

## Contents in Context

### *Environmental Chemistry*, Vol. 1, no. 3, 2004

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#### **Organic Trace Gases in the Atmosphere: An Overview**

*Jonathan Williams*

*Environ. Chem.* **2004**, *1*, 125

The major carbon-containing atmospheric gases (carbon dioxide, carbon monoxide, and methane) are found in the atmosphere at the parts-per-million levels, where they affect physical phenomena such as the greenhouse effect. There are however many more carbon-containing gases at much lower levels with many and varied roles; in the main these gases are more chemically active and affect principally *chemical* phenomena such as the ozone budget.

#### **Interaction between Sulfur(IV) Autoxidation Transients and Bioorganic Compounds**

*Wanda Pasiuk-Bronikowska, Tadeusz Bronikowski, Marek Ulejczyk*

*Environ. Chem.* **2004**, *1*, 137

Sulfur dioxide has long been known as a source of acidity in precipitation and of cloud condensation nuclei, but more recently it has been shown a source of radicals highly reactive with respect to various organic compounds. These radicals are formed as intermediates wherever sulfur dioxide, oxygen, and water come into contact, such as in a sulfur dioxide polluted environment (tropospheric clouds, surface waters, soil) and in living organisms (lungs, digestive tract). This work focusses on the destructive action of such intermediates upon organic compounds essential for life (such as enzymes and vitamins).

#### **Atmospheric Oxidation Mechanism of Isoprene**

*Jiwen Fan, Renyi Zhang*

*Environ. Chem.* **2004**, *1*, 140

Many plant species biosynthesize and emit the volatile hydrocarbon isoprene. Once in the atmosphere, isoprene is susceptible to a range of reactions involving potentially hundred of products and intermediate compounds. The products of these reactions in turn may pose a risk to human and plant health and impact the climate through the generation of acids, ozone, and atmospheric aerosols.

#### **Simulating the Formation of Secondary Organic Aerosol from the Photooxidation of Toluene**

*David Johnson, Michael E. Jenkin, Klaus Wirtz, Montserrat Martin-Reviejo*

*Environ. Chem.* **2004**, *1*, 150

Atmospheric particulate material can affect climate by absorbing and scattering solar radiation and by altering the properties of clouds. They are also implicated as a health risk. Secondary organic aerosol (SOA) material makes an important contribution to this particulate burden. SOA material results from the transfer of gas-phase species into a particle state after the formation of products from the reaction of atmospheric volatile organic compounds (VOCs) with oxygen. SOA from the oxidation of aromatic hydrocarbons, such as toluene, a gasoline fuel component, is important in the polluted urban environment and yet formation mechanisms are not well understood.

#### **Decomposition of Mercuric Chloride and Application to Combustion Flue Gases**

*Jennifer Wilcox, Paul Blowers*

*Environ. Chem.* **2004**, *1*, 166

The toxicity of the volatile metal mercury is well known; this  $\text{Hg}^0$  form accounts for about 99% of atmospheric mercury and the remainder the water-soluble oxidized ( $\text{Hg}^+$ ,  $\text{Hg}^{2+}$ ) form. The release of mercury from the atmosphere is measurable by a drop in the  $\text{Hg}^0$  levels, but to establish realistic scientific and regulatory standpoints the rate in which  $\text{Hg}^0$  converts to the oxidized forms needs to be understood. Conversely, from an industrial standpoint, understanding the rate at which the oxidized forms convert to  $\text{Hg}^0$  allows for better waste-scrubbing processes.

#### **Cadmium Adsorption by *Chlamydomonas reinhardtii* and its Interaction with the Cell Wall Proteins**

*Heliana Kola, Luis M. Laglera, Nalini Parthasarathy, Kevin J. Wilkinson*

*Environ. Chem.* **2004**, *1*, 172

In natural waters, trace metals levels are largely controlled by microbiology; organisms take up, metabolize, store, and detoxify the metals. However, aquatic organisms may regulate their own uptake via dynamic processes that result in a system that is far from equilibrium. By examining the model title alga with a battery of techniques, a more realistic assessment of metal uptake and metal regulatory processes could be gained.

#### **Biosorption of Cadmium by *Fucus spiralis***

*Bruno Cordero, Pablo Lodeiro, Roberto Herrero, Manuel Esteban Sastre de Vicente*

*Environ. Chem.* **2004**, *1*, 180

Conventional processes for the removal of heavy metals from wastewaters generally involves chemical precipitation of metals (changing the pH) followed by a period to allow the metal precipitates to settle and be separated. These processes are inefficient when the metals are at a low concentration and still demand handling and disposal of toxic metal sludges. An alternative method for heavy metal removal is adsorption onto a biological material, biosorption. The biological materials, including agricultural byproducts, bacteria, fungi, yeast, and algae, all which take up heavy metals in substantial quantities, are relatively inexpensive, widely available, and from renewable sources. However, biological materials are complex and the active mechanisms often unclear.

**Laser Ablation ICP-MS Analysis of *Faviidae* Corals for Environmental Monitoring of a Tropical Estuary**

*Niels C. Munksgaard, Yasmin Antwertinger, David L. Parry*

*Environ. Chem.* **2004**, *1*, 188

The composition of calcium carbonate in annual skeletal growth bands reflects the environmental conditions in which coral grows, enabling their use as long-term bio-monitors and archives of environmental conditions. Such archives will provide a baseline against which recent and future pollutant levels can be compared.

**Facilitated Heterogeneous Photodegradation of Dissolved Organic Matter by Particulate Iron**

*Julia A. Howitt, Darren S. Baldwin, Gavin N. Rees, Barry T. Hart*

*Environ. Chem.* **2004**, *1*, 197

Iron oxides, as suspended minerals or as a colloidal phase, are common in Australian freshwater systems. Freshwater systems are also loaded with carbon-based substances, 'dissolved organic matter', but not all is biologically available as food to freshwater organisms. However, photochemical interactions between these iron oxides and dissolved organic matter provide a mechanism for biologically resistant carbon to re-enter the food web. Suspended iron oxides thus need to be considered in carbon cycles in aquatic ecosystems.