

 FACULTY OF SCIENCE NEWSLETTER

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# Breaking News Poisonous Milk Powder Incident

by Professor W K Chan, Department of Chemistry

SUE NO. 第 六 期

## FROM THE EDITOR

#### Dear readers,

The poisonous milk powder incident is making a big impact nation-wide.

In this issue of science@HKU, our chemists will tell you more about the nature of chemical compound involved in this incident. Some of our alumni have participated in the drug testing of both the horses and the athletes during the Olympics Equestrian Events. You can find out what they are doing in this issue, too.

Also, this is the second time for the Faculty to conduct faculty-wide undergraduate admission. The results are very encouraging. The average score of 2AL1AS subjects of JUPAS applicants admitted in 2008 is 3.66 (A=5, B=4, C=3, D= 2, E=1, others=0) for BSc, and 4.94 for BSc (Actuarial Science) students. Besides, the number of top performers admitted to both programmes has increased significantly.

Last but not least, our Faculty will reach its 70<sup>th</sup> year in 2009. Alumni, please watch out for the series of events to cerebrate this happy moment.

Yours sincerely,

Dr H F Chau Chief Editor



The recent "poisonous milk powder" cases in China have drawn lots of attention of the public about the safety of dairy products in China. According to more recent news report, other than milk powder, dairy products such as ice-cream bar may also contain melamine, the chemical that is considered to be the source of the safety problems.

### What is Melamine (三聚氰胺)?

Melamine (also called Cyanuramide, Cyanuric triamide; IUPAC name: 2,4,6-Triamino-1,3,5-triazine)

is a chemical that has various important applications in industry. It is produced by the condensation of urea:



Melamine is one of the major starting materials in the production of melamine-formaldehyde, which can be used as an adhesive or for the production of resins. The synthesis of this product is via the crosslinking reaction between melamine and formaldehyde:



The resulting product has superior hardness and is resistant to moisture and heat, and therefore the resins are useful in the manufacture of dinnerware and decorative laminated plastic sheets for tabletop.

Due to its high nitrogen content (66.6 % by weight), addition of this chemical to food products can boost up the total nitrogen content, which is commonly used as an indicator of protein content (and hence the nutrition value) in food products. However, the actual protein content has, of course, not been increased by this "cheating".

It was reported that the consumption of dairy products added with melamine has caused several adverse health effects to children. According to the Materials Safety Data Sheet [1], the target organs affected by melamine are bladder and kidney. Animal tests also showed that chronic exposure to melamine resulted in the development of tumor in kidney, ureter, and bladder.

[1] Materials Safety Data Sheet, Sigma-Aldrich Company, version 1.8, 2006.

# HKU Chemistry Graduates and the Beijing 2008 Olympic Equestrian Events



I he Olympic and Paralympic Equestrian Games were held very successfully in Shatin and Beas River from August 8 -21 and September 7 - 11 respectively. One of the reasons that Hong Kong was invited to co-host the Olympic and Paralympic Equestrian Games is that Hong Kong has a strong team of experts and a world-class racing laboratory, the Racing Laboratory of the Hong Kong Jockey Club (HKJC), for doping control testing.

In this newsletter, we are happy to have Dr Emmie N M Ho, Racing Chemist and Dr Colton H F Wong, Chemist, who acquired their PhD degrees in Chemistry at HKU in 2001 and 2003 respectively, and are now working in the HKJC racing laboratory, to share with us their experience and excitement in participating in the Beijing Olympics Equestrian Games.

**Question 1:** It is truly a privilege for Hong Kong to have hosted such a high level competition here. There must be a lot of preparation work for the racing laboratory before the games started. Can you share with us what your team had to get ready for these spectacular games?



Emmie: As you know, our Racing Laboratory is a world class drugtesting facility, which has been accredited to the ISO/IEC Guide 25 International Standard for chemical testing. Since 2001, it has been appointed by Fédération Equestre Internationale (FEI) as its sole Reference Laboratory in Asia. Our Racing Laboratory actually has a lot of experiences in doping control for high-level competitions including Olympic Games. For example, in 2004 Athens Olympic Games, our laboratory performed referee sample analyses for three positive samples; in 2002 Busan and 2006 Doha Asian Games, our laboratory was also responsible for testing of all equestrian samples. Though we already have a lot of experience and good reputation in doping control, we, like the athletes, do have some world record in the Beijing Olympic Games to achieve as well. In order to avoid inadvertent medication positive for this year's equestrian games, we provided the first ever Post-Arrival Elective Testing (PAET) for the horses so as to ensure that they are clear of medication used before the games. This service has never been provided in any of the Olympic Games before. The PAET was very much welcomed and proved to be helpful to the participants in better knowing the medical status of the horses. Another world record we wanted to set is the shortest period for reporting the sample testing. As HKJC has the advantage of having on-site medication and doping control facilities, we hope we could provide the fastest turn-around time ever met in the Olympics Games which is an average of 7 days for reporting negative samples and 12 days for positive samples (compared with 17 - 21 days for positive samples in 2004 Athens Games). In fact, we have done even better than that. The turn-around times were much shorter than what we anticipated.



**Colton:** In order to achieve the above goals, we have acquired extra equipment and prepared contingency plans. Besides, teamwork is very important. All of our staff members were willing to give up leaves and to work overtime during the entire Olympic Games and Paralymic Games.

**Question 2:** Was doping in the past Olympic equestrian events a serious problem? What anti-doping measures have been taken here in HK?

**Colton:** There were four positives from equestrian events in the 2004 Athens. Actually only one of the four cases was a genuine doping case (zuclopenthixol). The other three were due to misuse of medications (betamethasone, diphenhydramine metabolite & flunixin). In fact, these three drugs are in the list of FEI elective testing program. If PAET was in place at that time, these three cases might have been avoided. As for this year, you can see from the news, we have 6 positives in the Olympic Games. The official enquiry is still under way.

#### Question 3: Are there differences in the doping tests (in the anti-doping measures) between the regular horse racing and the Olympics games?

Emmie: I am afraid the test scope is strictly confidential and therefore I am not allowed to disclose the details because that would reveal our detection capabilities and might probably give clues to others for doping purposes. However, I can tell you that different scopes may be used for different types of samples. For instance, for new horses we need to test only for the presence of long acting drugs because a new horse requires quite a long period of training time before its first race. Therefore fast acting drugs need not be tested in this case.

**Question 4:** How did you find this invaluable experience in participating in the Beijing 2008 Olympics? **Colton:** Both of us, together with all our colleagues, were so happy and excited to have participated in the Games. It was just amazing that the equestrian games were actually held in the field that is so close to our laboratory. We could feel very much the excitement there even when we were working in the lab.

Emmie: Absolutely. Though the doping control testing in the Olympic Games has been an extremely demanding and challenging task, this is truly our honour that we could make this contribution to the Games. Despite the long working hours (in fact some of us had been working consecutively for more than a month without taking a single-day rest) and the awful take-away meals, we enjoyed participating in the Olympics very much. We would like to say thank you to our team because without excellent team work and mutual understanding, we could not have achieved the success we have reached today.

# When Natural Hazards Become Natural Disasters: Feeling the Power of Our Earth

As I pen this article I am looking out the window at the wind and rain brought by Typhoon Nuri, the first Storm Signal No. 9 hoisted in 5 years. Fittingly as I sit through typhoon Nuri I feel it is time to reflect on a year where humanity has at many times, felt the immense power of the earth we live on.

Natural hazards become disasters when they cause socio-economic loss. The month of May, 2008 provided three examples of the devastating power of natural hazards, with hidden costs that have the longest repercussions. On May 2 a volcanic eruption in southern Chile cost more than 150,000 lives and estimated economic losses of \$100 billion USD. As this volcano erupted a large tropical cyclone on the other side of the world had formed in the Bay of Bengal. The tropical storm developed into a devastating cyclone (Nargis) that struck Myanmar in early May. This was followed by the equally devastating Sichuan earthquake, which occurred just 8 days later. I have summarized each of these events here starting with a distant but globally important volcano.

#### The Chaitén volcano

Chaitén is a volcanic caldera 10 kilometres northeast of Chaitén town in southern Chile. On May 2, 2008 the volcano erupted for the first time in more than 9,000 years. The Chilean Government began an evacuation of people from the area. Through May to July eruptions continued along with consistent ash fall, intermittent small earthquakes and pyroclastic flows. Forests around the volcano were burned by pyroclastic flows or flattened by explosions and large parts of Southern Argentina and Chile were coated with ash. Often the ash results in lahars (mud flows) and rain in late May caused flooding in Chaitén damaging many buildings, and completely filling the original course of the Chaitén River. Over the subsequent weeks, the river excavated a new course destroying part of the town by July 2008.



Volcanic ash and gases flow from the eruption of Chaitén volcano, Chile, flow across the southern part of South America. The image was taken from MODIS on the Terra satellite.

#### Cyclone Nargis

Cyclone Nargis was a strong tropical cyclone that caused the worst natural disaster in the recorded history of Myanmar. The cyclone and storm surge made landfall on May 2, causing catastrophic destruction and at the time of writing at least 146,000 people are listed as dead with thousands more people still missing. It is likely that due to problems with aid dispersion, politics, access and the ongoing threat of disease and famine that the death toll may exceed 1 million within 2 years of the disaster. Damage in what is already an underdeveloped country is estimated at over \$10 billion (USD).



On April 15 (top), rivers and lakes are sharply defined. The numerous channels of the Irrawaddy delta are observed on the left-hand side of the image. Cyclone Nargis came ashore across the Mouths of the Irrawaddy and followed the coastline. The entire coastal plain is flooded in the May 5 image (bottom). Source: NASA; images and caption courtesy: the MODIS Rapid Response Team.

#### The Sichuan earthquake

The 2008 Sichuan earthquake, which measured 7.9 Mw according to USGS, occurred at 2.28pm (local time) on May 12, 2008 in Sichuan province of China (the epicenter was in Wenchuan County). The true toll of this event may never be known. As I write, at least 70,000 people have lost their lives, 370,000 have been injured and more than 18,000 remain missing. It is apparent that more than 45.5 million people in 10 provinces and regions were affected. The total economic loss was estimated at \$86 billion (USD).

#### How did it happen?

The Sichuan earthquake occurred as the result of motion on a large fault system on the northwestern margin of the Sichuan Basin. The earthquake's epicenter and focal-mechanism are

### by Dr A Switzer, Department of Earth Sciences

consistent with it having occurred as the result of movement on the Longmenshan fault or a tectonically related fault. The earthquake reflects tectonic stresses resulting from the convergence of crustal material slowly moving from the high Tibetan Plateau, to the west, against strong crust underlying the Sichuan Basin and southeastern China.

The earthquake occurred as a result of strain in the earths crust as the India plate pushed against the Eurasia plate. The two plates converge with a velocity of about 50 mm a year, lifting the Tibetan Plateau and creating the mountainous terrain of the Himalayas. The resulting stress caused an upward movement along the Longmen Shan or other nearby faults on the Sichuan Basin northwestern margin.



A bank building in Beichuan, China after the earthquake. Remarkably a young girl was reportedly found alive in the ruins more than 4 days after the earthquake.

Natural hazards have both fascinated and horrified humanity for many thousands of years, and are important to the future of humanity. Entire civilisations have fallen victim to natural hazards such as volcanoes, tsunami, drought and flood. Recently the Department of Earth Sciences has added a broadening course in natural hazards and geological risk to provide students with a background on the varied and dynamic nature of Earths natural hazards and the inherent risks associated in living within their reach.

So as I finish this article, Typhoon Nuri has passed Hong Kong with only a few minor incidents. I ponder when the next direct hit will come?

### Reference:

http://earthobservatory.nasa.gov/



## Research of Organic Opto-Electronics in the Faculty

Organic thin-film transistor array fabricated entirely by printing process on a flexible plastic film. Source: National Institute of Advanced Industrial Science and Technology, Japan

Modern people are enjoying the benefits of using many different electronic appliances, ranging from digital watches, personal computers, mp3 players, mobile phones, light emitting diodes (LED), and others. New generations of products with enhanced performance and more functions are released to the market every year. The hearts of all these electronic equipments are made of inorganic semiconducting materials, of which silicon is the most representative example. However, the cost of producing and processing electronic grade silicon is very high. In addition, silicon is a highly rigid material that has little mechanical flexibility. In recent years, scientists have turned their attention to explore new semiconducting materials for modern electronics.

Among all the potential new materials, organic materials are promising candidates for the next generation of semiconductors for electronics in the future. In general, organic compounds have lower production and processing cost, and it is easier to optimize the properties OLED Prototype Devices Developed at HKU-CAS joint laboratory on new materials



of organic semiconductors by systematically varying the structure of molecules. They are also more flexible and ductile, which allows the production of very thin and flexible electronic equipment. Although the road to success may be quite long, there have been some breakthroughs recently. A Japanese electronic company has announced the commercialization of a display screen made of organic materials. The thickness of the screen is less than 1 mm, which is much thinner than the currently used LCD monitors. However, the cost is also very high at the moment. It is expected that in few years time, larger and cheaper

TVs or monitors made of organic light-emitting diodes will be available in the market. In addition to light emitting devices, scientists are exploring the potentials of applying organic materials in photovoltaic devices (solar cells), photo detectors (camera), and transistors (the fundamental component of logic gates for computation).

Scientists in the University of Hong Kong are working on the development of semiconducting organic materials for new optical and electronic applications. These research projects involve the efforts of scientists from different disciplines, including chemistry, physics, and electronic engineering. The key researchers in these projects include: Professor C M Che, Hui Wai Hann Chair Professor of Chemistry; Professor W T Wong, Chair Professor of Chemistry; Professor Vivian W W Yam, Chair Professor of Chemistry; Professor W K Chan, Professor of Chemistry; Dr A B Djurišić, Assistant Professor of Physics. In the past few years, they have received several major research grants from the **Research Grants Council of Hong** Kong, Innovation and Technology Commission, and HKU University Development Fund. They are also working closely with colleagues from the Faculty of Engineering in this inter-disciplinary research area.



# Curriculum

# **Major in Environmental Science**

New major from 2009

he Faculty is pleased to announce a new major, Environmental Science in the BSc Programme from the academic year 2009-2010.

#### Why should we study environmental sciences?

Humankind is living an incredibly challenging time. Challenges to the environment are coming from a number of directions, including global warming, natural resources, diseases and hazards, and sustainable development. Nothing is more important than learning how to reduce our impacts on the environment and to conserve its lifesupport system.

> It is no longer sufficient to be educated in traditional sciences of biology, chemistry, physics and geology. Understanding the environment and human impacts on the environment requires that we cut across the traditional boundaries of knowledge.

The Environmental Science Major will provide students with a strong scientific and technological background for understanding and addressing the environmental issues faced by mankind, and prepare them for work in industries and government agencies where they will have to wisely manage the resources for which they are responsible.

The curriculum of the Environmental Science major at HKU

The curriculum for environmental sciences in HKU is designed to provide students a broad knowledge base, to stimulate their intellectual curiosity, and to enable them to acquire critical intellectual skills, to appreciate the complexities of issues in the increasingly interconnected world, and to see things from multiple

#### perspectives.

In year one, students will take 4 introductory courses. In years 2 and 3, students will take a capstone course and at least 8 advanced level courses from the four thematic areas: (1) Life and environment; (2) Physical and sustainable environment; (3) Pollution; and (4) Monitoring and management.

By completion of this major, students should be able to:

- understand the different components of the environmental systems;
- critically comment, assess and communicate about global environmental problems, issues of resource management, policies and management methods; and
- apply scientific understanding and methods to solve environmental problems.

#### **Career prospects**

There is an increasing demand for environmental science graduates, both locally and internationally in the government and industrial sectors.

- Environmental consultants environmental impacts assessment, engineering consulting, advising government departments and international organizations, risk analysis for insurers, re-insurers and commercial organizations
- Environmental laboratories eco-toxicology, bioremediation, pollution control and environmental protection
- Planning departments energy policies, resources management, land-use planning, statutory regulations, hazards prevention agencies
- 4. Environmental professionals conservation organizations, habitats and ecosystems management, conservation biology and fisheries
- 5. Teaching profession academics, school teachers

For details, please visit: http://www.hku.hk/science

#### Brainteaser

### Question: Can you identify this satellite in our solar system?

#### Prize: \$50 book token

Deadline: Friday, November 28, 2008

Please email your answer together with your name and school (for students), to scinews@hku.hk. FIVE winners will be drawn randomly from the contestants who give the correct answer.



#### Answer to Last Issue's Quiz:

The coronavirus is shown in the micrograph, which primarily infects the upper respiratory and gastrointestinal tract of mammals and birds. The most known human coronavirus is SARS-CoV which causes Severe Acute Respiratory Syndrome (SARS).

Winners of last issue's quiz will be informed individually.



### Faculty News

# **Celebrating the Science Faculty Platinum Jubilee**

2009 marks the 70th Anniversary of the Faculty of Science. On this auspicious occasion, the Faculty would like to highlight the notable contributions of its teachers and graduates on pursuing academic excellence and to feature the achievements of our alumni in decades.



In celebration of our Platinum Jubilee, a series of events have been planned ahead, including the Home-coming Day and Anniversary Dinner. In addition, an Anniversary Commemorative Booklet and a Special Issue of Newsletter on Platinum Jubilee Celebrations are to be published as well. The success of these celebrations relies tremendously on your continuous support and participation. Come celebrate with us!

Below please find the highlights of the Science Faculty Platinum Jubilee Celebrations in 2009:

Mid Januarv

Opening Ceremony of Stephen Hui Geological Museum cum Kick-off Ceremony of the Science Faculty Platinum Jubilee Celebrations

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May 9 Home-coming Day (Rayson Huang Theatre, HKU)

November 15 Anniversary Dinner (Hong Kong Convention and Exhibition Centre)

#### More Information

The celebration activities are to be confirmed. For details and updated information, please visit our anniversary webpage.

Should you be interested in any of our functions, please send us an email at scialum@hku.hk, so that we will keep you updated in the future.

# www.hku.hk/science/70th



#### Contacts update

To maintain close bonding with the Faculty, please notify us if there are any changes in your correspondence details. You may update your contacts online.

### **Open Nomination of Distinguished** Science Alumni

The Faculty of Science is proud of its graduates and would like to honour the distinguished alumni in various sectors and salute their achievements and contributions to the society in the Platinum Jubilee.

We invite you to nominate alumni who have outstanding achievements in their career and/ or have exceptional contributions to society. We have various channels to honour our distinguished alumni, which include the Anniversary Dinner, on-line webpage and in our publication. You may nominate science alumni online by December 31, 2008. The nominated alumni will be selected by our panel formed by patrons or prominent figures associated with the Faculty, and members of panel to be announced in due course.



# Launch of Faculty School Talks

The Faculty of Science is happy to launch the new round of the Talk@MySchool Programme in academic year 2008-09. Last year, colleagues of the Faculty had delivered more than 80 school talks in Secondary Schools or at HKU campus, either on the degree programme offered by our Faculty and the Faculty's single admission policy, or on topics in different Science areas selected by secondary school

teachers. In addition to the school talk programme, students could get to know about researches conducted in our Faculty and taste the life of a HKU Science student by visiting our well-equipped laboratories and the fascinating geological museum.

For teachers who are interested in the above programmes, please visit www. hku.hk/science/community or contact us by email at ssst@hku.hk.



### Achievements

- Professor C M Che, Hui Wai Hann Chair of Chemistry, Department of Chemistry, was invited to present the 2008/2009 Julia S and Edward C Lee Memorial Lecture at The University of Chicago on October 13, 2008. He is the first Chinese to receive this honour and the second Asian Chemist over the past 60 years to be the Lee memorial lecturer. Among the past receipents, six of whom are Nobel Laurates.
- Professor Y Lam, Honorary Professor of Department of Statistics and Actuarial Science, has received the Second Prize (First Contributor) of the Natural Science Award of the Ministry of Education. The Award is based on his work in Geometric Process with the University of Hong Kong being the second completion institute.
- Professor V W W Yam, Chair Professor of Department of Chemistry, was awarded the Outstanding Women Professionals and Entrepreneurs Awards 2008, recognizing her oustanding achievemnt in the community.
- Professor Ming Ko Woo, alumni of HKU (graduated in 1967), has been awarded the prestigious J.Tuzo Wilson Medal for Canadian geophysicists in the Canadian Geophysical Union. Dr Woo has worked in the Canadian Arctic and subarctic for three decades. He is a Fellow of the Royal Canadian Geographical Society and was President of the Hydrology Section of the Canadian Geophysical Union. Dr Woo is recognized internationally for his expertise on snow, permafrost, water-related issues and drought problems.

- Ms Olivia Chan, PhD student of the School of Biological Sciences, has become the first recipient of the NASA Planetary Biology Internship Award in the region, and has spent the summer at NASA studying biotic-abiotic interactions in cyanobacterial microbialites - unique freshwater corals that form here on Earth in conditions that mimic those thought to exist on Mars when liquid water flowed on its surface. Olivia is jointly supervised by Dr Steve Pointing (Biological Sciences) and Professor Jonathan Aitchison (Earth Sciences).
- Miss Lam Sau Luen, a BSc student, has been awarded a Silver Medal in the Hong Kong Young Ambassador Scheme 2008/09 by the Hong Kong Federation of Youth Groups, recognising her contributions in promoting Hong Kong as a hospitable and welcoming city.
- Dr Maggie Lau Chui Lim, Postdoctoral Fellow of School of Biological Sciences, has been awarded a Wellcome Trust Scholarship to attend a workshop entitled "Working with Pathogen Genomes" to be hosted in Thailand by the Wellcome Trust, a pre-eminent international organization for genome research in Cambridge, in November, 2008.
- Miss Amy Zhang, MPhil student of School of Biological Sciences, has been awarded the first Hong Kong Science and Technology Parks (HKSTP) Scholarship Award which allowed her to participate the Scandinavian Entrepreneurship Tour in January 2008. Amy is supervised by Dr Kenneth Leung from the School of Biological Sciences.

#### **Talks**

- April 15, 2008: Colloquium: "Quantized Transverse Spin Resistance" by Professor Shou-Cheng Zhang, Stanford University, USA (co-organized with the Department of Physics)
- April 25, 2008: Public Lecture: "Interfacing Chemistry and Biology to Discovery Molecules with Function" by Professor K D Janda, The Scripps Research Institute, USA



 May 29, 2008: Public Lecture: "Sichuan Earthquake and Cyclone Nargis" (co-organized with the Department of Earth Sciences)



 September 26, 2008: Public Lecture: "ABC of Large Hadron Collider (LHC)" Professor Edna Cheung, Nanjing University

### **Upcoming Events**

- October 15, 2008: Public Lecture: "The Deep Sea" by Ms Claire Nouvian, co-organized with the Consulate General of France in Hong Kong and Macau
- October 18, 2008: Information Day for Undergraduate Admissions, provides an opportunity for students to better understand the academic programmes offered by the Faculty of Science
- October 29, 2008: Public Lecture: "Life on the Edge" by Dr S B Pointing, School of Biological Sciences

For details: please visit www.hku.hk/science

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