VATIS UPDATE

Ozone Layer Protection

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Apprise yourself with the latest technological innovations

Highlights:

- Eco-friendly adsorption chiller
- A study on the benefits of R290 over HFCs
- Clean and green vapour degreasing process
- Clean agent fire extinguishing system
- Foam blow molding process
- Researchers study destruction of methyl bromide

APCTT
Asian and Pacific Centre for Transfer of Technology

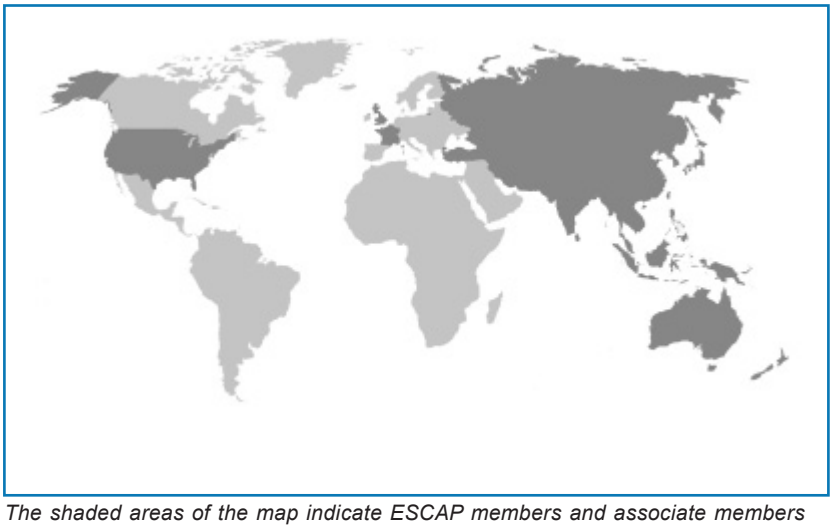
UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

Ozone Cell
Ministry of Environment, Forest & Climate Change
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

National Oceanic and Atmospheric Administration (NOAA), the United States, releases an ozonesonde in Antarctica that's attached to a helium balloon. The instrument will rise 18 miles into the atmosphere to measure the thickness of ozone.

(Credit: NOAA, USA)

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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Scientists study effects of organic compounds

The ozone layer of the lower stratosphere is an extremely diffuse abundance of O_3 that absorbs up to 99% of incoming ultraviolet solar radiation, thereby creating the conditions that make known life possible. Until recently, scientists from NASA believed that only long-lived compounds like halons, Chlorofluorocarbons (CFCs) or bromomethane contributed to ozone depletion. This led researchers to look for another contributor, very short-lived brominated substances (VSL_{org}), generated by ocean biogenic sources with cyclic variabilities that are not well understood. However, activity that increases the production of VSL_{org} could accelerate the depletion of atmospheric ozone.

Chemists and atmospheric researchers analyzed data collected by NASA's Airborne Tropical Tropopause Experiment (ATTREX) over the tropical Pacific region during 2013 and 2014. The experiment included measurements of organic bromine substances conducted with the Global Hawk Whole Air Sampler (GWAS). The researchers combined the aircraft observations with a chemistry-climate model in an attempt to quantify the total bromine load in the atmosphere. The finding has been reported in the *Proceedings of the National Academy of Sciences*.

One surprising finding was the similarity of the amounts of bromine between the Eastern and Western Pacific Ocean, despite their different vertical transport mechanisms into the atmosphere. The study found ~6 parts per thousand to the stratospheric input at the tropical tropopause, the boundary between the troposphere and the stratosphere. The differences between the two regions were considered to be scientifically negligible. They noted that uncertainties remain in the characterization of the overall contribution of VSL substances to total stratospheric bromine because all of the results described by the study are derived from model calculations.

Source: http://www.phys.org

Some ozone safe chemicals can harm environment

A new study from the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado Boulder, the United States, and the NOAA Earth System Research Laboratory (ESRL), has revealed that some substitutes for ozone-damaging chemicals can also be harmful to the environment, as they could degrade to potent greenhouse gases and contribute to global warming. According to the study appeared in the publication of the *American Geophysical Union*, for the first time, researchers found that these replacement chemicals can break down in the atmosphere to form a greenhouse gas that can persist for millennia.

The team specified that chemicals widely used as refrigerants break down in the stratosphere, a layer in the middle atmosphere. Under some conditions, these can form a potent greenhouse gas that lasts for up to 50,000 years. "This compound, carbon tetrafluoride or CF4, essentially lasts forever because there aren't any known removal mechanisms in the atmosphere," said James Burkholder, at NOAA ESRL. The study conducted by CIRES scientist Aaron Jubb showed how CF4 can be made from some halocarbons, which are chemicals that include Hydrofluorocarbons (HFCs) and Hydrochlorofluorocarbons (HCFCs) and are substitutes for the more ozone-damaging substances that have largely been phased out.

According to the Australian environment department, Ozone-Depleting Substances (ODS) are those that affect the ozone layer and are widely used in refrigerators, airconditioners, fire extinguishers, in dry cleaning, as solvents for cleaning, electronic equipment and as agricultural fumigants. Some ODSs which have been banned or regulated in some countries include CFCs, halon, carbon tetrachloride (CTC), methyl chloroform, HCFCs, methyl bromide and bromochloromethane.

Source: http://www.ibtimes.com.au

Impact of climate change on ozone

Complex processes of climate change impact on the ozone layer are subject of an extensive measurement campaign with the German High Attitude and Long Range (HALO) research aircraft. The campaign is coordinated by climate researchers of Karlsruhe Institute of Technology (KIT) and carried out in close collaboration with several partners.

"The tropopause region above the Arctic has hardly been studied so far with focused airborne observations. For the present measurement campaign, the HALO research aircraft has been equipped with a combination of specially developed sensors. In particular, we want to better understand the

processes influencing ozone and other climate-affecting trace gases in the Arctic tropopause region in winter," Hermann Oelhaf of the KIT Institute of Meteorology and Climate Research, says. He coordinates the campaign together with his colleague Dr. Björn-Martin Sinnhuber.

During the campaign, the researchers will in particular focus on processes controlling ozone, water vapor, and other trace gases in the tropopause region, i.e. in the transition zone between troposphere and stratosphere at 7 to 17 kilometers altitude. At polar latitudes, it is found at 7 to 12 km altitude. "The distribution of climate-influencing trace gases in the tropopause region is controlled by transport pathways, by which air masses from the Arctic enter the mid-latitudes and vice versa, and by exchange processes between the stratosphere and troposphere," Hermann Oelhaf explains. HALO can reach altitudes of up to 15 km and has a range of more than 8,000 km, which makes it particularly suited for such studies.

An important measurement instrument on board of HALO is the GLORIA infrared spectrometer developed and built jointly by scientists and engineers of KIT and ForschungszentrumJülich.

http://www.reportingclimatescience.com

Ozone hole over Antarctica

The ozone hole over Antarctica currently extends over 26 million square kilometres – an area larger than the North American continent. Currently, it is approximately 2.5 million square kilometres larger than at the same time in 2014. In 2006 it was larger than now, at 27 million square kilometres. Researchers from the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) Earth Observation Center (EOC) have discovered this trend using Earth observation satellites.

The current size of the ozone hole and its belated appearance surprised the atmospheric scientists at the DLR EOC, who, by analysing satellite data, observed changes in the air currents in the stratosphere, which are a possible cause of the size of the current ozone hole. Michael Bittner, responsible for the World Data Center for Remote Sensing of the Atmosphere (WDC-RSAT) at the EOC, explains: "In August 2015, we observed an unusually strong southern flow, which directs warm and ozone-rich air masses from lower latitudes over Antarctica. The typical polar vortex, which provides isolation for Antarctica, could not develop well under these conditions." At the end of August, the situation changed abruptly – the intake of warm air masses stopped and there was a very quiet atmospheric phase. During this event, the polar vortex over Antarctica became stabilised in such a way that the enhanced ozone supply became degraded. A huge, almost circular ozone hole formed.

Source: http://www.dlr.de

Restoring depleted stratospheric ozone

Researchers from the Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation and Moscow State University, Russia, have demonstrated that electron beam injection from high-altitude balloons could create local perturbations of ozone and some other minor atmospheric constituents, a novel approach specially for restoring depleted stratospheric ozone. Theoretical analysis of the problem and the results of numerical computations are presented, displaying noticeable increase of ozone concentration near balloon. Such exercise is of special significance as it is known that stratospheric ozone layer plays the main role in protection of the Earth's surface from hazardous UV radiation. The dynamics of ozone in this layer is very complicated and often significant depletion in ozone concentration (especially near poles) is detected. That is why to investigate various mechanisms suitable for ozone restoration in the stratosphere is of prime importance.

It is shown with the help of numerical computations that noticeable local changes of minor atmospheric constituents are created by short pulses of energetic electrons from high-altitude balloon at the heights $h \sim 35 - 45$ km. According to our results ozone production rate up to $(2 - 5)10^{11}$ cm^{-3} s^{-1} is expected in the center of the electron beam at the initial stage of the electron beam injection. Later on turbulent diffusion comes into play and causes significant decrease of the ozone production. At smaller heights the background concentration of ozone is too large compared to the produced perturbations. At the heights $h \geq 50$ km the chemical reactions becomes rather slow to compare with the diffusion time due to the significant decrease of the N_2 and O_2 concentrations.

The research findings appear in the *International Journal of Electronics and Applied Research*.

Source: http://www.eses.co.in

Synthesis Report findings presented at 27th Meeting of the Parties

The Synthesis Report comprising of the findings of the three assessment panels of the Montreal Protocol, namely the Scientific Assessment Panel (SAP), Technology and Economic Assessment Panel (TEAP) and Environmental Effects Assessment Panel (EEAP) were presented at the 27th MOP to the Montreal Protocol held from 1st to 5th November, 2015 at Dubai, UAE.

The report highlighted the summary of the achievements of the Montreal Protocol in phasing out Ozone Depleting Substances (ODS) and reducing the rate of ozone depletion, thereby avoiding, large increases in Ultra-Violet (UV) radiation on the Earth's surface. The key findings of the report comprise of the following:

a) Progress in technology had reduced ODS use and had beneficial side effects. Though many ODSs have been phased out, the use of Hydrofluorocarbons (HFCs), as alternatives to ODSs has increased. Many HFCs are potent greenhouse gases and their potential influence on climate is a concern. Similarly controlled uses of methyl bromide have been drastically reduced with immediate benefit to the ozone layer, but continued Quarantine and Preshipment (QPS) uses prevent further benefits being realized. Further, fire protection in civil aviation remains an unresolved challenge.

b) In response to the technological changes that had enabled reductions in ODS usage, the sum of ODS amounts in the atmosphere is now decreasing from its maximum in the1990s. The ODS amounts are expected to continue decreasing with adherence to the Montreal Protocol. ODS levels are projected to decline by about 0.6% each year until the end of this century, when they are expected to return to pre-1960 values. The global ozone layer has stabilized and is not getting worse.

c) The control of ozone depletion has prevented large increases in UV radiation in most parts of the globe. Damaging effects of ozone loss on human health and the environment have been minimized. Human health has been protected from the worst effects of ozone depletion. The Montreal Protocol has limited the increases in solar UV-B radiation in populous areas in the world. Changes in lifestyle have increased UV exposure, and consequently the background prevalence of skin cancers.

d) As ODSs declined, the evolution of the stratospheric ozone layer in the second half of the 21st century will depend largely on atmospheric abundances of Carbon dioxide (CO_2), Nitrous oxide (N_2O) and Methane (CH_4). In 2010, the decrease in annual ODS emissions under the Montreal Protocol was estimated to provide about five times the climate benefit compared with the annual emission reduction target for the 1st commitment period (2008–2012) of the Kyoto Protocol. Beyond 2015, if the Parties fail to implement the Montreal Protocol, the consequences of ODS emissions would have continued through the coming decades.

The presentation concluded by outlining key future challenges including the need to avoid and increase in the use of HFCs.

TEAP presents report on the full range of alternatives to ODSs

The Technology and Economic Assessment Panel (TEAP) of the Montreal Protocol presented the final report on additional information on alternatives to ODSs. The salient features of the report comprise of the following:

a) By 2030, a Business As Usual (BAU) scenario shows a 50% growth in the demand for high Global Warming Potential (GWP) Hydrofluorocarbons (HFCs) in non-Article 5 Parties (developed countries), and an almost 300% growth in Article 5 Parties (developing countries), particularly due to growth in the stationary Air-conditioning and commercial refrigeration sub-sectors.

b) Options for alternatives to ODS, particularly those with low- to zero-GWP, continue to emerge into the market across all sectors.

c) Delaying and extending the manufacturing conversion period, especially for the dominant stationary Air-conditioning sector, significantly increases both the climate impact and the conversion costs.

d) Continued, improved tracking of production and consumption of all alternatives across all sectors will improve future analysis.

e) There is no universal definition currently for what constitutes High Ambient Temperature (HAT) and consequently a

HAT country (or region). If, during a certain number of hours per year, temperatures above a certain level would occur, this could be defined as HAT. Industry defines temperature zones if a certain temperature is exceeded during a certain number of hours in a year (i.e., 35-438 hours per year.

It was also mentioned that the technical reports on HAT refrigerant testing, which are currently under preparation, will provide additional data to inform future assessments.

Eco-friendly adsorption chiller

Bry-Air (Asia) has launched Eco-Max adsorption chillers in India in the capacity range of 35 to 1,180 kW. The product is the first of its kind in India and will be manufactured in India under license from Power Partners, the United States. The adsorption chiller utilizes low-grade process heat which is available in abundance and is generally discharged as waste. It has advantages including low electricity consumption, low noise and vibration, a life expectancy of more than 20 years, and low maintenance requirements. It is suitable for process industries such as power plants, food and beverages, and chemical manufacturing, and for commercial applications such as office buildings, hotels, and malls.

Source: https://www.ejarn.com

HPMP Stage-II

The 72nd meeting of the Executive Committee (Ex-Com) of the Multilateral Fund (MLF) held in May, 2014 has approved US $490,000 for the preparation of HCFC phase-out Management Plan (HPMP) Stage-II for India with United Nations Development Programme (UNDP) as the lead implementing agency in association with United Nations Environment Programme (UNEP) and GIZ, Proklima, Government of Germany as cooperating agencies. The HPMP Stage-II would address phase-out of HCFCs in various sector of foam manufacturing including Extruded Polystyrene (XPS), various subsectors of Refrigeration and Air-conditioning (RAC) manufacturing and RAC servicing sector. The HPMP Stage-II would also include strategy for awareness among the stakeholders and training of enforcement officers across the country.

The Stage-II of HPMP will be addressing a large number of Micro, Small and Medium Enterprises (MSMEs) especially in foam manufacturing sectors as large HCFC consuming enterprises have already been addressed under HPMP-I. However in case of RAC sector, both large HCFC consuming as well as MSMEs will be addressed under HPMP Stage-II wherever safe, technically proven, commercially viable and environment friendly, non ODS technologies are available. The Ex-Com of the MLF during its 74th meeting held in May, 2015 approved the policy guidelines for HPMP Stage-II in the consumption sector.

Source: http://www.ozonecell.com

Financing the Climate Co-benefits of the HCFC Phase-out

A guide for Low Volume Consuming Countries

This document provides guidance for Ozone Officers in low volume HCFC consuming countries (LVCs) to help them understand how to seek financing outside of the Montreal Protocol's Multilateral Fund to achieve the climate co-benefits indicated in their national HCFC Phase-out Management Plans (HPMPs). Although this is specifically targeted to assist LVCs that only consume HCFCs for servicing RAC equipment, the document should be useful to all LVCs. It is intended to provide practical steps to guide Ozone Officers on how to identify support for the climate co-benefits of their HPMPs. It describes LVCs and the challenges and opportunities Ozone Officers in LVCs may face in identifying and accessing support to address climate co-benefits. The publication then outlines what climate benefits are possible in refrigeration servicing sector. It introduces the concept of co-financing and the various institutions that can provide support to LVCs as they phase out the HCFCs. Finally, it demonstrates how to prepare for discussions on co-financing with potential donors to address climate cobenefits during the HCFC phase-out.

The document is divided into six sections: Phase-out schedule for HCFCs; Description of LVCs with refrigeration servicing sector only; Progress so far on HCFC phase-out in LVCs with servicing only and what that means in terms of climate; An overview of alternatives for HCFCs in refrigeration and air-conditioning; Financing options available to LVCs seeking support for climate benefits; and Guide to Ozone Officers for accessing co-financing.

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Pakistan to reduce ozone depleting gases

Pakistan's Climate Change Ministry Ozone protection initiative National Program Manager Mazhar Hayat announced that controlling emission of ozone layer-cracking gases is need of the hour to protect earth's health and sustainability. "Use of ODSs such as CFCs had cracked a hole in the ozone layer that protects us from the sun's harmful ultraviolet radiation. But thanks to global community's role, the ozone-depletion problem has been substantially addressed," said Hayat, in a press conference.

He pledged to make all-out efforts to prove that Pakistan is very much serious in joining global efforts to completely restore the ozone layer to its 1980-level by the middle of the century, which is inevitable for sustainability of earth and the life on it. "Thirty years ago, the international community signed the Vienna Convention for the protection of the Ozone layer. Under its Montreal Protocol, a global treaty passed in 1987 to phase out ODSs like chlorofluorocarbons (commonly found in spray cans and refrigerants at the time), ozone depletion has stopped. However, the world is on track to completely restore the ozone layer," added Hayat.

Source: http://www.pakistantoday.com.pk

Ozone-harming substance imports to drop in Myanmar

Myanmar is planning to limit imports HCFCs, a substance harmful to the ozone layer, to members of an organisation still being formed. HCFCs are widely used in refrigeration, air conditioning, foam blowing and solvent applications, and developing countries that have joined the Montreal Protocol have rolling targets to phase out the substance, according to a previous United Nations Environmental Programme report on HCFCs.

"Under the Montreal Protocol, Myanmar plans to reduce its imports of HCFC using 2009-10 as the base. In 2009-10, a total of 78 tonnes of HCFC were imported, and Myanmar's obligations require it to bring in 10 percent less, or 7.8 tonnes. According to the Montreal Protocol, we have to reduce our HCFC imports annually," said U Than Aye, director from the Ministry of Environmental Conservation and Forestry, at the International Day for the Preservation of the Ozone Layer.

Myanmar does not domestically manufacturer HCFCs and instead relies on imports. Developing countries have until 2030 to stop using the substance, though there are other targets in the coming years. Myanmar will also import air-conditioners and fridges using the substitute gas. The ministry has been discussing an association with prominent business chamber Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI) since August, and are now working through the rules and procedures.

Source: http://www.mmtimes.com

Viet Nam reduces ODS consumption

Viet Nam has significantly reduced its consumption of three ODSs namely, CFCs, HCFCs and Halon, since joining the Montreal Protocol on Substances that Deplete the Ozone Layer in January 1994. According to the Ministry of Environment and Natural Resources, some 3.6 tonnes of CFC-11 in the textile industry, 5.8 tonnes of CFC-12 automotive air-conditioning and 40 tonnes of CFC in residential and commercial air-conditioning have been cut down annually. The ministry banned the import of CFCs on January 1, 2010 and plans to stop HCFCs consumption in Viet Nam by 2030.

Source: http://www.english.vietnamnet.vn

1358 industrial units get rid of ODS in Iran

Iran's Manager of the National Ozone Project has announced the elimination of ODSs from 1358 industrial units in the country. "Changing the function of these units and equipping them with modern technologies has been a tough task. Implementing the present laws and regulations and with the support of the Parliament, government and some international organizations, we managed to accomplish this project," said Ebrahim Hajizadeh, at the 30th anniversary of the Vienna Convention.

Hajizadeh further noted that, "the activities of these units in 31 provinces are now being monitored and the reports are sent to Iran's Environmental Protection Organization. So far, we have received 60 million dollars from the United Nations and we are also allowed to use the government's budget in accordance with the Parliament's legislations". Hajizadeh underlined that in addition to the elimination of ODSs in the country, we have tried to influence the region as well because we already have the necessary technology and power to do so.

Source: http://www.en.mehrnews.com

Malaysia to phase-out HCFC by 2030

Malaysia is targeting to phase-out the usage of HCFCs by 2030 in the effort to protect the ozone layer. "The thinning of the ozone layer could have serious impacts on human beings, animals and plants. The phasing out of HCFC in stages began in 2013 with the freeze on the import at baseline level based on consumption in 2009 and 2010," said Datuk Ir Hamim Samuri, Deputy Minister of Natural Resources and Environment.

Malaysia had also embarked on phase one of an HCFC Reduction Management Plan in which 17 companies succeeded in switching to ozone-friendly technologies with a US$8.3 million allocation from The Montreal Protocol on Substances that Deplete the Ozone Layer, said Hamim. Malaysia has submitted HPMP-II to the Montreal Protocol at the end of next year for its phase two implementation to get more than 100 companies to switch to ozone friendly technology.

Source: http://www.bernama.com.my

EU reports progress on phase-out of ODS

According to a report published by the European Environment Agency (EEA). Europe is making steady progress on the phasing out of chemicals that damage the ozone layer. The report, considered more than 200 ODSs and found that their "consumption" in the EU was negative in 2014, meaning more ODS were exported or destroyed than produced or imported. The statistics indicate that companies in the EU have been consuming relatively small amounts of the ODS that are controlled under the Montreal Protocol. Consumption has now been negative or close to zero since 2010. The 1989 Montreal Protocol required the phasing out of ODSs, including CFCs, halons and HCFCs.

The European Union has already achieved its phase-out goals under the protocol, but in 2009 introduced further legislation that covered additional substances and obliged companies to report their use of ODS, including imports, exports, production and destruction. The EU produced 177,040 metric tonnes of controlled substances in 2014, nearly all of which was produced as a feedstock for use inside the EU. While feedstock use increased compared to 2013, emissions from feedstock used decreased, indicating there has been an improvement in emissions control in the industry. Meanwhile, 6,843 metric tonnes were imported, 9,165 metric tonnes destroyed and 11,247 metric tonnes exported in 2014. Both exports and imports were found to be predominantly made up of HCFCs.

Source: http://www.businessgreen.com

Maldives limits anti-ozone substances

President Abdulla Yameen Abdul Gayoom on Sunday ratified Bill on Protection of the Ozone Layer which would enhance implementation of strategies to reduce the amount of ODSs imported and used in the Maldives.The bill submitted by Dhiggaru MP Ahmed FarisMaumoon will also promote the replacement of ODSs with environmentally friendly substances.The bill was passed by the parliament on November 5.

Submitting the Bill to the parliament, MP Faris stated that the industrialisation of first world countries has impacted negatively on the global environment, with universally accepted effects such as climate change.MP Faris recalled that the Maldives had signed the Vienna Convention agreement (1986) to protect the ozone layer in 1988 and the Montreal Protocol (1987) in 1989 to reduce the amount of ozone-depleting chemicals, noting that the latter has been the most successfully implemented.

The Maldives had also compiled a plan to halt the use of HCFCs until the year 2020 after the decision of the 19th Meeting of the Parties (MOP), of the Montreal Protocol to phase-out HCFCs by 2030. Montreal Protocol's ExCom had approved the Maldives' action plan, added Faris. According to Faris, the Bill on Protection of the Ozone Layer was lobbied to facilitate government authority to minimise and stop the use and importation of ODSs to the country, considering the dire need for a system of laws for the Maldives to act on ozone protection agreements the nation has signed and ratified.

http://www.haveeru.com.mv

Skills competition in refrigeration servicing sector

A Skills Competition on Good Practices in the China RAC Servicing Sector was held in Guangzhou on 2-4 December 2015. The event was organised by the Vocational Training and Qualification Certification Association of China with the assistance of the Guangzhou Industry and Trade Technician College.

This event aimed to further strengthen and improve the training delivery ability and skills of professional teachers from training centres in China on good practices in the RAC servicing sector. In total, more than 80 people attended.

http://www.unep.org

Patent for CO_2/ hydrocarbon refrigerant blend

Curtin University, Australia, has filed a patent for a CO_2/hydrocarbon refrigerant blend which lowers CO_2's freezing point to -78.5°C. Curtin University, has found that by adding what has been described as "a small amount" of "a light hydrocarbon agent", CO_2's triple point could be lowered to -78.5°C at atmospheric pressure. The patent holder sees the CO_2 blend's lower triple point making it a useful addition to the list of currently available refrigerants for specialist industrial applications. These currently include the flammable hydrocarbons ethane, which has a boiling point of -89°C and propylene, which has a boiling point of -47.6°C.

According to the developers, the inert nature of CO_2 is seen as an advantage, particularly in offshore processing plants where risk factors are high, citing its use in cascade refrigeration for producing liquefied natural gas. The petrochemical industry is known to have a particular problem in finding a safe replacement for R22, a refrigerant often used in fully-flooded refrigeration systems for the process of liquifying natural gas.

Source: http://www.coolingpost.com

A study on the benefits of R290 over HFCs

In a study published in Guide to Natural Refrigerants in North America – State of the Industry 2015, Embraco, the United States, emphasised the use of hydrocarbon refrigerants and variable speed compressor technology in light commercial refrigeration systems. The study showed both the simplicity and benefits of substituting HFC refrigerants with hydrocarbons by analysing the substitution of a HFC compressor with a conventional on-off propane compressor as well as replacing a conventional HFC compressor with a propane compressor with variable cooling capacity.

Both studies analysed energy consumption levels of plug-in vertical freezers. The first example is a glass-door vertical freezer with 14 cubic feet (0.4 m^3) of internal volume and the second one is a solid door vertical freezer manufactured from stainless steel with an internal volume of 20 cubic feet (0.6 m^3); both are used as cooling equipment for retail stores, supermarkets and restaurants. The selected systems were originally manufactured with Embraco compressor models NT2178GK (using R404A) and NEK2150GK (using R507).

R290 was selected as the substitute for both original refrigerants. The configurations of all the refrigeration systems tested were almost identical, with compressor and filter dryers changed for the comparative testing. In analysing the difference between HFC and hydrocarbon refrigerants, the systems using hydrocarbon refrigerants show an improved performance in all parameters. The result showed a 37.5% reduction in energy consumption, while replacing the NEK2150GK HFC compressor with a propane compressor in a solid door vertical freezer yielded a 42.9% reduction in energy consumption.

Source: http://www.hydrocarbons21.com

Scientist studies benefits of new metal alloy

According to Casey Miller, a scientist at Rochester Institute of Technology (RIT), the United States, a promising new metal alloy system could lead to commercially viable magnetic refrigerants and environmentally friendly cooling technologies. Miller and his colleagues at RIT published their findings in the October 28 issue of Scientific Reports. Miller's work in this area also led to an international collaboration that published in Applied Physics Letters on October 6.

The study published in Scientific Reports explores an iron-based alloy as a component of next-generation cooling technologies. The materials use magnetic fields to change a refrigerant's temperature without the coolant gases associated with global warming. The thermodynamic phenomenon, called "magnetocaloric effect," makes magnetic refrigeration an environmentally friendly and efficient alternative to current cooling technologies.

The alloy is a substitute for metals made from rare-earth elements, predominantly produced in China and increasingly used in modern magnets. The supply and cost of rare-earth metals are susceptible to geopolitical tensions that hamper the commercial viability of new magnetic refrigeration technologies, the authors reported. Transition metals typically offer supply chain stability and are cheaper by weight than rare-earths, said Miller.

Source: http://www.azom.com

Energy efficient multi-blend refrigerant

MTL Cool, Canada, manufacturer of refrigerated display cases, has introduced a new line of energy-efficient units that run on U.S.

Environmental Protection Agency (EPA)-approved HCR188C/R-441A, a multi-blend hydrocarbon refrigerant that is ASHRAE-classified and ETL safety-listed. The company said the new line offers improved efficiency compared to units running on either R-134a or R-290 (propane), with test data showing that the first of this line, the new NRC2 system, runs on a 17 percent lower charge and requires 17 percent less energy compared to units running on R-290.

"We noticed a quicker pull-down time (to get from 75° to 38°), which means even more cost savings passed on to the customer due to a shorter run-cycle and less power consumed. We are also tweaking the design for full production units, reducing the sizing of the coils compared to what's used for propane. Reducing the surface area of the coils means even less charge is needed, creating another way that use of the multi-blend hydrocarbon saves money," said Mark Bedard, at MTL Cool. *Contact: MTL Cool, 7880 Boulevard Industrie, Chambly, Quebec 3L 4X3, Canada. Tel: +1-450-658-2344; Fax: +1-450-658-2311; E-mail:info@mtlcool.com*.

Source: http://www.achrnews.com

Mercedes-Benz develops R1234yf alternative

Mercedes-Benz, Germany, has announced plans to equip its vehicles with carbon dioxide (CO_2) air conditioning systems. The new system developed by the automobile manufacturer will exceed the European Union's (EU) Mobile Air Conditioning (MAC) Directive which was first introduced on January 1, 2013. Under the Directive car makers had to replace R134a with a refrigerant that has a global warming potential (GWP) under 150. To comply with MAC Directive the motor vehicle industry replaced its R134a air conditioning systems with R1234yf.

However, Mercedes-Benz refused to use the new refrigerant claiming it was a fire risk. This was the main driver behind the company's decision to develop its very own CO_2 system. Finally, Mercedes-Benz has agreed to use R1234yf until it can begin introducing CO_2 air conditioning systems across its fleet in late 2016 or early 2017. But the car maker will not use R1234yf without protection. While using R1234yf Mercedes-Benz will install "specific protective devices" in its vehicles in the event of a head-on collision, using an argon gas suppressant to avoid the refrigerant mixing with hot engine components.

The new CO_2 air conditioning systems will be installed in its S and E Class vehicles from 2017. According to Mercedes-Benz, the use of CO_2 as a refrigerant did necessitate the redesign of crucial components. CO_2 air conditioning systems operate at a pressure of more than 100 bar – 10 times higher than today's systems. This means that all components including the hoses and seals had to be redesigned.

Source: http://www.climatecontrolnews.com.au

HFO/HFC/CO_2 hybrid on its way

A new lower GWP replacement for R404A, which blends an HFO and an HFC with a "natural" refrigerant is to be made commercially available next year.The unusual refrigerant blend, R455A, which developer Honeywell has been keeping under wraps, is being considered for ASHRAE classification as an A2L "mildly flammable" gas.Honeywell has confirmed that the refrigerant, which it will be marketing as Solstice L40X, consists of 75.5% HFO R1234yf, 21.5% R32 and 3% CO_2.Said to be tailored for hermetic reciprocating compressors in MT and LT, its original planned application was for use as a low GWP replacement for R404A in condensing units. However, it is known that it is also being tested in stand-alone refrigeration equipment. Pastorfrigor, the Italian display equipment manufacturer, featured a unit running on the new gas at last month's HOST exhibition in Milan.

A Honeywell spokesman confirmed that R455A was one of the developmental refrigerants it is working on with major components manufacturers and OEMs. The spokesman also confirmed that Pastorfrigor had been running preliminary tests in a non-optimised chiller cabinet originally designed for R407F (Honeywell's lower GWP (1824) R404A replacement blend marketed as Performax LT). The performance of R455A was said to match R407F in the Pastorfrigor tests and exhibit a lower discharge temperature of an average of 8°C. Pastorfrigor is to start full tests in the near future.On the face of it, the addition of a small amount of the "natural" refrigerant CO_2 makes this blend an unusual one, but it is known that Honeywell and others have been working with different blends containing CO_2 for a number of years. The CO_2 is thought to boost system capacity.

http://www.coolingpost.com

Clean and green vapour degreasing process

KYZEN, the United States, has introduced VaporDegreasing 20|20, a proven effective process that's clean and "Green". The DuoSolvent™ cleaning process is developed in an effort to generate a cleaning process that works within a vapor degreaser and eliminates the need for a water rinse. The DuoSolvent™ process incorporates an engineered cleaning solvent that matches a wider range of residues and is then rinsed with an environmentally friendly rinsing solvent. A unique feature of the DuoSolvent™ process is a secondary distillation process that removes the solvating agent dragout in combination with soils that are accumulated in the rinse fluid boil sump.

The parts are rinsed with a fluorinated rinsing fluid. The vapor blanket formed from the rinsing fluid is condensed, drained into the final rinse tank and overflowed back into the boil sump. This waterless process provides the beneficial properties that vapor degreasing while overcoming health, cleaning, and material limitations associated with common vapor degreasing solvents used today. *Contact: KYZEN Global Corporate Headquarters, 430 Harding Industrial Dr., Nashville, TN 37211, Tel: +1-615-831-0888.*

Source: http://www.kyzen.com

Environmentally friendly vapour degreasing solvent

Developed by Banner Chemicals Group, the United Kingdom, the Solvex HD is a unique, patented environmentally friendly vapour degreasing solvent. This product is based on a blend of powerful cleaning solvents. Solvex HD is an ideal product for high precision cleaning. Its high wetting ability makes it is perfect for cleaning components with complex geometries & blind holes while its superior solvency power makes light work of medium to heavy degreasing applications. The outstanding cleaning performance and excellent HS&E characteristics of Solvex HD gives this product good potential for widespread use in critical cleaning applications within the medical devices, defence and high precision engineering industries.

Solvex HD is an excellent alternative to traditional Chlorinated & Brominated cleaning solvents that are designated Carcinogenic, Mutagenic or Reproductive toxins (CMR). This product is also an excellent drop in replacement to many ODSs. Solvex HD can also offer a more cost effective alternative to other expensive Fluorinated products currently on the market. Solvex HD is an environmentally sensible product with zero ozone-depletion potential (ODP) and very low GWP. Solvex HD is operator friendly with a large margin of safety between the exposure guidelines that have been established for each of the components and exposures anticipated from intended end-use applications.

Solvex HD has many favourable properties that make it an excellent precision cleaning product. These include a high solvency power combined with low surface tension, non-flammability and excellent solvent stability. This makes it ideal for ultrasonic immersion and vapour degreasing applications. Solvex HD is very easy to use and maintain. As the product is extremely stable it does not require monitoring for pH, Alkalinity or Acid Acceptance Values (AAV). Solvex HD is compatible with a large variety of metals and plastics. *Contact: Banner Chemicals Group, Hampton Court, Tudor Road, Manor Park, Runcorn, Cheshire WA7 1TU, United Kingdom. Tel: +44-1928-597-000; Fax: +44-1928-597-001; E-mail: info@bannerchemicals.com.*

Source: http://www.stowlin.com

Zero ODP specialty solvent

Developed by The Chemours Company, the United States, the Vertrel™ XP specialty fluid is a proprietary azeotrope of Vertrel™ XF and isopropanol and has zero ODP. It is ideally suited for use in vapor degreasing equipment for precision and specialty cleaning, rinsing, and drying, in addition to some specialty applications. It is used to replace current HCFCs and perfluorocarbon (PFC) fluids in most applications.

Vertrel™ XP specialty fluid is compatible with most plastics and elastomers, and can be used to clean a wide variety of soils including cutting oils, gear oils, heavy greases, hydraulic oils, stamping oils, vacuum oils, waxes, and mineral oils. Vertrel™ XP can be used extensively to replace CFC-113, methyl chloroform, HCFCs, and PFCs in several applications. Vertrel™ XP has been accepted by the U.S.EPA under the Significant New Alternatives Policy (SNAP) program as a substitute for ODSs.

Vertrel™ XP is also VOC compliant under the California South Coast Air Quality Management

District (SCAQMD) regulations which require VOC content less than 50 g/L of solvent. Vertrel™ XP is not a hazardous air pollutant (HAP) and is, therefore, not subject to NESHAP regulations. Vertrel™ XP is not included in the SARA Title III Section 313 list of toxic chemicals, and is not subject to SARA Title III (EPCRA) reporting requirements. *Contact: The Chemours Company, 1007 Market Street, P.O. Box 2047, Wilmington, Delaware 19899, USA. Tel: +1-302-773-1000*.

Source: https://www.chemours.com

Water based cleaner for flux removal

Flux-Off Aqueous from Chemtronics, the United States, is an extra-strength water based cleaner for flux removal in ultrasonic, batch and in-line cleaning systems. It is an excellent cleaner for the removal of all rosin and no clean flux types from electronic subassemblies, printed circuit boards and all other electronic components. This concentrated formula can be diluted 1:10 with deionized water for handling all cleaning applications. Flux-Off Aqueous can effectively remove other contaminants such as dirt, grease, handling soils and molding compounds. Flux-Off Aqueous is generally compatible with most materials used in printed circuit board fabrication. With any cleaning agent compatibility must be determined on a noncritical area prior to use. *Contact: Chemtronics, 8125 Cobb Center drive Kennesaw, GA 30152, USA. Tel: +1-1-770-424-4888*.

Source: https://www.chemtronics.com

Environmentally friendly solvent

EnSolv NEXT from Enviro Tech, the United States, is a highly effective and inexpensive fluorinated solvent. EnSolv NEXT is a more environmentally friendly alternative to HCFC, which contributes to the depletion of the ozone layer and will be unavailable in the United States starting in 2015. Unlike many older alternatives, EnSolv NEXT has zero ODP and a very low impact on global warming. In addition, EnSolv Next is non-flammable, non-explosive, and safer for employees and the workplace.

EnSolv NEXT and other High-Trans Fluorinated Azeotropes are extremely effective for precision cleaning in high-tech industries such as aerospace, aviation, and medical due to the use of an additive called Trans 1,2-DiChloroEthylene. This makes EnSolv Next fluorinated cleaning solvents clean more effectively at a lower cost. EnSolv NEXT can be used to clean adhesives, fluxes, pastes, buffing compounds, greases, silicone oils, particulate, resins, waxes and much more. *Contact: Enviro Tech, 1800 N. 25th Avenue Melrose Park, IL 60160, USA. Tel: +1-708-231-4184*.

Source: http://www.envirotechint.com

CO_2 based cleaning solutions

Developed by Linde AG, Germany, the CRYOCLEAN® is an attractive and established alternative to traditional cleaning methods. It uses solid carbon dioxide, also known as dry ice, as cleaning agent. Similar to sand blasting dry ice particles are propelled by compressed air and shot on the contaminated surface. The cleaning effect of dry ice is based on a combination of embrittlement and cracking of the contaminant, kinetic impulse and a gas jet resulting from the explosive sublimation of dry ice upon impact.

Other than any other cleaning method CRYOCLEAN® avoids or considerable reduces the use of cleaning agent which has to be disposed afterwards. It works without solvents and does not leave any moisture behind which often allows in-situ cleaning of equipment. Linde offers a range of CRYOCLEAN® alternatives suitable for different cleaning tasks. CRYOCLEAN® pellet cleaning works with preproduced grain sized particles and is predominantly used for manual cleaning of equipment and tools.

CRYOCLEAN® snow cleaning is mainly used as an upstream or downstream process step on fully automated serial production of products. CRYOCLEAN® snow+ combines the strengths of dry ice and abrasives for manual cleaning during production. *Contact: Linde AG, Germany. Tel: +49-89-35757-01; Fax +49-89-35757-1075; Email info@linde.com*.

Source: http://www.linde-gas.com

OzonAction Education Pack

The OzonAction Education Pack contains an entire teaching and learning programme, based on basic knowledge, practical skills and participation, for students to learn about concrete and simple solutions to protect the ozone layer and safely enjoy the sun.

For more information, contact:

OzonActionProgramme
E-mail: ozonaction@unep.fr
Web: http://www.unep.fr/ozonaction/

Clean agent fire extinguishing system

Developed by Minimax Fire Products, the United States, the MX 1230 System uses Novec™ 1230 from 3M, the United States. This highly effective fire suppressant has low toxicity, an atmospheric lifetime of 5 days, zero ODP and significantly lower GWP than other agents. (Halon has an atmospheric lifespan of up to 110 years and extremely high GWP.) Novec™ 1230 will not damage electronics and leaves no residue behind, which dramatically reduces clean-up and minimizes downtime of critical infrastructure.

The Minimax MX 1230 system is extremely flexible. The innovative multi-zone design saves space and maintenance costs. The 725 psi multi-zone system protects multiple areas from a single agent supply. Each zone is connected to a separate selector valve. If a fire is detected the control panel opens only the related zone selector valve to discharge agent into the affected zone. If the fire is detected in a different zone, the control panel opens the selector valve related to that zone. Only Minimax can provide the capability to protect multiple zones with a single agent supply. *Contact: Minimax Fire Products, USA. Tel: +1-888-882-0191; Fax: +1-269-818-1608; E-mail: sales@minimaxfp.com*.

Source: http://www.minimaxfp.com

Inert gases fire suppression system

Developed by Ansul, the United States, the INERGEN Fire Suppression System protects enclosed areas where people may be present, fire may strike day or night, and damage from conventional agents cannot be tolerated. Upon discharge, INERGEN agent fills the room, mixing with the air to suppress fires quickly and effectively. Safe for people, INERGEN agent is non-synthetic and made of naturally occurring gases: nitrogen, argon, and carbon dioxide (CO_2).

Once discharged, it returns to the atmosphere in its natural state. INERGEN agent is free of residues and corrosive by-products that may produce further property damage. And because it poses no ozone depleting or global warming threat, INERGEN agent will never be subject to future legislative bans. *Contact: ANSUL Brand Headquarters, Tyco Fire Protection Products, One Stanton Street, Marinette, WI 54143-2542, USA.*

Source: https://www.ansul.com

Process technology for halon alternative fire extinguishing agent

The Centre for Fire, Explosive and Environment Safety (CFEES), an establishment of Defense Research and Development Organisation (DRDO), India, has developed an economic and commercially viable technology for the production of heptafluoropropane (HFC227ea). The process involves hydro fluorination of hexafluoropropene with anhydrous hydrofluoric acid using in-house developed metal oxide based catalyst. Transfer of technology has already been executed with industrial partner M/s Gujarat Fluorochemicals Pvt. Ltd. under DRDO-FICCI-ATAC program.

More than 80 per cent of the fire protection uses are in the civil sector industries such as oil, power, telecommunication, etc. Large demand of HFC227ea by civil sector may bring down expected cost of indigenous HFC227ea making it cheaper than imported HFC227ea.

Interestingly, the performance of HFC227ea *vis-à-vis* Halon1301 has been proved outstanding for retrofitment in fire suppression system for T-72 tank and meeting the requirements of GSQR 666 and NFPA 2001 for fire suppression timing for both crew and engine compartments.

Source: http://www.drdo.gov.in

Optimal design method for gaseous fire extinguishing systems

In a study conducted by researchers from Kyungmin University, Republic of Korea, optimal design methods were applied to the agent discharge flow of clean agent fire extinguishing systems. The methods combined optimal design theory and engineering theory for engineering analysis in a design program or coast savings in value engineering. Optimal design parameters were determined to optimize the agent discharge flow based on the design theory of the clean agent fire extinguishing systems and the theory of optimal design. The design factors were verified in regard to suitability for the performance of fire extinguishing systems.

The results provide a foundation for optimal design method methods in other fire extinguishing systems. Optimization of the agent discharge flow of the discharge nozzle was confirmed by the constraints on the inner diameter of the discharge nozzle and the pipe, agent arrival time, flow, and pressure variation of the agent. The deviation of discharge pressure and time of the agent discharge nozzle were found to correlate with the pressure variation.

The research findings are published in *Fire Science and Engineering*.

Source: http://www.koreascience.or.kr

New catalyst for rigid polyurethane foam

Air Products, the United States, has introduced the new Polycat™ 204 catalyst to its product portfolio for use in rigid polyurethane foams. Polycat 204 is a non-emissive catalyst specifically designed to help polyurethane foam producers maximize their foam performance and achieve up to six to eight months of system stability when incorporating "Next Generation" Hydrofluoroolefin (HFO) Blowing Agents, such as Honeywell's Solstice LBA (HFO-1233zd(E)). These new HFO Blowing Agents are being used and commercially adopted in response to increasing global regulation and, ultimately, the phase-down of HFC Blowing Agents.

HFO Blowing Agents have significantly reduced GWP relative to HFC Blowing Agents and are typically used in polyurethane foam applications that require high insulation properties, such as spray foam insulation, refrigerator/freezer insulation, and panel insulation for building structures. "Increasing environmental regulation of HFCs and the need to reduce building emissions while maintaining shelf stability in applications like spray foam can present a real challenge to the polyurethane foam industry. This innovative product is helping the industry adopt HFO blowing agents with reduced GWP footprint, while also reducing Volatile Organic Compound (VOC) emissions," said Steve Hulme, at Air Products.

The Polycat 204 catalyst is a tool that can significantly increase the shelf stability of Solstice LBA based spray foam systems. Solstice LBA has an ultra-low GWP of one, which is 99.9 percent lower than traditional blowing agents and equal to carbon dioxide. It is non-ODS, nonflammable and is VOC-exempt per the U.S. EPA. It has received approval under the EPA's SNAP Program, the European Union's Registration, Evaluation, Authorisation & restriction of Chemicals (REACH) program and other chemical registration requirements globally.

Source: http://www.news.thomasnet.com

Foam blow molding process

At the NPE2015 show in Orlando, the United States, W. Müller USA Inc., Agawam. Mass., the maker of blow molding extrusion heads launched its foam blow molding process. "At NPE, we started talking to selected customers about our new blow molded foam technology for packaging. They had a lot of questions about things like physical properties, and I had to tell them that we're still at the very beginning, in terms of application development. But we have proven that the process works very well," said company president Wolfgang Meyer.

The process uses a special head design for three-layer coextrusion with solid inner and outer skins and a foamed center. The machine's main horizontal extruder provides the middle foamed layer, while two separate vertical extruders provide the skins. It uses no chemical blowing agent only talc as a nucleating agent, so it is acceptable for food packaging, Meyer said. Another feature of the head which is retrofittable to any brand of continuous-extrusion machine is a "pineapple" dynamic mixer to disperse the gas. Higher mixer speed yields finer cell structure. Cell structure thus can be controlled independently of extruder speed, unlike other processes.

Source: http://www.ptonline.com

HFO1233zd wins innovation award

Developed by Honeywell, the United States, Solstice Liquid Blowing Agent (LBA), the HFO 1233zd(E), has won a top chemical award. The low GWP gas, which is also being used as a refrigerant in chillers and as a constituent in other low GWP refrigerant blends, is sold by Honeywell as the foam blowing agent Solstice LBA. As a critical material used in energy-efficient polyurethane foam insulation, Solstice LBA was named the winner of the 2015 Polyurethane Innovation Award by the American Chemistry Council's Center for the Polyurethanes Industry (CPI).

Solstice LBA was voted top innovation from among three finalists by judges and attendees of the CPI Polyurethanes Technical Conference in Orlando, Florida. The award highlights the role that innovation plays in the polyurethane industry and recognises companies and individuals whose vision and perseverance bring new products, technologies and initiatives to the marketplace.

Source: http://www.coolingpost.com

International Standards in Refrigeration and Air-Conditioning

This guide provides an introduction and overview of the issues related to international standards in the refrigeration and air-conditioning sector.

For more information, access:

http://www.unep.org/ozonaction/

Advances in barrier film reduces fumigant emissions

Arkema, France, has developed a new and effective soil fumigant marketed under trade names PaladinÂ® and AccoladeÂ®. The dimethyl disulfide (DMDS) based technology is a pre-plant soil fumigant which is very effective against parasitic nematodes, soil-borne plant pathogens and weeds. Soil fumigant efficacity is maximized by using a gas barrier film that is highly impermeable to DMDS. Arkema has developed, and industrially produced, an LDPE based multilayer gas barrier film using a high performance tie layer, OrevacÂ®, and gas barrier resin, EvasinÂ® EVOH. The films barrier properties to DMDS have been evaluated in multiple humidity and temperature conditions according to the French norm NF T54-195-2. The gas permeability for this film have been compared against the industry standard polyamide-based films to understand the relative performance for this new technology.

Geo SafeÂ® TIFÂ® series is a unique seven-layer barrier fumigation film product line; manufactured from very flexible high-strength polyethylene with an inner core of gas impermeable EVOH barrier resin. Geo SafeÂ® soil fumigation films bring leading TIFÂ® film technology into a common sense approach to success. As the industry moves away from methyl bromide used to control weeds, pests and diseases, the need for a totally impermeable film (TIFÂ®) has become a necessity. Geo SafeÂ® fumigation films provide proven performance results for both broadcast and row mulch applications. Extensive research has been conducted on Geo SafeÂ® to assure growers repeatable and reliable performance. Results indicate that fumigant rates based on gallons per acre may be reduced by as much as 10% to 50% under Geo SafeÂ®, while still maintaining efficacy and yields.

Source: http://www.plastemart.com

Researchers study destruction of methyl bromide

Researchers from Stanford University, the United States, University of Nevada, the United States, and San Joaquin Valley Agricultural Sciences Center, the United States, studied destruction of methyl bromide sorbed to activated carbon by thiosulfate or electrolysis. Methyl bromide (CH_3Br) is widely used as a fumigant for postharvest and quarantine applications for agricultural products at port facilities due to the short treatment period required, but it is vented from fumigation chambers to the atmosphere after its use. Due to the potential contributions of CH_3Br to stratospheric ozone depletion, technologies for the capture and degradation of the CH_3Br are needed to enable its continued use.

Although Granular Activated Carbon (GAC) has been used for CH_3Br capture and thiosulfate has been used for destruction of CH_3Br in aqueous solution, this research explored techniques for direct destruction of CH_3Br sorbed to GAC. Submerging the GAC in an aqueous thiosulfate solution achieved debromination of CH_3Br while sorbed to the GAC, but it required molar concentrations of thiosulfate because of the high CH_3Br loading and produced substantial concentrations of methyl thiosulfate. Submergence of the GAC in water and use of the GAC as the cathode of an electrolysis unit also debrominated sorbed CH_3Br.

The reaction appeared to involve a one-electron transfer, producing methyl radicals that incorporated into the GAC. Destruction rates increased with decreasing applied voltage down to ~−1.2 V vs the standard hydrogen electrode. Cycling experiments conducted at −0.77 V indicated that >80% debromination of CH_3Br was achieved over ~30 h with ~100% Coulombic efficiency. Sorptive capacity and degradation efficiency were maintained over at least 3 cycles. Capture of CH_3Br fumes from fumigation chambers onto GAC, and electrolytic destruction of the sorbed CH_3Br could mitigate the negative impacts of CH_3Br usage pending the development of suitable replacement fumigants.

Source: http://www.pubs.acs.org

Palm dates fumigation

In a research, scientists from National Agronomic Institute of Tunisia, and National Agency for Environment Protection, Tunisia, used several methods to insect post harvest of Date Palm fruits control. Fumigation with methyl bromide (CH_3Br) was the best way to control pests of stored dates in Tunisia and other countries, for its effectiveness against different stages of insect development. Due to its harmful effects on humans and/or on the environment, its use is now very limited and it is forbidden and removed since 2005 in the developing countries and in 2015 in under developing countries.

The aim of this current work is to present a new more efficient and economical alternative that replaces methyl bromide. It is the use

of a generator that combines the phosphine (PH_3) at 2% and carbon dioxide (CO_2) at 98%. For a dose of 3 g/m^3 of phosphine, we tested the efficacy of four different temperatures (35±1°C, 30±1°C, 25±1°C and 20±1°C) for four different durations of treatment (8, 12, 16 and 24 hours) on mortality of several development stages of two species of Lepidoptera (*Ectomyelois ceratoniae* and *Ephestia kuehniella*) causing damages on date palm dates.

As control, untreated samples (infested dates and different moth stages) were used. The best result is observed at 35±1°C with of a processing time of 8 hours. When the temperature is 30±1°C the processing time is 12 hours, for a temperature of 25±1°C the processing time is 16 hours and if the temperature is reduced to 20±1°C , the processing time increased to 24 hours. Organoleptic analysis of treated and untreated dates showed that these treatments do not affect the quality of dates treated compared to those not treated.

Source: http://www.ijair.org

Soil biosolarization for strawberry production

A team of researchers from Instituto Andaluz de Investigación y Formación Agraria y Pesquera (IFAPA), Spain, and University of California, the United States, have tested soil biosolarization, a new technique combining soil biofumigation and soil solarization, to cultivate the *Camarosa* strawberry at Huelva in the southwestern coast of Spain. Soil was biofumigated by amendment of fresh chicken manure at 12,500 kg/ha with or without *Trichoderma* at 3.5 kg/ha; chicken manure at 25,000 kg/ha; *Brassica juncea* pellets at 2,000 kg/ha; sugar beet vinasse at 15,000 kg/ha; or dried olive pomace at 12,500 kg/ha. Soil was then solarized for 30 days by covering with a clear plastic mulch. A control that received fermented manure remained uncovered.

The results show that the highest yield averaging 70,543 kg/ha and the lowest percentage of 12.6 % of second-class fruits were obtained by amendment of fresh chicken manure. Yields were also similar to the higher yields previously reported for chemical fumigation with 1,3- dichloropropene and chloropicrin. In addition, biosolarization is about 20 % cheaper than treatment with 1,3-dichloropropene and chloropicrin. Biosolarization with chicken manure is, therefore, a promising sustainable option for strawberry production.

The research is published in the journal *Agronomy for Sustainable Development*.

Source: https://hal.archives-ouvertes.fr

Soil fumigation with ammonium bicarbonate

Banana production is severely hindered by plant-parasitic nematodes in acidic, sandy soil. In a study carried out by a team of researchers from Nanjing Agricultural University and Hainan University, China, investigated the possibility of applying a novel fumigation agent based on ammonium bicarbonate as a strategy for controlling plant-parasitic nematodes under sealed conditions. Moreover, its effects on the nematode community in pot and field experiments were also measured using morphology and feeding-habit based classification and the PCR-DGGE method.

Results showed that a mixture (LAB) of lime (L) and ammonium bicarbonate (AB) in suitable additive amounts (0.857 g kg^{-1} of L and 0.428 g kg^{-1} of AB) showed stronger nematicidal ability than did the use of AB alone or the use of ammonium hydroxide (AH) and calcium cyanamide (CC) with an equal nitrogen amount. The nematode community was altered by the different fumigants, and LAB showed an excellent plant-parasitic nematicidal ability, especially for *Meloidogyne* and *Rotylenchulus*, as revealed by morphology and feeding-habit based classification, and for *Meloidogyne*, as revealed by the PCR-DGGE method. Fungivores and omnivore-predators were more sensitive to the direct effects of the chemicals than bacterivores.

This study explored a novel fumigation agent for controlling plant-parasitic nematodes based on LAB and provides a potential strategy to ensure the worldwide development of the banana industry. The research is published in *Scientific Reports*.

Source: http://www.nature.com

Solar Chill

Solar Chill is a global initiative that is developing a climate- and ozone-friendly vaccine cooler that is powered by solar energy and which will directly help improve the health of children in developing countries. The technology is publicly-owned and will be freely available for any company in the world interested in producing SolarChill units. The partners include UNEP OzonAction, UNICEF, WHO, Danish Technological Institute, Greenpeace, GTZ Proklima, Programs for Appropriate Technologies in Health and the private sector companies Vestfrost and Danfoss.

For more information, access:

http://www.solarchill.org

RECENT PUBLICATIONS

CO_2 as a Refrigerant

This guide highlights the application of CO_2 in supermarkets, industrial freezers, refrigerated transport, and cold stores as well as ice rinks, chillers, air conditioning systems, data centers and heat pumps. This guide is for design and development engineers needing instruction and inspiration as well as non-technical experts seeking background information on a specific topic.

Handbook on indirect refrigeration and heat pump systems

This handbook will help readers to better understand and work with indirect systems. Although most refrigeration systems are constructed as direct systems, i.e. systems with direct expansion, indirect systems with secondary fluid circuits have long been used for systems where there are many places to be cooled or where long pipes are required, such as in artificial ice rinks, commercial refrigeration and ground-source heat pumps with long collector tubes in the ground. Indirect systems have come into focus to an ever-increasing extent because of requirements governing tighter constructions in order to minimize refrigerant leakage from plants as well as changing legislation implemented in order to achieve the phasing out of various types of refrigerants.

For the above two publications, contact: International Institute of Refrigeration, 177, boulevard Malesherbes, 75017 Paris, France. Tel: +33-142-273-235; Fax: +33-147-631-798

GUIDE+ Directory of Natural Refrigerant Businesses in China 2015

"GUIDE+ Directory of Natural Refrigerant Businesses in China 2015", is a listing of 201 companies in China using natural refrigerants in their businesses. The Directory provides vital information to give easy access to parties interested in expanding their business in China or in partnership with the Chinese HVAC&R industry.

Contact: Shecco SPRL, Rue Royale 15, 1000, Brussels, Belgium. Tel: +32-2230-3700; Fax: +32-2280-0436; E-mail: europe@shecco.com

TECH EVENTS

2016

9–10 Feb
Tokyo, Japan

Atmosphere Asia 2016
Contact: ATMOsphere Asia 2016
Tel: +81-3-3287-7330
E-mail: info@ATMO.org
Web: http://www.atmo.org

25-27 Feb
Mumbai, India

ACREX INDIA 2016
Contact: ISHRAE
K-43 (Basement), Kailash Colony
New Delhi-110 048, India
Tel: +91-11-4163-5655
E-mail: acrex2015@ishraehq.in
Web: http://www.acrex.in

10-13 Mar
Goyang City, Republic of Korea

Ozone2Climate Technology Roadshow and Industry Roundtable
Contact: Mr. Atul Bagai
Senior Regional Coordinator
UNEP Regional Office for Asia and the Pacific (ROAP)
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Fax: +66-2-280-3041
E-mail: atul.bagai@unep.org

7-9 Apr
Beijing, China

China Refrigeration
Contact: Chinese Association of Refrigeration (CAR)
Fl.10,Yindu Tower,67
Fucheng Rd., Haidian District,
Beijing-100142, China
Tel: +86-10-6871-9984
Fax: +86-10-6842-0694
E-mail: wqzhong@car.org.cn
Web: http://www.cr-expo.com

23-25 May
Kuala Lumpur, Malaysia

REVAC 2016: International Refrigeration, Ventilation and Air-Conditioning Event
Contact: UBM ASIA (Thailand) Co Ltd.
503/23 K.S.L. Tower
14th Floor Sri Ayuthaya Road
Kwaeng Thanon Phayathai
Khet Rajathewee,
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Tel: +66-2642-6911
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E-mail: info@cmpthailand.com

11-13 Oct
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Chillventa – the Exhibition for Energy Efficiency, Heat Pumps and Refrigeration
Contact: NürnbergMesse GmbH
Online-Redaktion für Aussteller
Messezentrum, 90471 Nürnberg
Germany
Tel: +49-911-8606-8600
Fax: +49-911-8606-8601
Web: https://www.chillventa.de

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