friendly protective coating for its double-twist wire-based products. The new coating offers improved technical performance and environmental compatibility when compared with mesh products coated with high-density polyethylene (HDPE) and polyvinyl chloride (PVC). According to Maccaferri, the PA6 coating is much more environment-friendly than traditional wire coatings, as it does not contain any pthalates, heavy metals or ozone depleting chemicals. Furthermore, unlike PVC, it does not emit hydrogen chloride during burning.

The PA6 coating is an organic-based, extruded polyamide material, which is said to offer improved adhesion characteristics, enhanced resistance to mechanical damage and better cold temperature performance. Resistance to hydrocarbon pollutants is also claimed together with long-term strength and elasticity. Extensive accelerated testing has shown that, when compared with traditional PVC or HDPE coatings for wire products, the new Maccaferri PA6 system is 50 per cent harder and is 25 per cent more malleable, even after long-term exposure to ultraviolet (UV) rays. The results also showed that PA6 gave a three-fold improvement in coating-to-wire adhesion, significantly more resistance to impact and abrasion damage, and achieved a 30 per cent improvement in design life.

*Source: specificationonline.co.uk*

## Concentrated aqueous stencil cleaner

Kyzen Corp., the United States, has announced its new Aquanox® A8820 Advanced Aqueous Stencil Cleaner. Aquanox® A8820 is an engineered cleaning fluid designed to remove wet solder paste and uncured chip bonder adhesive from stencils used in surface mount printing processes. A8820 effectively removes common solder pastes and fluxes and demonstrates a favourable compatibility profile with stencil cleaning systems. Additionally, the no-foaming property of A8820 is compatible with all materials commonly used in electronic assembly manufacturing and cleaning processes. *Contact: Kyzen Corporation, 430 Harding Industrial Drive, Nashville, Tennessee, TN 37211, United States of America. Tel: +1 (615) 8310 888; Fax: +1 (615) 8310 889.*

*Source: www.kyzen.com*

## Eco-friendly, industrial grade aqueous degreaser

Eco-Rite™ Environmentally Preferable Products (EPP) from ITW Chemtronics, the United States, are a series of products that are designed to have a very low impact on the environment. These new products that provide efficient cleaning are low on global warming potential (GWP) and violatile organic compounds (VOCs) and don't have any harsh caustic materials. Eco-Rite EPPs do not contain phosphates, 2-butoxyethanol, alkylphenolethoxylates or petroleum distillates. They are also free from ozone depleting chemicals and hazardous air pollutants (HAPs).

Eco-Rite Heavy Duty Degreaser is designed for heavy-duty cleaning performance. The degreaser is ideal for cleaning metal parts, electric motors, petrol engines and tools. It penetrates quickly, emulsifies fast and lifts tough grime formed by grease, oil, waxes and resins. The non-inflammable and biodegradable product has been formulated with ingredients on the Design for Environment list of the Environmental Protection Agency (EPA) of the United States. *Contact: ITW Chemtronics, 8125 Cobb Centre Drive, Kennesaw, Georgia, GA 30152, United States of America. Tel: +1 (800) 645 5244; Fax: 1 (770) 424 4267; E-mail: askchemtronics@chemtronics.com.*

*Source: www.chemtronics.com*

## FDA approval for new HFA metered dose inhaler

Sunovion Inc. (formerly Sepracor Inc.), the United States, has announced that the country's Food and Drug Administration (FDA) has approved its New Drug Application (NDA) for XOPENEX HFA™ (levalbuterol tartrate) inhalation aerosol, a hydrofluoroalkane (HFA) metered dose inhaler (MDI) for the prevention and treatment of bronchospasm in patients with reversible obstructive airway disease, such as asthma and chronic obstructive pulmonary disease (COPD). The MDI development programme included approximately 1,870 paediatric and adult subjects and 54 pre-clinical and clinical studies.

XOPENEX MDI utilizes state-of-the-art HFA technology and does not contain a chlorofluorocarbon (CFC) propellant. Each canister provides 200 actuations (or inhalations). The company is working with 3M's Drug Delivery Systems Division in the United States under an agreement that includes scale-up, manufacturing and supply of XOPENEX HFA. *Contact: Sunovion Inc., 84 Waterford Drive, Marlborough, MA 01752, United States of America. Tel: +1 (508) 481 6700; Fax: +1 (508) 357 7491; E-mail: info@sunovion.com.*

*Source: www.prnewswire.com*

## New pharmaceutical aerosol composition

Chiesi Farmaceutici S.p.A., Italy, has secured a United States patent on aerosol compositions that contain an active ingredient, a propellant containing a hydrofluoroalkane (HFA), a co-solvent and a low-volatility component. The invention in particular relates to aerosol compositions for use in pressurized metered dose inhalers (pMDI), as well as to the use of certain components in aerosol compositions, a method for their preparation and to their use for the administration of active material by inhalation. The low-volatility component is used to increase the mass median aerodynamic diameter (MMAD) of the aerosol particles on actuation of the inhaler. The nature and concentration of the low-volatility component can be chosen to influence, for example, the size and/or the density of the particle, both of which affect the MMAD.

The objective of the invention is to provide a pMDI having HFAs as propellant, which is pharmaceutically and clinically equivalent to the pMDIs which use chlorofluorocarbons (CFCs). The invention allows the design of formulae using HFAs with particle size characteristics similar to those of the CFC formulations they replace. This allows development of products that are equivalent pharmaceutically and clinically to the CFC formulation.

*Source: www.freepatentsonline.com*

## Transition to inhalant without a propellant

The German drug major Boehringer Ingelheim has announced that it is updating health-care professionals and patients that the transition to Combivent Respimat (ipratropium bromide plus albuterol) Inhalation Spray for the maintenance treatment of chronic obstructive pulmonary disease (COPD) is almost complete. The distribution of Combivent (ipratropium bromide plus albuterol sulphate) inhalation aerosol (Combivent MDI) will cease in May 2013, instead of the earlier announced December 2013, and once the supply runs out, Combivent Respimat will be the only Combivent product available. Combivent Respimat is a propellant-free inhaler that utilizes a slow-moving mist to deliver the active ingredient. It was developed in response to the Montreal Protocol.

*Source: www.thepharmaletter.com*

## CFC-free, stable inhalation formulation

Amphastar Pharmaceuticals Inc., the United States, has patented a stable aerosol epinephrine suspension formulation with high inhalation delivery efficiency when administered via a metered dose inhaler (MDI) for the treatment of acute bronchial asthma, chronic obstructive pulmonary diseases (COPD) and other respiratory disorders. The formulation, which is free of chlorofluorocarbons (CFCs), comprises a therapeutically effective amount of epinephrine and hydrofluorocarbon (HFC) propellant, co-solvent, surfactant and antioxidant. The active ingredient epinephrine is pre-micronized and suspended in an alcohol/surfactant solution with hydrofluoroalkane (HFA) propellant. The formulation very efficiently delivers drug micro-particles into the patients' lungs.

The HFA propellant used has zero ozone depletion potential (ODP), and is typically 1,1,1,2-tetrafluoroethane (HFA-134a), 1,1,1,2,3,3,3-heptafluoropropane (HFA-227) or a mixture of the two. The preferred surfactants are sorbitan oleates and ethanol is the preferred co-solvent. A small amount of antioxidant in the formulation minimizes impurity generation through oxidation of epinephrine and ensures the stability of the formulation during storage and use.

*Source: www.freepatentsonline.com*

## HF-365/227 blends receive EPA SNAP approval

The United States Environmental Protection Agency (EPA) has issued approval under Significant New Alternatives Policy (SNAP) for commercial blends of Solkane® 365/227 from Solvay Chemicals, the United States. The new products contain hydrofluorocarbon (HFC)-365mfc and HFC-227ea – 7 to 13 per cent HFC-227ea and the remainder HFC-365mfc. EPA had previously listed HFC-365mfc as an acceptable substitute for several foam blowing end uses. SNAP approval of Solkane 365/227 (87:13 and 93:07 blends) makes this third-generation foaming agent solution an acceptable substitute for ozone-depleting substances in rigid polyurethane spray and extruded polystyrene applications.

In addition to the applications approved under SNAP, typical applications include polyurethane and extruded polystyrene pipe insulation, polyurethane sandwich panels (continuous/discontinuous; construction/reefer), polyurethane and polystyrene insulation panels, and polyurethane block and integral foams. *Contact: Solvay Chemicals Inc., P.O. Box 27328, Houston, Texas, TX 77227, United States of America. Tel: +1 (713) 525 6800; Fax: +1 (713) 525 7805; E-mail: solvaychemicals.us@solvay.com.*

*Source: www.4-traders.com*

## Tensile properties of microcellular PLA foams

Five scientists from Ningbo Key Lab of Polymer Materials, Ningbo Institute of Material Technology & Engineering, China, have studied the tensile properties of microcellular poly(lactic acid) (PLA) foams blown by compressed carbon dioxide ($CO_2$). For this, microcellular PLA foams with various crystallinities, cell morphologies and densities were prepared using $CO_2$ as the physical blowing agent. The evolution of crystallinity developments in four types of PLA samples during the saturation, foaming and annealing processes was investigated.

Crystallization of about 20 per cent was reached in PLA samples after $CO_2$ saturation, a high crystallinity of about 38.2 per cent could be achieved for the foamed PLA that has the highest crystallization ability. PLA samples had low elongation at break of 3.6-15.1 per cent. After foaming, however, PLA foam presented a significant increase in the elongation at break up to 15.1 times compared with that of the unfoamed counterpart. On the other hand, microcellular foaming endowed PLA foams with a maximum increase in specific tensile strength of 53.1 per cent. The influences of crystallinity, foam density and cell morphology on the tensile properties of PLA foams were also investigated. *Contact: Mr. Wentao Zhai, Ningbo Key Lab of Polymer Materials, Ningbo Institute of Material Technology & Engineering, Chinese Academy of Sciences, Ningbo 315201, Zhejiang Province, China. E-mail: wtzhai@nimte.ac.cn.*

*Source: cel.sagepub.com*

## Extruded foams with zero ODP

The Dow Chemical Company, the United States, has developed a method for the production of large-celled extruded polystyrene (XPS) foams with zero ozone depletion potential (ODP). The method eliminates the use of hydrochlorofluorocarbon (HCFC)-based blowing agents. The study discloses unique approaches for large-celled foams to balance the often competing requirements and relationships between material selection, processing conditions, expansion behaviour and end-use properties. It demonstrates production of large-celled hydrofluorocarbon (HFC)-based foams with zero ODP that can perform in a manner consistent with their HCFC-based predecessors. *Contact: Dow Global Technologies Inc., 2040, Dow Centre, Midland, Michigan, MI 48674, United States of America.*

*Source: cel.sagepub.com*

## Low-GWP liquid blowing agent for foam insulation

Honeywell, based in the United States, is developing a new blowing agent with low global warming potential (GWP) for the production of energy-efficient polyurethane foam insulation. The blowing agent being developed is a non-inflammable liquid that will help reduce the overall environmental impact of foam. Honeywell expects the blowing agent will have performance comparable to those of other fluorocarbons, but with a low GWP of less than 15. In addition, the agent will have an atmospheric lifetime of just a few days. These properties are expected to result in lower greenhouse gas (GHG) emissions impact on the environment, while also providing the foam's high insulation performance, dimensional stability and compressive strength. Honeywell expects the product to be available in sample quantities for customers in later part of this year. Polyurethane foam is used primarily as insulation for appliances and homes, as well as for commercial roofing systems.

*Source: www.prnewswire.co.uk*

## Growing berries without methyl bromide

Nine years ago, the fatal plant disease *Verticillium* wilt was wiping out strawberry plants at the farm of University of California Santa Cruz (UCSC), the United States. Chemicals and crop rotation failed to treat infested fields. A visiting plant pathologist from the Netherlands recommended a little-known organic technique called anaerobic soil disinfestation, and UCSC professor Dr. Carol Shennan decided to give it a try. "After the first treatment we almost entirely eliminated *Verticillium* from the soil," says Prof. Shennan. The number of disease spores dropped from 20 per gram of soil to zero or one.

Dr. Shennan is currently compiling nearly a decade of results comparing anaerobic soil disinfestation with chemical fumigation. The results show that after disinfestation, *Verticillium* disease spores consistently dropped in number by 80 to 100 per cent. "This is similar to the levels we have achieved with fumigation," states Dr. Shennan. Fumigation with methyl bromide (MeBr), the ozone-depleting chemical banned by the Montreal Protocol, has been a staple of the local berry industry for decades.

Ms. Carolyn O'Donnell of the California Strawberry Commission, says: "Farmers have tried other fumigants, but there are not a lot of good options." The problem has turned the spotlight to fumigant-free alternatives like anaerobic soil disinfestation. While disease organisms decline after treatment, the total number of soil bacteria increases. Disinfestation appears to alter microbial communities, but it likely does not kill as many organisms. Disinfestation is also less


*A strawberry bed under treatment, with rice bran as carbon source*

toxic to humans than chemical fumigation as the active ingredients are inert.

As part of the treatment, carbon sources like rice bran, molasses and grape skins are mixed into the soil. A tarp covers the planting bed, and drip irrigation is used to saturate the bed. This promotes the growth of anaerobic bacteria. "We don't know the exact mechanism by which this kills pathogens, but it likely involves the organic acids produced by anaerobic bacteria," says Dr. Shennan. This growing season, Farm Fuel Inc. treated more than 130 acres in Santa Cruz and Monterey with the disinfestation method. "The plants did really well after treatment, and we didn't see big die-offs," says Ms. Stefanie Bourcier, the company's CEO. The untreated neighbouring block of plants had significant incidence of *Fusarium* wilt disease.

*Source: www.gtweekly.com*

## Vegetable growers work with methyl bromide alternatives

For decades, vegetable farmers in Georgia, the United States, relied on the soil fumigant methyl bromide (MeBr) to control weeds, insects and nematodes, but recent changes in environmental regulations have led them to find replacements. Mr. Stanley Culpepper, a weed scientist with the College of Agricultural of Environmental Sciences, University of Georgia (UGA), the United States, has been working to find alternatives to MeBr. The challenge has been finding something that is as easy to use, economical and as effective as MeBr. Mr. Culpepper and his team are researching four systems to replace MeBr on farms that use plasticulture – a planting technique employed in commercial vegetable production where black plastic is stretched over planting rows to reduce water loss and to block weeds.

The alternatives are more complex because they require a systems approach using three fumigants applied appropriately or two fumigants and a herbicide programme. One alternative being used is the UGA 3-way system that employs Telone II, metam sodium and chloropicrin – each applied at the appropriate place in the soil profile to maximize pest activity. The researchers estimate that it has replaced MeBr on about 70 per cent of the acres in Georgia. This is the most economical system, though a very complex, and was found to control more than 93 per cent of the nutsedge, the most challenging pest for the growers.

Another option is Trifecta, a much easier application that combines Telone II, chloropicrin and dimethyl disulphide (DMDS). Mr. Culpepper points out that Trifecta is still in development, but he is optimistic current research will yield better yet economical pest control. The third alternative is the Paladin Pic that includes a 79:21 mixture of DMDS:chloropicrin. It is highly effective in controlling nutsedge and nematodes, but herbicides are required for other weeds. Mr. Culpepper is working on a fourth alternative that will offer more flexibility.

*Source: southeastfarmpress.com*

## Pressurized disinfestation with carbon dioxide

Raw ingredients for food – grains, nuts, vegetables, etc. – are easily infested by insects and microbes, particularly when the products are stored for longer periods. Conventional disinfestation using insecticides or toxic gases – such as methyl bromide, phosphine or hydrocyanic acid – is fast falling out of favour due to various reasons. Carvex Verfahrenstechnologie für Lebensmittel und Pharma GmbH, Germany, offers a non-toxic pressurized disinfestation system with natural source of carbon dioxide ($CO_2$) for raw foodstuff ingredients, animal feed, tobacco, herbal teas and medicines.

The pressurized $CO_2$ disinfestation process works at ambient temperature and pressures of up to 40 bar. The material to be treated is put in sacks into specially designed disinfestation chambers. After the chamber is closed, it is filled with $CO_2$ until the desired pressure is reached. After the exposure period has elapsed, the pressure in the chamber is released and the material removed.

Low-cost single chamber systems for sporadic use and for treating smaller volumes are the standard. A second and a third chamber can be added, depending on the treatment capacity required. The chambers themselves are offered in different diameters and lengths. They can be loaded manually or using forklifts, pallet trucks or roller conveyors. The chamber diameter depends on the packaging unit size of the products to be treated, while the length is determined by the required pressure. It is possible to treat small containers as well as entire pallets of sacks, bales, etc.

*A a triple chamber Carvex silo system*

Depending on requirements, the chambers can be supplied with or without a special $CO_2$ coating on the inside. They can be fitted with one or two quick-release closures. *Contact: Carvex Verfahrenstechnologie für Lebensmittel und Pharma GmbH, Sprudelstraße 1, D - 53557 Bad Hönningen, Germany. Tel: +49 (2635) 78938; E-mail: info.hgn@carvex.de.*

*Source: www.carvex.de*

## Fumigants and fumigation methods

Honeywell International Inc., the United States, is patenting fumigant compositions that include hexafluoropropene or 1,1,3,3,3-pentafluoropropene, and methods of preparing such compositions. The fumigant compositions may be suitable for use as soil fumigant compositions and structural fumigant compositions against a wide variety of undesirable species such as weeds, nematodes, pathogens, animals and insects.

These fumigant compositions may comprise an alkylene fluorocarbon having at least one $C=CF_2$ group. The fluorocarbon may have a low toxicity and a low global warming potential (GWP). For example, it may have a GWP of less than 1, more particularly, less than 0.5. In some embodiments, the fumigant composition comprises or consists essentially of hexafluoropropene (HFP), or 1,1,3,3,3-pentafluoropropene (1225zc) that has a lifetime of only 5.8 days, which translates into a GWP of about 0.25. 1,1,3,3,3-pentafluoropropene also has a highly reactive carbon-carbon double bond and therefore has a GWP of less than 1. Both these compounds also have negligible ozone depletion potential (ODP).

In addition to the fluorocarbon, the fumigant compositions may also include other active ingredients, such as methyl iodide, chloropicrin, acrolein, 1,3-dichloropropene, dimethyl disulphide, metham sodium, furfural, propylene oxide and a surfactant. In certain embodiments, both HFP and 1225zc may be used with or without additional actives. In some embodiments, the HFP or 1225zc can be diluted with a suitable carrier solvent that can include at least one C3-C4 hydrofluorocarbon olefin or at least one hydrochlorofluorocarbon olefin that preferably has a combination of desirable environmental and functional properties. For example, the carrier solvents can have an ODP of zero or nearly zero. The solvent may also have a low GWP, which can preferably be equal to or less than about 10 relative to carbon dioxide ($CO_2$).

The fumigant composition may be applied to soil or structures as part of an aqueous solution or dispersion. The fumigant composition may be applied by a number of different procedures that are currently employed for soil and structural treatments. In some embodiments, soil fumigant may utilize either shank injection or drip irrigation. For structural fumigation, the chemicals may be heated to a gas before introducing them within a building, chamber, vehicle or other space or structure.

*Source: patents.com*

## The Montreal Protocol and the Green Economy

This global study addresses how and to what degree national, regional and international actions taken under the Montreal Protocol have also contributed to the restructuring of national economies and the global one towards a "Green Economy", defined as "one which achieves increasing wealth, provides decent employment, successfully tackles inequities and persistent poverty, and reduces ecological scarcities and climate risks". This study specifically explores how the Montreal Protocol has contributed to the stimulation of more efficient production processes, driving innovation, industrial restructuring, job creation, trade, health and ecosystem benefits, and climate change mitigation. The study is intended as a case study contribution to the Green Economy Initiative of the United Nations Environment Programme (UNEP) with its findings informing the question of how different multilateral environmental agreements contribute to a Green Economy.

*Contact: OzonAction Branch, United Nations Environment Programme (UNEP), 15, rue de Milan, 75441 Paris Cedex 09, France. Tel: +33 (1) 4437 1450; Fax: +33 (1) 4437 1474; E-mail: ozonaction @unep.org.*

## Ozone and Ozone Depletion: Sources, Environmental Impact and Health

Several new concepts have emerged recently in the field of ozone science, creating a need for an in-depth publication covering the various ozone-related issues. This book fills that void in the literature by providing a unique collection of the understanding of the "good" and "bad" of ozone gas. The chapters written by leading experts in the field from all over the world will serve as a single reference to a global perspective on the various sources for ozone, the ozone layer, the effect of ozone depletion on human health and the environment, causes and effects of bad ozone, etc. The book aims to try and give the 'overall picture' to the readers on different topics in the field of ozone.

*Contact: Nova Science Publishers Inc., 400 Oser Avenue, Suite 1600, Hauppauge NY 11788-3619, United States of America. Tel: +1 (631) 231 7269; Fax: +1 (631) 231 8175; E-mail: nova.main@nova publishers.com.*

**25-27 Sep**
Bad Krozingen
Germany

**5th International Conference on Solar Air-Conditioning**
Contact: Ostbayerisches Technologie-Transfer-Institut e.V.
Wernerwerkstr. 4,
93049 Regensburg, Germany.
Tel: +49 (941) 296 88 29;
Fax: +49 (941) 296 88 17.

**09-13 Oct**
Bangkok
Thailand

**BANGKOK RHVAC 2013**
Contact: Thai Trade Fair,
44/100 Nonthaburi 1 Road,
Bang Kra Sor, Nonthaburi 11000,
Thailand.
Tel: +66 (2) 507 7842;
Fax: +66 (2) 547 5683-4;
E-mail: rhvac@ditp.go.th.

**19-21 Oct**
Xi'an
China

**ISHVAC – International Symposium on Heating, Ventilation and Air-conditioning**
Contact: Mr. Ran Gao,
Secretariat of ISHVAC2013,
No. 13 Yanta Road, Xi'an,
Shaanxi 710055, China.
Tel: +86 (29) 13629284215;
E-mail: GaoRan_hvac@yahoo.cn;
Website: www.ishvac2013.org.

**04-06 Nov**
San Diego
United States

**2013 Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reduction**
Contact: Methyl Bromide Alternatives Outreach,
6556 N. Dolores Avenue,
Fresno, California, CA 93711,
United States of America.
Tel: +1 (559) 449 9035;
Fax: +1 (559) 449 9037;
Website: mbao.org.

**12-14 Nov**
Jakarta
Indonesia

**HVACR INDONESIA 2013**
Contact: Informa Exhibitions Pte. Ltd.,
111 Somerset Road #11-08,
TripleOne Somerset,
Singapore 238164.
Tel: +65 6411 7777;
Fax: +65 6411 7778;
E-mail:info@psseries.com.

**12-14 Nov**
Shanghai
China

**CIAAR 2013 – China International Auto Air-conditioning & Refrigeration Exhibition**
Contact: Shanghai Gehua Exhibition Service Co. Ltd.,
Room 1206-1208, Xin'an Building,
No. 99 Tianzhou Road,
Shanghai 200233, China.
Tel: +86 (21) 5445 1166;
Fax: +86 (21) 5445 1968;
E-mail: kim.yang@gehuaexpo.com.

# PUBLICATIONS from APCTT

## PERIODICALS

(Free access at www.techmonitor.net)

- ❑ Asia Pacific Tech Monitor (4 issues/year) (e-version)
- ❑ VATIS Update (4 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<br>Volume 1: How to Guide & Quick reference materials<br>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.*

*# Six issues per year. A print version for distribution to a select target group is supported by the Ozone Cell, Ministry of Environment & Forests, Government of India.*

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