

**Reductive dehalogenation of chlorinated dioxins by an anaerobic bacterium**

M. Bunge *et al.*  
*Nature*, 2003, **421**, 357–360.

Detoxification of polychlorinated dibenzo-*p*-dioxins and dibenzofurans (PCDDs and PCDFs) is important for the removal of notorious environmental pollutants. Bioremediation promises avenues for microbial reductive dechlorination, although only a few anaerobic bacteria are capable of substituting chlorine with hydrogen during dehalorespiration. Such microbial dechlorination occurs naturally in sediments in mixed cultures. This paper reports isolation and characterization of a *Dehalococcoides* species enriched from freshwater sediment.

**An invariance property of diffusive random walks**

S. Blanco and R. Fournier  
*Europhys. Lett.*, 2003, **61**, 168–173.

Spontaneous movement of several insects, ants for example, can be modelled as a constant-speed random walk with diffusion. It is shown in this paper that under certain specific conditions, the average length of trajectories through the system depends only on the geometry of the system, being independent of the process of diffusion. This invariance property is likely to have broad application in physics and biology.

**Influence of the initial forming pressure and sample geometry on the final density of PZT type sintered ceramic samples**

C. F. Miclea *et al.*  
*Rom. J. Phys.*, 2000, **45**, 751–758.

Microstructural characteristics affect the performance of piezoelectric ceramics that are used in interconversion of mechanical strain and electrical energy. Fabrication of sintered ceramic parts via the powder metallurgy route is popular. This paper reports on the densification process of piezoelectric material under various initial forming pressure and different sample geometry.

**Global drug-resistance patterns and the management of latent tuberculosis****infection in immigrants to the United States**

K. Khan *et al.*  
*New Engl. J. Med.*, 2002, **347**, 1850–1859.

Increasingly disproportionate number of foreign-born new immigrants to the USA suffer from tuberculosis. The region-specific drug resistance profile contains useful information for detection and treatment of the disease among the fresh immigrants. Rifampin plus pyrazinamide is preferred over isoniazid as a chemotherapy.

**Chemical kinetics studies at high temperatures using shock tubes**

B. Rajakumar *et al.*  
*J. Indian Inst. Sci.*, 2002, **82**, 37–47.

Shock tubes are used to study kinetics at very high temperature gradients. In the first case, the authors report the use of a single pulse shock tube and the analysis of the equilibrated products by GC and IR. In the second case, a laser-sclieren system is utilized for online monitoring of chemical kinetics. One of the reactions studied is pyrolysis of ethyl chloride to C<sub>2</sub>H<sub>4</sub> and HCl.

**Comparative study of mixed product and quaternion product**

Md. Shah Alam  
*Indian J. Phys.*, 2003, **77**, 47–49.

Mixed number and quaternion are both expressed as a sum of a scalar and a vector. The mixed product and the quaternion products are different. A comparative analysis of the product of these two types of algebraic entities leads to the conclusion that mixed product is more consistent with Physics, Pauli matrix algebra, the Dirac equation, and the differential operators.

**Stochastic gene expression in a single cell**

M. B. Elowitz *et al.*  
*Science*, 2002, **297**, 1183–1186.

Heterogeneity in phenotypic expression in clonal populations is believed to arise from noise or stochastic variations in the gene expression. Intrinsic noise inherent in the biochemical process and extrinsic noise due to fluctuations in cellular com-

ponents contribute to the overall variation. The results reported in this paper demonstrate how factors like copy numbers of molecule, genetic factors, transcription rate and regulatory dynamics dictate the precision of gene regulation.

**Fractal analysis of printed structures**

O. Zmeskal *et al.*  
*J. Imaging Sci. Technol.*, 2002, **46**, 453–456.

Fractals, objects of fragmented geometric shape, are popular concepts in understanding structures for printing and imaging. An ‘intensity fractal function’ is introduced in this paper as a new method of factor analysis of printed pages, that provides new information not obtainable by conventional methods.

**Fourier Transform Infrared Microspectroscopy as a tool to differentiate *Nitzschia closterium* and *Nitzschia longissima***

S. Vardy *et al.*  
*Appl. Spectrosc.*, 2002, **56**, 1545–1548.

Two related species of diatom, *N. closterium* and *N. longissima* are hard to differentiate under the light microscope, though they are clearly identifiable through expensive and time-consuming SEM procedure. *N. closterium* is associated with mortality of prawn larvae in hatcheries, whereas *N. longissima* has no known toxic effect. Development of a simple spectroscopic method with the help of FT-IR microscopy combined with Mahalanobis distance analysis accomplished an easy and accurate means for rapid identification of hazardous diatom species.

**Two-step enantio-selective optical switch**

P. Kral *et al.*  
*Phys. Rev. Lett.*, 2003, **90**, 033001.

One of the most difficult tasks of a chemist is asymmetric synthesis and chiral purification. The authors report a robust method that utilizes an enantio-selective optical switch that can turn chiral molecules into enantiometrically pure state in two steps. Purification of a racemate of D<sub>2</sub>S<sub>2</sub> molecule demonstrates the efficacy of the new method.