THE SCIENCE OF OZONE LAYER

Clouds of acid make sky bright but eat the ozone

There was some spectacular evening twilight in Europe in the week that ended on 23 February. Long after the sun had sunk below the horizon, the sky was bathed with a phenomenal orange-yellow glow, far brighter and longer-lasting than the usual twilight. Such amazing evening light can sometimes come from volcanic eruptions, when dust high in the atmosphere bounces back light from the Sun below the horizon; but there were no recent eruptions.

The mystery may have been solved by the physicist Dr. Les Cowley, an expert in atmospheric optical phenomena. He believes that the Sun's rays were being reflected by very high clouds in the stratosphere, about 20 km high, far above the height of normal clouds. Usually the stratosphere is far too dry for clouds to form, but when it is intensely cold, below -70ºC, the extremely low temperatures can produce clouds of acid. Such clouds usually form only in the intense cold of winter in the Arctic or Antarctic, but there was exceptionally cold air that week in the stratosphere over Europe. Such unusual clouds help chemical reactions in the stratosphere that eat into the Earth's ozone layer, producing ozone holes that allow ultraviolet light to reach the Earth's surface. (Source: www.timesonline.co.uk)

Measures of ozone depletion in the polar stratosphere

Researchers from Germany and New Zealand have investigated the extent to which quantities that are based on total column ozone are applicable as measures of ozone loss in the polar vortices. Such quantities have been used often in ozone assessments by the World Meteorological Organization, and also to assess the performance of chemistry-climate models.

The most commonly considered quantities are March and October mean column ozone polewards of geometric latitude 63º and the spring minimum of daily total ozone minima polewards of a given latitude. Particularly in the Arctic, the former measure is affected by vortex variability and vortex break-up in spring. The minimum of daily total ozone minima polewards of a particular latitude is debatable, insofar as it relies on one single measurement or model grid point.

Dr. Rolf Müller and colleagues found that, for Arctic conditions, this minimum value frequently occurs in air *outside* the polar vortex, both in the observations and in a chemistry-climate model. Neither of the two measures shows a good correlation with chemical ozone loss in the vortex deduced from observations. They recommend that the minimum of daily minima should no more be used when comparing polar ozone loss in observations and models. As an alternative to the March and October mean column polar ozone, they propose the minimum of daily average total ozone polewards of 63º equivalent latitude, except for winters with an early vortex break-up.

Such a definition, they opine, would both obviate relying on one single data point and reduce the impact of year-to-year variability in the Arctic vortex break-up on ozone loss measures. The measure would also show a reasonable correlation (r = -0.75) with observed chemical ozone loss. However, the researchers warn that simple measures of polar ozone loss must be used with caution, and say that it would be preferable to use more sophisticated measures that include additional information to disentangle the impact of transport and chemistry on ozone. *Contact: Dr. Rolf Müller, Institut für Chemie und Dynamik der Geosphäre, ICG-1, Forschungszentrum Julich, 52425 Julich, Germany. E-mail: ro.mueller@fz-juelich.de.* (Source: www.atmos-chem-phys.org)

Brewer ozone spectrophotometer at Antarctica

Dr. Tom McElroy of Environment Canada was at the Antarctica in February, to install a Canadian-designed device to monitor stratospheric ozone. He anchored the Brewer Ozone Spectrophotometer on a rooftop at the Amundsen-Scott Base under an agreement between the United States National Oceanic and Atmospheric Administration (NOAA) and Environment Canada.

The automated machine, the most accurate ozone measuring instrument in the world according to Environment Canada, is so sensitive that it can detect even minute changes in the amount of stratospheric ozone during daylight hours. It can also measure the ozone by peering at the moon. Dr. McElroy says the measurements from the South Pole will help validate and enhance ozone readings taken by satellites and other ground-based devices, which have limitations since it is difficult to measure stratospheric ozone in darkness, which shrouds the pole about half the year. The Antarctic installation also fills a hole in the network of 200 Brewers operating in 45 countries and feeding readings into a global data centre. (Source: www.canada.com)

Low level of stratospheric ozone spotted in India

The Indian reserve of coking coal is located mainly in the Jharia coal field in Jharkhand state. Though air pollution from oxides and dioxides of carbon, nitrogen and sulphur is reported to have gone up in this area due to large-scale opencast mining and coal fires, no significant study on the possible impact of coal fires on the stratospheric ozone concentration has been reported so far.

Ms. Nandita D. Ganguly from St. Xavier's College, Ahmedabad, India, studied the possible impact of coal fires – burning for more than 90 years – on the current stratospheric ozone concentration using satellite-based data obtained from Upper Atmospheric Research Satellite Microwave Limb Sounder, Earth Observing System Microwave Limb Sounder and Ozone Monitoring Instrument.

The stratospheric ozone values for 1992-2007 near Jharia and places to its north were found to be consistently lower than those of places lying to its south by 4.0-20 per cent. However, owing to lack of systematic ground-based measurements of tropospheric ozone and vertical ozone profiles at Jharia and other places in different directions, it was difficult to make any strong conclusion on the existence of a relationship between coal fire pollution and stratospheric ozone depletion. *Contact: Ms. Nandita D. Ganguly, Department of Physics, St. Xavier's College, Ahmedabad 380 009, Gujarat, India. E-mail: nanditad@icenet.net.* (Source: www.ias.ac.in)

ODS PHASE-OUT IN INDIA

Halon sector phase-out project

The Executive Committee of the Multilateral Fund in its 29th meeting had approved US$2.6 million for phasing out Halon production and consumption in India. The enterprises producing Halons have dismantled their production plants and rendered them incapable of producing Halons. At present, there is no Halon production in India.

Industry structure: At the time of preparation of the Country Programme, there were about 200 manufacturers of fire-fighting equipment, of which over 85 per cent were manufacturers of portable fire extinguishers. Halons were used in about 5 per cent of the fire-fighting applications. As of 1991, there were two manufacturers of Halon-1211 and Halon-1301. The total installed production capacity was 500 MT.

ODS Consumption: In 1991, the total consumption of Halons in India was 750 MT, equivalent to 3,650 ODP tonnes. This constituted 7.2 per cent of India's total ODS consumption and almost 28 per cent of the total ODP. Imports accounted for 550 MT of the total consumption. The growth rate in the sector was forecast at 15 per cent annually.

Technology: As noted earlier, the use of Halons in fire-fighting constituted about 5 per cent of the fire-fighting applications in India. There were no drop-in replacement technologies identified. The alternative technologies identified were ABC powder, inert gases, aqueous systems, CO_2-based systems, fast-response sprinklers, etc. Among the priority actions identified to address the ODS phase-out in this sector were:

- Revision of national fire-extinguisher codes and standards to promote Halon alternatives;
- Halon conservation to limit emissions;
- Feasibility of a Halon management programme including Halon banking; and
- Evaluation of essential uses of Halons, particularly in the defence sector.

(Source: The Montreal Protocol: India's Success Story 2007)

Aerosol sector phase-out project

Aerosols are widely used in several applications involving propellants including perfumes, shaving foams, insecticides, pharmaceuticals, paints and inhalers. In this sector, 23 projects covering 44 enterprises were supported to phase out CFC-11 and CFC-12. India is preparing the transition strategy for metered dose inhalers, with assistance from UNDP. One of the best examples of successful change over to alternatives has been the case of a pharmaceutical firm, which has entered into an agreement to supply CFC-free inhalers overseas. The non-ODS alternatives proposed include liquefied petroleum gas (LPG), particularly for the industrial aerosol sector. Hydrocarbon aerosol propellants are proposed for other applications. This complicates issues related to consistent availability of non-ODS alternatives and associated costs.

Industry structure: The total production of aerosol containers in 1991 was estimated to be 45 million, of which over 90 per cent used CFCs as propellants. About 200 aerosol manufacturers were identified, all in the private-sector. About 70 per cent of these were small/medium enterprises (SMEs), many of which were in the informal sector, principally manufacturing personal care products such as perfume and deodorant sprays.

ODS consumption: In 1991, the aerosol sector consumed 1,100 MT of CFCs (about 40 per cent CFC-11 and 60 per cent CFC-12) – about 22 per cent of India's total CFC consumption at that time. The demand for aerosol products was projected to grow annually at 20 per cent until 2000, 18 per cent until 2005 and 15 per cent until 2010. These estimates were based on considerations such as emerging customer base for personal care products, entry of multinational corporations in India leading to expansion of the manufacturing base in this sector, reduction in taxes on cosmetics, etc.

Technology: Hydrocarbon-based aerosol propellants were identified as the preferred substitute for phasing out CFCs in the aerosol sector, specifically, butane, destenched LPG, etc. The SMEs predominantly used locally developed manual propellant filling machines, which were suitable for CFC propellants but considered unsafe and unsuitable for hydrocarbon-based substitute propellants. Many of the SMEs had manufacturing facilities in locations that could be considered unsafe for handling hydrocarbon-based propellants. Therefore, safety measures for handling hydrocarbons including safety training and audits were identified as important inputs in addition to investments needed for conversions.

(Source: The Montreal Protocol: India's Success Story 2007)

HVAC industry aims at zero ozone depletion

The heating, ventilation, air-conditioning and refrigeration (HVAC) industry is hoping to get rid of its 'global warmer' stigma through increased use of gases with zero ozone depletion potential (ODP). The impact on global warming by the industry is negligible compared with the automobile, process and cement and petrochemical industry, said Mr. S. Bhagavan, President of the Bangalore Chapter of the Indian Society of Heating, Refrigerating and Air-Conditioning Engineers.

The HVAC industry has advanced technologically and more than 90 per cent of the refrigerant gas is reclaimed or recycled, Mr. Bhagavan said. The new transition gases have very marginal global warming potential (GWP). For instance, new CFC-free refrigerants such as R410A (replacement for old R22) and R134 (replacement for old R12) are being used more and more. They have zero ODP and negligible GWP. Besides, they also work at slightly higher pressures resulting in less energy consumption.

There is scope for lot of innovation and development of sustainable solutions in the field of HVAC. More than 60 per cent of the electricity consumption of a traditional multi-storied workspace, hotel or shopping mall is attributed to air-conditioning. HVAC is working to offer alternative and cutting-edge solutions to address this and other factors. HVAC solutions also address problems of indoor air pollution. Poor ventilation systems and ineffective removal of polluted indoor air result in Sick Building Syndrome (SBS), viewed by the World Health Organization as a disease with symptoms that include headache, dizziness, fatigue, cough, itchiness and eye irritation. (Source: www.blonnet.com)

IN THE NEWS

Ozone Secretariat compiles non-compliance decisions

The Ozone Secretariat recently released a compilation of "Decisions of the Parties Related to the Non-compliance Procedure of the Montreal Protocol on Substances that Deplete the Ozone Layer". The Non-compliance Procedure of the Montreal Protocol is the primary tool for monitoring obligations for phasing out ozone-depleting substances (ODS). The ideology behind the Procedure is that repeated interactions and iterative discourse can engage the violator in a cooperative enterprise to end non-compliance.

The Montreal Protocol's Implementation Committee investigates allegations of non-compliance and makes recommendations to the Protocol's member states. The Protocol supplies a list of potential remedies, including assistance to the violator, cautionary messages, and suspension of specific membership rights and privileges. In the past, the usual response of the Implementation Committee has been to recommend economic aid, technical assistance or other measures to bring the violator back into compliance.

The reprinted decisions cover the following topics:

- Non-compliance procedure;
- Implementation committee;
- Compliance by groups of parties;
- Compliance by particular Parties; and
- Current Non-Compliance Procedure of the Montreal Protocol.

(Source: www.unep.fr)

Consumption and production of ODS in developing countries

Compliance with the approaching 2010 targets for the phase-out of the consumption and production of CFCs and Halons is the major challenge facing countries that operate under Article 5 of the Montreal Protocol. Developing countries must also prepare themselves to comply with the accelerated HCFC phase-out schedule, beginning with a freeze in production and consumption by 2013. In 2015, comes the deadline for the complete phase-out of methyl bromide (MeBr). Decision makers in these countries need information that easily conveys where their countries stand vis-à-vis these targets. "Trends Analysis: Consumption and Production of Ozone Depleting Substances in Developing Countries" service is designed to provide such a visual tool.

Created by the OzonAction Programme of the United Nations Environment Programme (UNEP), the Trends Analysis helps the Compliance Assistance Programme (CAP) team monitor and analyse compliance status of countries for which UNEP is the implementing agency under the Multilateral Fund. It serves as a visual analytical tool for long-term national strategic planning to phase out ozone-depleting substances (ODS). UNEP also uses the Trends Analysis for discussions with the various National Ozone Units, as well as key benchmarking document in meetings of the Regional Networks of Ozone Officers.

Trends Analysis presents updated information for CFCs, Halons and MeBr. It includes an analysis of the HCFC consumption and production trends in developing countries. Contents of each country report covers in graphics information such as: consumption level, production level, consumption freeze level, production freeze level, and the compliance targets. This web version of the Trends Analysis is updated once a year. *Contact: Mr. Rajendra Shende, Head, OzonAction Branch, UNEP Division of Technology, Industry & Economics, 15 rue de Milan, 75441 Paris Cedex 09, France. Tel: +33 (1) 4437 1459; Fax: +33 (1) 4437 1474; E-mail: ozonaction@unep.fr.* (Source: www.unep.fr)

Global solvents market to exceed 20 million tonnes

Regulatory concerns, marked shift towards oxygenated and green solvents, decline in chlorinated and hydrocarbon solvents, and strong demand in certain emerging economies are the key factors fuelling modest growth in the global solvents market. Green solvents such as terpenes, hydrogen peroxide and propylene glycol are being increasingly preferred due to their eco-friendly aspects. In addition, the regulations insist and compel the

use of green solvents in many developing nations. On the other hand, reduction in prices of green solvents with support from technological developments will ensure robust growth for eco-friendly green solvents across the globe in the coming years. Green solvents market is the fastest growing segment in the global solvents market and is projected to register a CAGR of over 4.2 per cent during the analysis period, says the "Solvents: A Global Strategic Business Report" from Global Industry Analysts Inc.

Global solvents market is experiencing steady growth driven by increasing consumption from technologically advanced sectors of electronics, medical products and automotives. Asia-Pacific is the largest and the fastest growing solvents market in the world and is projected to reach 6.4 million tonnes by 2010, growing at a compounded annual rate of about 4.8 per cent over the period 2001-2010. A strong economic and investment attitude would promote demand for solvent-based products. Majority of these products would be manufactured in the Asia-Pacific region because of lower labour and transportation costs. Oxygenated solvents market represents the largest segment in the global solvents market and is projected to exceed 12.9 million tonnes by 2010.

The report provides a review of market trends, end-use market analysis, regulatory and environmental issues, product introductions/innovations, product overview, and recent industry activity. It analyses market data for North America, Europe, Asia-Pacific and Latin America by product segments and also makes long-term projections for solvents for the period 2011-15. *Contact: Global Industry Analysts Inc., 5645 Silver Creek Valley Road, San Jose, California 95138, United States of America. Tel: +1 (408) 528 9966; Fax: +1 (408) 528 9977; Website: www.strategyr.com.* (Source: www.emediawire.com)

International Code Council acts on ASHRAE proposals

International building codes may soon incorporate a new load calculation standard proposed by the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) and Air-Conditioning Contractors of America (ACCA). The International Code Council (ICC), which develops model codes that may be adopted by code jurisdictions internationally, received 15 proposals from ASHRAE. After receiving public comments, final hearings for the code change proposals will take place in September 2008, and if accepted, they would be included in the 2009 code.

Under a proposal to both the International Mechanical Code (IMC) and the International Energy Conservation Code (IECC), references to load calculation guidance in the ASHRAE Handbook, Fundamentals, would be replaced with requirements from a new ASHRAE standard developed with ACCA, ANSI/ASHRAE/ACCA Standard 183-2007, Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings. The standard establishes minimum requirements for building loads that are inclusive of as many procedural methods as possible while identifying core elements that impact heat loss and gains. Also approved was a proposal from ASHRAE to add new refrigerant classifications to the IMC from ANSI/ASHRAE Standard 34-2007, Designation and Safety Classification of Refrigerants. (Source: www.hvacwebconnection.com)

Sweden and UNEP work jointly to aid phase-out of HCFCs

The Swedish Environmental Protection Agency and the United Nations Environment Programme (UNEP) recently signed a partnership agreement in to launch joint activities that assist developing countries end their reliance on hydrochlorofluorocarbons (HCFCs), chemicals which were adopted as alternatives to the ozone-depleting chlorofluorocarbons, used in applications like refrigeration, air-conditioning and foam blowing. The new cooperation aims to raise the awareness of industry and governments in developing countries about commercially available alternatives to HCFCs and aims to convince them about the benefits of adopting such technology.

UNEP OzonAction launched a new section of its website – the HCFC Help Centre – on 16 November 2007 in response to the need for policy and technology information about HCFCs and their alternatives. Although HCFCs have much lower ozone-depleting potential than CFCs, they are nonetheless harmful to the ozone layer. Besides, many HCFCs have high global warming poten-

tials – up to 2,000 times that of carbon dioxide (CO_2). By supporting the replacement or avoidance of HCFCs in developing countries, the partnership will therefore contribute to protection of both the stratospheric ozone layer and the global climate system.

This initiative comes on the heels of a historic agreement that was negotiated in September 2007 under the Montreal Protocol, speeding the phase-out of HCFCs in developing countries, advancing the final phase-out date of these chemicals by 10 years. The result of the adjustment will mean that the benefits for the climate system, subject to alternatives adapted, will be considerable – preventing the release of up to the equivalent of about 25 billion tonnes of CO_2 over the coming decades, where zero or low GWP substitute technologies are adopted by countries. There is an opportunity to gain additional climate benefits in improved energy efficiency of replacement technologies and other improvements, increasing the cumulative climatic advantage to the equivalent of around 38 billion tonnes of CO_2. (Source: www.solutions-site.org)

China combats ills of air-conditioning boom

In the past one decade, the number of households owning air-conditioning (AC) units has tripled in China. More than 20 million units are now sold in the country each year. Couple that with the rapid trend towards technology-based industries, where heat-producing equipment like network servers demand low temperatures, and one could see how the demand for AC will keep growing.

Consider refrigerant, the life-blood of any AC unit. After years of relying on substances that contribute to the depletion of the earth's ozone layer, much of the developed world has recognized the need for heating, ventilation and air-conditioning (HVAC) systems that minimize the impact on the environment. In recent years, the HVAC industry has begun to introduce chlorine-free refrigerants to the market. These dramatically reduce environmental impacts and help provide for greater efficiency levels as well. Beyond 2010, new AC equipment using chlorine-containing refrigerant will not be manufactured in nations that are Parties to the Montreal Protocol. As greater numbers of AC units are placed into service, more electricity is needed to power them, adding on to the carbon dioxide (CO_2) released into the atmosphere.

China is now taking steps to limit the use of environmentally harmful refrigerants and to improve the energy efficiency of units. It recently ceased production and consumption of CFCs. The country is revising standards and guidelines on testing methods, energy efficiency, overall performance, safety and emissions for the HVAC industry. Specifically, the new efficiency standard will set a minimum level for AC equipment beginning in 2009, and the revision is expected to reduce the energy consumption by 15-25 per cent and limit CO_2 emissions. Recently, the country committed to limit the use of the more harmful refrigerant HCFCs before 2013 as part of a phase-out plan. However, China still produces more than half the global volume of chlorine-containing refrigerant today. It builds nearly 30 million AC units annually, one-third of which are exported using refrigerant with chlorine. Thus, many challenges remain to be tackled. (Source: www.forbes.com)

DuPont launches refrigerator labelling

DuPont has taken "aggressive action" to protect refrigerant patents by launching a sophisticated refrigerant labelling programme. The programme creates labels, which verify that DuPont equipment contains 100 per cent licensed Suva 410A or Suva 407C refrigerant and therefore can be exported and used worldwide. The label includes DuPont Izon technology in a bid to prevent copying, counterfeit or unauthorized use.

"We have invested significant resources and millions of dollars in research. The protection of our intellectual property enables us to continue to invest in innovative technologies for the air-conditioning and refrigeration markets," said Ms. Cynthia Green, vice president and general manager of DuPont Fluoroproducts. DuPont has warned importers, buyers, and users of air-conditioning equipment to ensure their systems contain refrigerants from authorized manufacturers. Potential ramifications of using unauthorized refrigerants include equipment seizure and destruction, monetary fines, negative publicity, and significant business interruption, warns DuPont. (Source: www.hvnplus.co.uk)

REFRIGERANTS/ AIR-CONDITIONING

New CO2-based heating/cooling equipment

At the recent Interclima 2008 event in Paris, two Japanese companies – Sanyo and Daikin – displayed new carbon dioxide (CO_2) heat pumps specifically designed for the European market. Sanyo presented a new model with a higher capacity, reaching 9 kW. All key components have been developed directly by Sanyo, including a performing two-stage rotary compressor. The heat pump will also be capable of heating up water at external ambient temperatures down to -25°C, while operating silently. On the other hand, Daikin presented a prototype for a CO_2 heat pump adapted to European conditions. The product, presented as "Tomorrow's Heat Pump", aims to serve space and water heating needs, providing an integral residential solution to replace current systems. The new model would be capable of heating water up to 85°C.

Among the showcased refrigeration technologies, several were based on the natural refrigerant CO_2. Vahterus of Finland, for instance, showcased a prototype of its cascade ammonia/CO_2 system for refrigeration applications. It showed how its plate-and-shell solution can be optimized for different uses, from flooded or direct expansion evaporators to cascade or condensers. Bitzer, the leading compressor manufacturer, presented information about its range of semi-hermetic reciprocating compressors for CO_2 applications. Bitzer compressors can serve a large range of commercial refrigeration applications. (Source: www.r744.com)

Refrigerant cycle apparatus

Sanyo Electric Co. of Japan has taken a United States patent on a refrigerant cycle apparatus in which a compressor, a radiator, pressure reducing devices, an intermediate pressure receiver and an evaporator are successively connected to one another in an annular form to constitute a refrigerant circuit, and is operated at a supercritical pressure on a high-pressure side. Carbon dioxide (CO_2), the refrigerant gas, is sucked into the compression element of the compressor, and is compressed to elevate the temperature and pressure. The gas is discharged into the radiator, where the heat gets radiated. The refrigerant that flows out of the radiator is throttled by the pressure reducing device and moved to the evaporator. In the evaporator, the refrigerant evaporates, and absorbs heat from its periphery to exert cooling function.

In this type of apparatus, when radiator temperature rises, refrigeration decreases, and hence the pressure on the high-pressure side needs to be raised to compensate for the drop. As a result, compressive power increases and performance decreases. Moreover, since the CO_2 refrigerant has less pressure loss as compared with other refrigerants, a pressure reduction step has to be incorporated. When a conventional electronic expansion valve is used as pressure reducing device, it is difficult to obtain desired throttling effects. If a capillary tube is used for the purpose, its length has to be increased or its diameter has to be reduced. A capillary tube of 0.6 mm will need to be 20 m long to be effective. The invention solves this technical problem by connecting the components serially in an annular form to constitute a refrigerant circuit. This helps reduce the inner diameter of the capillary tube to 0.1-0.4 mm. (Source: www.freepatentsonline.com)

High-efficiency centrifugal chillers

Daikin Applied Systems, a subsidiary of Daikin Industries of Japan, has unveiled six models (400-700 RT) of high-efficiency, two-stage centrifugal chillers used for applications such as industrial cooling and large air-conditioning equipment. The high-efficiency, two-stage centrifugal compressors used for the new models have adopted a two-stage economizer cycle for raising the cooling capacity with optimum control of refrigerant in two stages.

Using ODP-free R134a as refrigerant, the models have attained the industry's top-class COP of 6 – 6.3 for 400-700 RT chillers. The control panel has a touch panel and a large display screen. Also, by responding to general-purpose networks such as the BAC-NET and LON, it has become

possible to connect the chiller unit to a monitoring system, thus simplifying the management of operation/maintenance. (Source: www.jarn.co.jp)

ODS-free refrigerants

Coolman Corporation, Thailand, offers several ODS-free refrigerants. Cold11 is a replacement for R11 and R123 refrigerants. It is a proprietary blended, efficient and environmentally safe hydrocarbon refrigerant designed as a direct replacement. Its unique thermodynamic properties is claimed to provide a better cooling efficiency and operate at lower pressure condition, saving up to 30 per cent energy. It is also compatible with most common refrigeration materials and lubricants including CFC, HFC, HCFC, metal components, mineral and synthetic (Ester and PAG) lubricants, seals, gaskets, hoses, compressors and O-rings. No change or minimum modification is required to the existing refrigeration system.

Coolman has other natural hydrocarbon refrigerants in the "Cold" line with similar properties, such as: Cold410, a replacement for HFC410A; Cold407, a replacement for HFC407C; Cold 134, a replacement for R134a; Cold12, a replacement for CFC12; and Cold 22, a replacement for HCFC 22. *Contact: Coolman Corporation Co. Ltd., 99, Moo3, Bangbuathong, Nonthaburi, 11110 Thailand. Tel: +66 (29) 226250; Fax: +66 (29) 226240; E-mail: coolman@coolmangroup.com.* (Source: www.coolmangroup.com)

Climate control systems

Advantage Air Australia offers a wide range of air-conditioning systems. The Gen III system is a reverse cycle air-conditioning system that uses superior technology in controlling and maintaining individual room temperature. It is a domestic air-conditioning system that allows full control through a home-automation system, and constantly regulates the airflow and room temperature. The Gen III is 26 per cent more efficient than the traditional ducted system, and comes with external compressors that use non-ozone depleting refrigerants to deliver outstanding performance. It is offered with wired or wireless colour touch screen control.

Advantage Air also offers a wide range of diffusers – such as, Linear Elite Diffuser, StreemLine Diffuser, Half Streemline Grille, Baby Linear Diffuser, Silhouette Diffuser and Swivel Jet Diffuser – with adjustable blades to maximize air flow. *Contact: Advantage Air Australia Ltd., 6 Miles Road, Kewdale, WA 6105, (POB 91 Bentley, WA 6982), Australia. Tel: +61 (8) 9334 5700; Fax: +61 (8) 9258 7973; E-mail: contact@advantageair.com.au.* (Source: www.infolink.com.au)

New VSA scroll compressors

Tecumseh Power Company, the United States, has assembled a new line of products and solutions that range from the basic compressor to complete refrigeration systems for food and retail stores with their new scroll compressors taking the centre stage. The scroll compressors are supplied as bare compressors, and incorporated in both the outdoor condensing unit and the new outdoor max unit. Tecumseh has released a full line of R404A scroll compressors for medium temperature commercial refrigeration applications ranging from 2 hp to 6 hp. (Source: www.jarn.co.jp)

Multi-scroll air-cooled chillers

Coolmation is marketing the new Y Power scroll series of air-cooled chillers, manufactured by Rhoss, Italy. Available in cooling capacities from 368 kW to 523 kW, Y Power chillers have been specifically developed to run on the environmentally friendly refrigerant R410a and feature five or six scroll compressors to offer superior energy efficiency performance at part load. The chillers also feature a specially designed and constructed stainless steel plate evaporator to minimize counter flow and pressure drops. This increases the efficiency of evaporation and helps reduce energy consumption pro rata.

Other efficiency features of Y Power include microprocessor control and improved condenser fin-and-tube design. The onboard-control system manages efficient chiller operation. The special condenser fin formation and tube geometry create considerably better heat transfer and help cut the air pressure drop over the coil, so reducing fan motor size and energy consumption. *Contact: Coolmation Limited, Unit 7, Millstream Industrial Estate, Ringwood BH24 3SD, United Kingdom. Tel: +44 (1425) 478971; E-mail: enquiries@cooling4industry.co.uk.* (Source: www.acr-news.com)

SOLVENTS/ COATINGS

Vapour degreasing replacement

Cleaning Products Division of Petroferm Inc., the United States, has introduced LENIUM FEC, a replacement for hydrochlorofluorocarbons, trichloroethylene, methylene chloride, perchloroethylene and n-propyl bromide in open-top and vacuum vapour degreasing. LENIUM FEC is a very stable, non-inflammable solvent cleaner based on hydrofluorocarbons and methanol. It is effective in electronic cleaning applications, removing solder fluxes, pastes and ionic residues from circuit assemblies. It also effectively removes adhesives, buffing compounds, drawing oils, fluorinated fluids, greases, hydraulic oils, resins, lapping compounds, inks and silicone oils. LENIUM FEC and its components are approved by Significant New Alternatives Policy (SNAP) of the United States Environmental Protection Agency (EPA) as an alternative to ozone depleting substances. (Source: www.emsnow.com)

Wafer-level cleaning solution

Kyzen Corporation, the United States, will shortly launch its award-winning, advanced technology Micronox MX2302 wafer-level cleaning solution in Asia. Micronox MX2302 is an engineered semi-aqueous solvent blend designed to remove difficult flux and paste residues including lead-free, rosin, no-clean, and tacky flux from wafer bumps found in flip chip, chip scale and microBGA packages. MX2302 has proved effective in ultrasonic, centrifugal and semi-aqueous spray under immersion cleaning systems. Easy to use, it has excellent compatibility with all soldering materials, passivation layers (PI, nitride, silicon dioxide, etc.) and metal layers.

MX2302 is compatible with all commonly used materials in electronics assembly, wafer bumping and advanced packaging manufacturing and cleaning processes. It is a biodegradable, non-inflammable, non-corrosive solvent that contains no CFCs or HAPs. Kyzen has evaluated MX2302 for removal of nearly 300 soldering materials from the world's leading suppliers. *Contact: Kyzen Corporation, 430 Harding Industrial Drive, Nashville, TN 37211, United States of America. Tel: +1 (615) 8310 888; Fax: +1 (615) 831 0889.* (Source: www.emsnow.com)

Environment-safe ultrasonic cleaner

Cleansafe585, manufactured Petroferm Inc. in the United States, is a high-performance aqueous cleaning agent for use in ultrasonic cleaning. It effectively removes a wide range of soils such as buffing and polishing compounds, drawing and stamping oils, coolants, synthetics and other metal-working fluids. In addition, it effectively removes soils and particulate from components with complex geometries, such as orthopaedic implants and surgical devices and instruments.

Cleansafe585 is designed for low environmental impact. It does not contain phosphates, nonylphenol ethoxylates or alkyphenol ethoxylates. The product has a low chemical oxygen demand and is free of volatile organic compounds. Cleansafe-585 is distributed by Stowlin Croftshaw. *Contact: Stowlin Croftshaw, Radnor Road, South Wigston, Leicester LE18 4XY, United Kingdom. Tel: +44 (116) 278 5373; Fax: +44 (116) 277 2616; E-mail: sales@stowlin.com; Web: www.stowlin.com.* (Source: www.manufacturingtalk.com)

Equipment cleaner

Contact Cleaner 2000 VC, from CRC Industries in the United States, is an alternative precision cleaner designed to remove contaminants from electronic equipment. An alternative to cleaners based on HCFC 141b when sensitive plastics are not a concern, the product has no flash point, says the manufacturer. It contains no Class I or Class II ozone depleting chemicals, and is non-inflammable. In addition, it is NSF K2 registered for use in meat and poultry plants. The product is not recommended for use on polycarbonate or Noryl type plastics. It is available in a 16-oz aerosol can. *Contact: CRC Industries, 885 Louis Drive, Warminster, Pennsylvania, PA 8974-2869, United States of America. Tel: +1 (215) 674 4300; Fax: +1 (215) 674 2196; Website: www.crcindustries.com.* (Source: www.ecmweb.com)

Multi-purpose cleaner/degreaser

HP™, from American Polywater Corporation in the United States, is a specially formulated solvent for multi-purpose industrial and maintenance cleaning. It replaces ozone-depleting CFCs, trichloroethane and other carcinogenic chlorinated solvents. HP effectively cleans industrial grimes, greases, transformer oils, lubrication fluids, tars, silicone, adhesives and fluxes. It evaporates with no residue and is essentially non-conductive. HP is suitable for use in electrical and communications maintenance as a replacement for 1,1,1-trichloroethane, but is slower drying.

Other advantages claimed for the product are:

- One cleaner that serves all electrical and communications cleaning needs;
- Free of all ozone-depleting solvents;
- Harmless to most plastics, including polycarbonate, ABS and polyethylene; and
- Non-corrosive, non-freezing, non-staining to metals.

HP can be used as a spray, wipe or immersion bath, and is effective at room temperature. For faster cleaning it can be heated to 52°C. *Contact: American Polywater Corporation, P.O. Box 53, Stillwater, MN 55082, United States of America. Tel: +1 (651) 430 2270; Fax: +1 (651) 430 3634.* (Source: www.polywater.com)

Quick-drying cleaner/degreaser

Triple Solutions Inc., Canada, offers a solvent for ultrasonic cleaning and vapour degreasing. A replacement for trichloroethylene, TRISOH 101 is suitable for cleaning and/or degreasing machine parts, electrical parts, metallic components, dies and moulds, stencils, printing ink, etc. It is an economical, powerful, ozone-friendly and easy to use choice in replacement cleaning agents. The advantages of TRISOH 101 include: RoHS free; non-inflammable and quick drying; does not leave any residue; working temperature of 47°C; and has no effects on stainless steel and has passed copper corrosion test. *Contact: Triple Solutions Inc., 1110 Finch Avenue W. #2, Toronto, Ontario M3J 2T2, Canada. Tel: +1 (905) 910 0541; Fax: +1 (901) 471 4011; E-mail: info@triplesolutions.biz.* (Source: www.triplesolutions.biz)

AEROSOLS

Food-grade deodorant

PureAyre®, produced by Clean Earth in the United States, is an environmentally safe, food-grade odour eliminator that kills bad smells without unnatural chemicals or perfumes. The spray delivers plant-derived enzymes that break the chemical bonds of odour-causing substances. It can safely be sprayed near infants or food or even directly on a pet's fur. Because PureAyre is sprayed via pumping action, it does not deplete the ozone layer or contain any harmful chemicals as propellant. *Contact: Clean Earth Inc., 1851 Central Pl S, Kent, WA 98030, United States of America. Tel: +1 (877) 787 3297; Fax: +1 (877) 870 4051.* (Source: sev.prnewswire.com)

Foam-forming formulation

Collegium Pharmaceuticals Inc., the United States, has patented a stable topical alcohol-free aerosol foam for pharmaceuticals intended for topical administration. The foam-forming formulation is an emulsion that contains an HFA propellant, one or more keratolytic agents, and optionally one or more additional pharmaceutically active agents.

The emulsion contains an oil phase and an aqueous phase. The active agent(s) may be dissolved in either phase or dispersed in the emulsion. The oil phase may contain, at least in part, the HFA propellant. The foam is stable on the skin at body temperature, and disappears into the skin upon rubbing or after prolonged standing. The composition can also contain one or more pharmaceutically acceptable excipients such as surfactants, emollients, emulsifiers, stabilizers, pH stabilizing agents, chelating agents, humectants, preservatives and combinations thereof, which may be present in the oil phase and/or the aqueous phase.

The inert non-flammable HFA propellant does not require the use of additional co-solvents or co-propellants. Besides their elevated volatility and vapour pressure, the HFA propellants have been found to provide an additional benefit in terms of reduction of apparent odour of active ingredients. They also mask colour by the formation of stable foams. (Source: www.wipo.int)

Development of a pMDI formulation with budesonide

Valois SAS, France, has developed a budesonide formulation based on hydrofluoroalkane (HFA) propellant to administer 220 µg of budesonide per shot. The formulation was designed to be physically and chemically stable and give reproducible aerosol performances. The stability of the resulting metered dose inhaler (MDI) was also evaluated under accelerated storage conditions (40°C and 75 per cent RH) up to six months to compare the formulation with Pulmicort® chlorofluorocarbon product in terms of *in vitro* performances.

Excipients selected for evaluation were polyethylene glycol (PEG) 300 and ethanol. The amount of micronized budesonide introduced into the formulation vessel was such that the appropriate dose of budesonide would be delivered to the patient. Pressurized MDIs (pMDIs) were prepared by introducing the HFA budesonide suspension formulation as a one-step filling process through a metering valve. Promising formulations were evaluated with regard to drug stability upon storage, delivered dose uniformity (DDU) over 10 actuations at 28.3 l/min and particle size distribution using a Next Generation Impactor at 30 l/min.

Valve types and materials combined with various actuator outlet orifice diameters were also evaluated. A first set of results was obtained with a DF30/50 RCU valve, which had polyacetal plastic components and nitrile rubber and thermoplastic elastomer gaskets combined with a 0.7 mm outlet orifice diameter actuator. A second set of results was obtained with a DF316/50 RCU valve with polyacetal plastic components and nitrile rubber and thermoplastic elastomer gaskets combined with a 0.5 mm outlet orifice diameter actuator.

PEG 300 at levels less than 0.5 per cent w/w was found to ensure good product performances and valve functioning throughout the MDIs' life. There was no sign of valve sticking. Ethanol at levels less than 1 per cent w/w helped dissolution of PEG 300 without causing significant solubilization of budesonide. The level of ethanol selected also helped reduce rapid formation of coarse flocks. This formulation was readily re-dispersible and avoided irreproducible dosing of the drug. The stable suspension of particulate budesonide was aided by employing a mixture of HFA propellants closely matching the density of the micronized budesonide. (Source: www.ijpsonline.com)

Desiccant for medicinal inhalants

Active packaging specialist Multisorb Technologies, the United States, is developing a new desiccant product that will offer a novel built-in solution to producers of dry powder and metered dose inhalers (MDIs). The company's latest offering for the pharma industry involves incorporating a desiccant within a thermoplastic that makes the inhaler structure. "Rather than having a built-in desiccant in an available space, we can take polysorb, which is 40 per cent molecular sieve desiccant, in a thermoplastic and make non-functional components," explained Mr. Adrian Possumato, global manager of Multisorb's pharmaceutical business.

Making the desiccant part of the physical structure of dry powder inhalers, actuators or aerosol-pressurized MDIs offers an alternative moisture management solution to manufacturers that can solve some of the issues common with more traditional desiccant products. For example, there can often be a problem when desiccant canisters are used in inhaler products, because when the consumers shake the device they hear movement of particles and assume there is still medication left in the inhaler – even if there may be a counter on the inhaler showing that the device is empty.

Although Multisorb has developed a compressed desiccant tablet in coated solid form which offers a solution to this problem, incorporating desiccant within the plastic inhaler structure still has distinct advantages as an alternative solution, for instance, in the case of inhalers based on the new propellant hydrofluoroalkane (HFA), which is rapidly gaining market. The difficulty with HFA is that it absorbs moisture very readily. The dosage chamber can pull in moisture, hydrating and crystallizing the drug, which means the drug can't pass through the valve system. Desiccant-enriched thermoplastic could offer a solution to this. The novel thermoplastic desiccant solution that the company is hoping to bring to the pharma industry could find particular application in the growing field of respiratory drug delivery. (Source: www.in-pharmatechnologist.com)

HALONS

Fire protection system

The global technology company 3M recently presented its revolutionary new fire safety systems. Among these is the Novec™ 1230 Fire Protection Fluid, which is a Halon alternative with less negative environmental impacts than other fire fluids. It has a number of safety advantages such as: electrically non-conductive and non-corrosive; fast vaporization to gas during discharge; does not damage electronics, electronic media or delicate mechanical devices; and safe to use on energized equipment. These safety attributes mean the Novec 1230 Fire Protection Fluid is a viable option for protecting data processing and control rooms, archives and museums, and the telecommunications, marine, and oil and gas industries. (Source: www.albawaba.com)

Apparatus for fine mist spray of effervescent liquid

The United States Navy has patented an apparatus, invented by Mr. Joseph E. Wolfe, for creating a fine liquid mist, and a method of forming an effervescent fine mist of non-toxic, non-combustible gas bubbles for application in fire-fighting operations. The apparatus includes a container capable of holding fluid, a perforated basket and a porous bag within the container to hold the reactant, a liquid supply system connected to the container, a mixing chamber connected to the container, and a convergent/divergent nozzle connected to the mixing chamber. The method of forming an effervescent fine liquid mist includes mixing liquid and chemical reactant to form gas bubbles, mixing the liquid and the gas bubbles to form a two-phase fluid flow, and directing the two-phase fluid flow through a convergent/divergent nozzle. Such a fine mist system has very favourable characteristics as a replacement for Halon systems.

Typically, such systems include nozzles that require high-pressure spraying of the liquid and the gas, which is undesirable. Another problem with these mixing nozzles is that the liquid and gas must be sprayed through fine holes of a small diameter, which can easily clog or wear away. Liquid-only water spray nozzles create water droplets by deflecting the water flow just ahead of the spouting aperture. As the droplet size is relatively large, a desirable fine mist cannot be achieved. This current apparatus employs a low-pressure, reliable, liquid/gas mixing nozzle earlier developed by Mr. Wolfe. The nozzle structure effects an extremely fine, liquid atomization with low pressurization of the liquid and gas that are delivered to the nozzle. Furthermore, the fluid and gas are delivered through relatively large apertures so that wear and clogging are minimized. (Source: www.freepatentsonline.com)

Fire extinguishing using hydrofluoroethers

Great Lakes Chemical Corp., the United States, has secured a European patent on a method that uses hydrofluoroethers (HFEs) as fire extinguishing agents. Highly fluorinated, saturated and unsaturated HFEs are non-ozone-depleting, efficient and economical fire extinguishing agents. HFEs could be used alone or in blends with other fire extinguishing agents in total flooding and portable systems. The method of this invention involves introducing to a fire a saturated, fluorinated C_4 or C_5 HFE in appropriate concentration, preferably 5-10 per cent in air, on a v/v basis. Suitable extinguishing agents (blends) for admixture with the HFEs include CF_3H, CF_3CHFCF_3, $CF_3CF_2CF_2H$, $CF_3CH_2CF_3$ and CF_3CF_2H. The HFEs of this invention may be produced via numerous routes. *Contact: Great Lakes Chemical Corporation, One Great Lakes Blvd., West Lafayette, IN 47906, United States of America.* (Source: www.freepatentsonline.com)

High-pressure CO_2 fire extinguishing system

Carbon dioxide (CO_2) is an inert gas that has no destructive effect on most materials, quickly dissipates after fire is extinguished and leaves no trace. In addition, CO_2 does not conduct electricity and has good electrical insulation properties, and its price of fire extinguishing agent is low. Because of these reasons, CO_2 fire extinguishing system has found favour as a fire extinguishing technology and a Halon substitute. It can put out

electrical fire, liquid fire, melted solid fire, solid surface fire, part deep-seated solid fire and gas fire. It is recommended in places where water-logging is not desirable, where it is difficult to clean after fire extinguishing agent is sprayed, where the protected objects are electric equipment, etc.

The CO_2 fire-fighting system, offered by Beijing North Electromechanic Industries Co. of China, is composed of an automatic fire alarm system and fire extinguishing equipment. The fire extinguishing equipment allows automatic and manual operation. The main technical parameters are:

- Protection area: 500 m^2
- Working temperature: 0-49ºC
- Designed working pressure: 15 MPa
- Filling density: 0.6-0.67 kg/l
- Volume of reservoir vessel: 40 l or 70 l
- Working pressure of nozzle: 2.2 MPa

Contact: Beijing North Electromechanic Industries Co., #18 Huoxing 3 Street, Huoxian Town, Tongzhou, Beijing, China 101109. Tel: +86 (10) 8058 3410; Fax: +86 (10) 8058 3410. (Source: ttxf.en.madeinchina.com)

Water-based fire extinguishant

Hartindo AF31 was developed after many years of research, testing and analysing the drawbacks of all conventional fire fighting media such as water, dry powder, foam, Halon and carbon dioxide, says its manufacturer Newstar Chemicals, Malaysia.

Hartindo AF31 is a water-based, biodegradable, non-corrosive and non-toxic chemical with zero ozone-depleting potential. It requires no special clean-up and is electrically non-conductive. In portable form, it is effective on all classes of fire (Class A, B, C, D and F/K). Hartindo AF31 not only puts out fires, but also renders objects non-inflammable, preventing re-ignition. Because of this, it is effective media for creating fire breaks when fighting forest fire. Conventional water or foam dispersal systems can be used to deliver it. *Contact: Newstar Chemicals (M) Sdn. Bhd., No. 5, Block A, Jalan SS13/5, 47500 Subang Jaya, Selangor, Malaysia. Tel: +60 (3) 5621 2168; Fax: +60 (3) 5621 1168; E-mail: office@newstarchemicals.com.* (Source: www.newstarchemicals.com)

FUMIGANTS

Biological alternative to methyl bromide

Researchers from the Bio-control Centre of Plant Diseases and Pests of Hebei Province, China, have developed and tested a natural biological product as an alternative fumigant to methyl bromide (MeBr) on strawberry crop. Kangdi-3 was tested in strawberry greenhouses in two provinces in China. MeBr at a normal dosage of 500 kg/hm^2 and Kangdi-3 at three dosages of 750, 1,500 and 2,250 kg/hm^2 were tested. Plots without any treatment were used as the control. During the growing stage, assessments were made on fungal communities in rhizosphere, growth status of strawberry, the disease levels on roots as well as the yields. The results showed that Kangdi-3 significantly reduced the quantity of fungi and the disease index, while enhancing strawberry growth and yields, as compared with the untreated control. The researchers therefore concluded that Kangdi-3 is a potential MeBr substitute to control replant diseases in strawberry. *Contact: Mr. Keqiang Cao, Bio-control Centre of Plant Diseases and Pests of Hebei Province, College of Plant Protection, Agricultural University of Hebei, Baoding 071001, China. E-mail: ckq@hebau.edu.cn.* (Source: www.springerlink.com)

Evaluation of fumigation and surface seal methods

Researchers at the United Sates Department of Agriculture's Agricultural Research Service conducted a field trial was in a peach orchard replant field to examine the effects of fumigation methods (shank-injection vs. subsurface drip-application treatments) and surface treatments (water applications and plastic tarps) on emissions of 1,3-dichloropropene (1,3-D) and chloropicrin (CP) from shank-injection of Telone C-35 and drip application of InLine. Treatments were control (no water or soil surface treatment); standard HDPE tarp, virtually impermeable film (VIF) tarp, and pre-irrigation, all over shank injection; and HDPE tarp over and irrigation with micro-sprinklers before and after the drip application.

The highest 1,3-D and CP emission losses over a two-week period were from the control (36 per cent 1,3-D and 30 per cent CP) and HDPE tarp (43 per cent 1,3-D and 17 per cent CP) over shank injection. Pre-irrigation four days before fumigation and VIF tarp over shank injection had similar total emission losses (19 per cent 1,3-D and 8-9 per cent CP). The HDPE tarp and irrigations over sub-surface drip-application treatments resulted in similar and the lowest emission losses (12-13 per cent 1,3-D, and 2-3 per cent CP). Lower fumigant concentrations in the soil-gas phase were observed with drip-application than in the shank-injection treatments. All treatments provided 100 per cent kill to citrus nematodes in bags buried from 30- 90 cm depth. Pre-irrigation and drip application appeared effective in minimizing 1,3-D and CP emissions. (Source: jeq.scijournals.org)

Heat treatment equipment for insect control

For years, methyl bromide (MeBr) has been the chemical of choice for fumigating insect infestations in bins, silos, and hard-to-access storage and processing areas. However, MeBr will soon be phased out for its ozone-damaging properties. As an MeBr alternative, spot insect heat treatment with Armstrong International's steam heater is a cost-effective method of controlling insect outbreaks without suspending regular operations.

Portable and permanent heaters use plant steam to provide quick, on-demand heat treatments even during production hours. Heat treatment typically costs less per application than chemical treatment. Furthermore, less downtime means greater production and thus more profit. *Contact: Armstrong International Inc., 816 Maple Street, Three Rivers, MI 49093, United States of America. Tel: +1 (269) 273 1415; Fax: +1 (269) 278 6555.* (Source: www.armstronginternational.com)

Recycling and recovery of methyl bromide fumigant

Halozone Technologies, the United States, has patented a method that captures unused methyl bromide (MeBr) from a fumigation cycle by adsorption on a molecular sieve for reuse. Recovery of MeBr is by desorption with hot gas without the need to purge the fumigation chamber with air. The loss of MeBr to the atmosphere is minimal. The method of MeBr recovery and reuse comprises the following steps:

Following fumigation, the gas remaining in the chamber is circulated over a molecular sieve bed in an adsorption unit to adsorb MeBr. The adsorption unit is blocked off, and the fumigated product is removed from the chamber. Another batch of product for fumigation is loaded into the chamber. Hot air is introduced into the adsorption unit to desorb the previously adsorbed MeBr, thus forming an air/MeBr effluent. The effluent is recirculated in the chamber and the adsorption unit until an equilibrium is reached between the concentration of MeBr in the chamber and the effluent from the adsorption unit. Sufficient MeBr is introduced into the chamber to make up an amount needed for effective fumigation. If for any reason, the reuse of adsorbed MeBr is not desirable in the fumigation chamber, the effluent may be cooled sufficiently to recover liquid MeBr to use for other purposes. (Source: www.freepatentsonline.com)

A new target site for the fumigant dimethyl disulfide

Dimethyl disulfide (DMDS), a plant-derived insecticide, is a promising fumigant as a substitute for methyl bromide. To further understand the action of DMDS, researchers from France's National Institute of Agricultural Research and Research Institute for Insect Biology examined its effect on cockroach's calcium-activated pacemaker neurons – octopaminergic neurosecretory cells, called dorsal unpaired median (DUM) neurons – of using whole-cell patch-clamp technique, calcium imaging and antisense oligonucleotide strategy. The researchers found that, at low concentration (1 µM), DMDS altered calcium-activated potassium currents (IKCa) and effected changes in $[Ca^{2+}]_i$. DMDS reduced amplitudes of both peak transient and sustained components of the total potassium current. IKCa was then confirmed as a target of DMDS by using iberiotoxin, cadmium chloride, and pSlo antisense oligonucleotide. The researchers also found that DMDS induced a $[Ca^{2+}]_i$ rise in DUM neurons, and concluded that DMDS affects multiple targets, which could be an effective way to improve pest control efficacy of fumigation. (Source: jpet.aspetjournals.org)

RECENT PUBLICATIONS

Solvents Database, 3rd Edition

The *Solvents Database* is an extensive compilation of over 140 properties of more than 1,627 solvents, 65 per cent more than the previous edition, allowing the user to search for information about specific solvents or specific properties. There are five sections in this third edition instead of the three in the previous: General Properties, Physical Properties, Environmental, Health and Safety, and Use. The database is useful for analytical chemists, environmental engineers, civil engineers, industrial engineers, industrial hygienists, safety scientists, and medical/biological researchers. Legislators and inspectors can also use the database to define and implement technically correct public safeguards on solvent use, handling, and disposal.

Contact: William Andrew Inc., 13 Eaton Avenue, Norwich, NY 13815, United States of America. Tel: +1 (607) 337 5080; Fax: +1 (607) 337 5090; E-mail: sales@williamandrew.com.

Blowing Agents and Foaming Processes 2007

The conference "Blowing Agents and Foaming Processes 2007" was dedicated to the critical role of blowing agents in foamed plastics and rubber. Foamed materials are being enhanced to replace dense solid polymers, reducing weight and costs. Chemical and environmental legislation is constantly changing and the foam industry is adapting to meet demands. The proceedings include papers from industry leaders such as BASF, Solvay, 3M Europe, Zotefoams, Trexel and several others, and will appeal to those involved in the formulation and application of blowing agents and techniques to produce expanded or foamed polymer substrates.

Contact: ChemTec Publishing, 38 Earswick Drive, Toronto, Ontario M1E 1C6, Canada. Tel: +1 (416) 265 2603; Fax: +1 (416) 265 1399; E-mail: info @chemtec.org.

TECH EVENTS

20-21 May
Berlin
Germany

The 10th International Conference on Blowing Agents and Foaming Processes 2008
Contact: Sharon Garrington, Conference Organiser, Conference Department, Rapra Technology Ltd., The United Kingdom.
Tel: +44 (1939) 250 383;
Fax: +44 (1939) 252 416;
E-mail: sgarrington@rapra.net.

2-4 Jul
Singapore

HVAC Asia 2008
Contact: HQ Link Pte Ltd., 205, Henderson Road, #03-01, Henderson Industrial Park, Singapore 159549.
Tel: +65 6534 3588;
Fax: +65 6534 2330;
E-mail : hqlink@singnet.com.sg;
Website: www.hvacrseries.com.

12-17 Jul
West Lafayette
United States

Purdue Compressor Engineering and Refrigeration and Air-Conditioning Conferences
Contact: Mrs. Virginia D. Freeman, Program Secretariat for The Ray W. Herrick Laboratories, Purdue University, 140 S. Martin Jischke Drive, West Lafayette, IN 47907-2031, United States of America.
Tel: +1 (765) 494 6078;
Fax: +1 (765) 494 0787;
Email: herlconf@ecn.purdue.edu;
Website: www.ecn.purdue.edu.

21-24 Aug
Xi'an
China

6th International Conference on Compressors & Refrigeration 2008
Contact: Prof. Xueyuan Peng, Secretary, School of Energy and Power Engineering, Xi'an Jiaotong University, Xi'an 710049, China.
Tel: +86 (29) 8266 3785;
Fax: +86 (29) 8266 8724;
E-mail: sec@iccr2008.org;
Website: www.iccr2008.org.

21-26 Sep
Chengdu
China

8th International Conference on Controlled Atmosphere and Fumigation in Stored Products
Contact: Ms. Li Yue, Chengdu Grain Storage Research Institute, State Administration of Grain Reserves, No. 95, Huapaifang Street, Chengdu 610031, China.
Tel: +86 (28) 8766 0408;
Fax: +86 (28) 8766 1523;
E-mail: caf20088th@yahoo.com.cn.