

30 July 2009

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## **Chem-Bio News – S&T Edition**

### **1. VAPOR PRESSURE OF ORGANOPHOSPHORUS NERVE AGENT SIMULANT**

**COMPOUNDS:** *"Our report extends the low end of the measured data range by 2 to 3 orders of magnitude in pressure."*

**2. DISCOVERY OF SWINE AS A HOST FOR THE RESTON EBOLAVIRUS:** *"REBOV isolates were found to be more divergent from each other than from the original virus isolated in 1989, indicating polyphyletic origins and that REBOV has been circulating since, and possibly before, the initial discovery of REBOV in monkeys."*

**3. A COMPARISON OF NEUROPROTECTIVE EFFICACY OF NEWLY DEVELOPED OXIMES (K203, K206) AND COMMONLY USED OXIMES (OBIDOXIME, HI-6) IN TABUN-POISONED RATS:** *"Due to its neuroprotective effects, K203 appears to be a suitable oxime for the antidotal treatment of acute tabun poisonings."*

**4. NANOENABLED MICROELECTROMECHANICAL SENSOR FOR VOLATILE ORGANIC CHEMICAL DETECTION:** *"The adsorption process in the ss-DNA decorated SWNTs does not occur in the bulk of the material, but solely involves the surface, which permits to achieve 50% recovery in less than 29 s."*

**5. DETERMINATION OF ORGANOPHOSPHORUS PESTICIDES BY CAPILLARY ELECTROPHORESIS-INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY WITH COLLECTIVE SAMPLE-INTRODUCTION TECHNIQUE:** *"Using this method, we have successfully separated and determined dimethoate, trichlorfon and glyphosate in vegetable sample with a recovery of 90-96%."*

**6. STICKY NANOTUBES DETECT BACTERIA IN SECONDS:** *"Although only tested on the typhus-causing Salmonella typhi bacteria so far, if the process can be applied more widely it could revolutionise bacterial testing in the medical and food industries."*

### **7. PROTEOMIC SCREENING OF VARIOLA VIRUS REVEALS A UNIQUE NF-KAPPA B INHIBITOR THAT IS HIGHLY CONSERVED AMONG PATHOGENIC**

**ORTHOPOXVIRUSES:** *"Thus, proteomic screening of variola virus has the potential to uncover modulators of the human innate antiviral responses."*

# CB Daily Report

## *Chem-Bio News*

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### **VAPOR PRESSURE OF ORGANOPHOSPHORUS NERVE AGENT SIMULANT COMPOUNDS**

Journal of Technology & Science

July 26, 2009

"The vapor pressures of four lower alkyl phosphonate compounds, dimethyl phosphonate (DMHP, CAS 868-85-9), dimethyl methylphosphonate (DMMP, CAS 756-79-6), diethyl methylphosphonate (DEMP, CAS 683-08-9), and diisopropyl methylphosphonate (DIMP, CAS 1445-75-6), have been measured by complementary methods that allow data collection at ambient and high temperatures by use of gas saturation and differential scanning calorimetry, respectively. Kosolapoff (J. Chem. Soc. 1955, 2964-2965) reported vapor pressure data above 200 Pa for several of these compounds measured by use of isoteniscope, although the lowest data points were deemed to be "not trustworthy" by the author."

"Our report extends the low end of the measured data range by 2 to 3 orders of magnitude in pressure. Antoine correlations, normal boiling temperatures, temperature-dependent enthalpies of vaporization, and volatility have been derived based on the measured data reported herein."

The full report can be found at: (A.B. Butrow, et. al., "Vapor Pressure of Organophosphorus Nerve Agent Simulant Compounds". Journal of Chemical and Engineering Data, 2009; 54 (6):1876-1883). Link not available.

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### **DISCOVERY OF SWINE AS A HOST FOR THE RESTON EBOLAVIRUS**

Blood Weekly

August 6, 2009

"Since the discovery of the Marburg and Ebola species of filovirus, seemingly random, sporadic fatal outbreaks of disease in humans and nonhuman primates have given impetus to identification of host tropisms and potential reservoirs."

"Domestic swine in the Philippines, experiencing unusually severe outbreaks of porcine reproductive and respiratory disease syndrome, have now been discovered to host Reston ebolavirus (REBOV). Although REBOV is the only member of Filoviridae that has not been associated with disease in humans, its emergence in the human food chain is of concern."

"REBOV isolates were found to be more divergent from each other than from the original virus isolated in 1989, indicating polyphyletic origins and that REBOV has been circulating

since, and possibly before, the initial discovery of REBOV in monkeys."

The full article can be found at: (R.W. Barrette, et. al., "Discovery of Swine as a Host for the Reston ebolavirus". Science, 2009; 325(5937): 204-206). Link not available.

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## **A COMPARISON OF NEUROPROTECTIVE EFFICACY OF NEWLY DEVELOPED OXIMES (K203, K206) AND COMMONLY USED OXIMES (OBIDOXIME, HI-6) IN TABUN-POISONED RATS**

Energy & Ecology  
August 7, 2009

"The neuroprotective effects of newly developed oximes (K203, K206) and commonly used oximes (obidoxime, HI-6) in combination with atropine in rats poisoned with tabun at a sublethal dose (180  $\mu$ g/kg i.m.; 80% LD50) were studied. The tabun-induced neurotoxicity was monitored by using a functional observational battery and an automatic measurement of motor activity."

"The neurotoxicity of tabun was monitored at 24 hours and 7 days following tabun challenge. The results indicate that K203 and obidoxime in combination with atropine allow all tabun-poisoned rats to survive within 7 days following tabun challenge, while 2 nontreated tabun-poisoned rats and 1 tabun-poisoned rat treated with K206 or HI-6 in combination with atropine died within 7 days. Only one of the newly developed oximes (K203) combined with atropine seems to be effective for a decrease in tabun-induced neurotoxicity within 24 hours after tabun sublethal poisoning, although it is not able to eliminate tabun-induced neurotoxicity completely. On the other hand, the neuroprotective efficacy of commonly used oximes (obidoxime and HI-6), as well as one of the new synthesized oximes (K206), is significantly lower in comparison with K203, according to the number of eliminated tabun-induced neurotoxic signs at 24 hours after tabun challenge."

"Due to its neuroprotective effects, K203 appears to be a suitable oxime for the antidotal treatment of acute tabun poisonings.."

The full article can be found at: (J. Kassa, et. al., "A Comparison of neuroprotective efficacy of newly developed oximes (K203, K206) and commonly used oximes (Obidoxime, HI-6) in tabun-poisoned rats". Drug and Chemical Toxicology, 2009; 32(2):128-138). Link not available.

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**NANOENABLED MICROELECTROMECHANICAL SENSOR FOR VOLATILE ORGANIC**

## CHEMICAL DETECTION

Journal of Technology & Science

July 26, 2009

"A nanoenabled gravimetric chemical sensor prototype based on the large scale integration of single-stranded DNA (ss-DNA) decorated single-walled carbon nanotubes (SWNTs) as nanofunctionalization layer for aluminum nitride contour-mode resonant microelectromechanical (MEM) gravimetric sensors has been demonstrated."

"The capability of two distinct single strands of DNA bound to SWNTs to enhance differently the adsorption of volatile organic compounds such as dinitrofluorene (simulant for explosive vapor) and dimethyl-methylphosphonate (simulant for nerve agent sarin) has been verified experimentally. Different levels of sensitivity (17.3 and 28 KHz  $\mu\text{m}^2/\text{fg}$ ) due to separate frequencies of operation (287 and 450 MHz) on the same die have also been shown to prove the large dynamic range of sensitivity attainable with the sensor."

"The adsorption process in the ss-DNA decorated SWNTs does not occur in the bulk of the material, but solely involves the surface, which permits to achieve 50% recovery in less than 29 s."

The full article can be found at: (C. Zuniga, et. al., "Nanoenabled microelectromechanical sensor for volatile organic chemical detection". Applied Physics Letters, 2009; 94 (22):23122). Link not available.

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## DETERMINATION OF ORGANOPHOSPHORUS PESTICIDES BY CAPILLARY ELECTROPHORESIS-INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY WITH COLLECTIVE SAMPLE-INTRODUCTION TECHNIQUE

Electronics Newsweekly

August 5, 2009

"A new method for the determination of organophosphorus pesticides using CE-ICP-MS with collective sample-introduction technique has been developed in this study. The method has been successfully used to separate and determine dimethoate, trichlorfon and glyphosate with an RSD of < 5% for migration times ( $n = 6$ ) and < 4% for peak areas ( $n = 6$ )."

"The experimental results showed that the collective sample-introduction considerably reduced the makeup volume and the dilution of analyte, and eventually resulted in a much lower detection limit and a much better electrophoretic resolution. The peak widths and the detection limits of dimethoate, trichlorfon and glyphosate obtained with this method are 15-17 s and 0.05-0.07  $\mu\text{g/mL}$  (as compound), respectively."

"Using this method, we have successfully separated and determined dimethoate, trichlorfon and glyphosate in vegetable sample with a recovery of 90-96%.."

The full article can be found at: (G.D. Yang, et. al., "Determination of organophosphorus

pesticides by capillary electrophoresis-inductively coupled plasma mass spectrometry with collective sample-introduction technique". *Electrophoresis*, 2009;30(10 Sp. Iss):1718-1723). Link not available.

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## **STICKY NANOTUBES DETECT BACTERIA IN SECONDS**

By Lewis Brindley  
Chemistry World  
July 27, 2009

"Sticky nanotubes that trap bacteria like flypaper can be used to identify bacterial infections in seconds rather than days, report Spanish chemists. Although only tested on the typhus-causing *Salmonella typhi* bacteria so far, if the process can be applied more widely it could revolutionise bacterial testing in the medical and food industries."

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"The technique uses carbon nanotubes coated with aptamers - short strands of genetic material that bind tightly to specific bacteria. Electrodes are coated with these sticky nanotubes and then dipped into a test liquid. Rather like flypaper, bacteria stick to the aptamers, which partially peel away from the nanotubes, changing their electrical conductivity. By measuring this change, the number of bacteria in the solution can be calculated.

Importantly, the technique is very precise - able to detect concentrations as low as a single bacterium in 5 millilitres of solution. In future, the researchers hope that the process will be used to monitor bacterial infections in real-time, dramatically improving patient care in hospitals and guarding against batches of contaminated food."

The full article can be found at: <http://www.rsc.org/chemistryworld/News/2009/July/27070903.asp>

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## **PROTEOMIC SCREENING OF VARIOLA VIRUS REVEALS A UNIQUE NF-KAPPA B INHIBITOR THAT IS HIGHLY CONSERVED AMONG PATHOGENIC ORTHOPOXVIRUSES**

Genomics & Genetics Weekly  
August 7, 2009

"Identification of the binary interactions between viral and host proteins has become a valuable tool for investigating viral tropism and pathogenesis. Here, we present the first systematic protein interaction screening of the unique variola virus proteome by using yeast 2-hybrid screening against a variety of human cDNA libraries."

"Several protein-protein interactions were identified, including an interaction between variola G1R, an ankryin/F-box containing protein, and human nuclear factor kappa-B1 (NF-kappa B1)/p105. This represents the first direct interaction between a pathogen-encoded protein and NF-kappa B1/p105. Orthologs of G1R are present in a variety of pathogenic orthopoxviruses, but not in vaccinia virus, and expression of any one of these viral proteins blocks NF-kappa B signaling in human cells."

"Thus, proteomic screening of variola virus has the potential to uncover modulators of the human innate antiviral responses."

The full article can be found at: (M.R. Mohamed, et. al., "Proteomic screening of variola virus reveals a unique NF-kappa B inhibitor that is highly conserved among pathogenic orthopoxviruses". Proceedings of the National Academy of Sciences of the United States of America, 2009; 106(22):9045-9050). Link not available.

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