New Projects

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Atomic Force Microscopy (AFM) in Direct Measurements of Colloidal Forces

IUPAC has approved a new project to recommend (1) procedures for measurement of interparticle distance dependence of colloidal force data using the atomic force microscope (AFM) colloid probe technique, and (2) methods by which force-distance data can be compared with existing models of interparticle forces.

The colloid probe AFM technique is a promising new method to determine the interactions between colloidal bodies. The technique is based on the general AFM, and this equipment is, in principle, available for many research groups (i.e., it is not excessively expensive). In order to avoid confusion in the literature about the use of AFM equipment for colloid stability measurements (and, consequently, about the interpretation of results), recommendations for the use of this equipment for this type of measurement are needed.

The project includes the following components:

- principles of atomic force microscopy
- attachment of colloidal probe to cantilever
- force measurement
- distance separation
- determination of spring constant
- determination of colloid probe radius
- interaction geometry
- interparticle forces
- nondeformable and deformable surfaces
- symmetric and asymmetric interactions

Comments from the chemistry community are welcome and should be addressed to the project coordinator, Prof. John Ralston, Ian Wark Research Institute, University of South Australia, The Levels, South Australia 5095, Australia; Tel.: +61 8 8302 3066; Fax: +61 8 8302 3683; E-mail: john.ralston@unisa.edu.au.

See http://www.iupac.org/projects/1999/1999-016-3-100.html for project description and update.

Selected Free Radicals and Critical Intermediates: Thermodynamic Properties from Theory and Experiment

Accurate thermodynamic data are required in modeling of atmospheric processes, combustion, and other complex chemical systems. However, for most of the free radicals participating in such processes, no reliable thermodynamic properties are available; literature data are contradictory, often depend on a single determination made decades ago using indirect methods, or are based on estimations. Owing to the progress made in developing new direct experimental techniques, reliable thermodynamic properties have become available for more and more free radicals. In spite of this success, a breakthrough and an essential improvement in this field may not be expected in the near future. Fortunately, recent studies using *ab initio* theoretical methods have shown that an accuracy better than 4 kJ/mol is a realistic aim in the computation of enthalpies of formation. This analysis of the state of affairs was the motivation that initiated a joint effort of experimentalists and theoreticians to create a set of reliable thermodynamic properties for selected organic free radicals.

IUPAC has approved a 2.5-year project for the compilation and critical evaluation of available thermodynamic properties as well as for the computation of accurate data for selected free radicals that are of importance in atmospheric chemistry and/or combustion. Altogether, six experimentalists and seven theoreticians are participating in the project. The interdisciplinary character of this group may prove to be useful in finding the right answer in cases where contradictory thermodynamic properties were published for the same free radical from different laboratories or were obtained by different techniques.

A series of seminal papers, to be published in leading journals of physical chemistry and chemical physics, is expected from this project. The final results of the project will appear in peer-reviewed journals such as the *Journal of Physical and Chemical Reference Data* or *Pure and Applied Chemistry*. A web version of the results may be presented in the NIST Chemistry Web Book.

It is expected that the recommended thermodynamic data, the results of compilation and critical data evaluation of organic free radicals, would be widely used by the kineticist community. The major