INTERNATIONAL SOLVAY INSTITUTES BRUSSELS

Solvay Colloquium

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Exploring unconventional synthetic routes by the use of high pressure

Pressures larger than 1 GPa are uncommon in laboratory synthetic processes in spite of representing a normal condition in Nature. The study of the pressure effects on molecular systems, including the simplest ones, is therefore a prerequisite to understand chemical and physical properties of the Earth's interior as well as of outer planets and satellites. The high-pressure chemistry of molecular systems is a fascinating world characterized by unusual behaviors with respect to ambient conditions whose achievements often challenge consolidated assumptions in the chemical community. Pressure is indeed able to efficiently reduce the intermolecular distances creating configuration interactions uncommon at ambient conditions. The information about the reactivity at the molecular level which can be gained by high pressure studies has a two-fold importance. From fundamental point of view, since the reactivity takes place in condensed phases, they represent an invaluable tool for providing insight about the mechanisms regulating solid state chemistry. From applicative point of view, the search for new exciting materials and the way to scale down the synthesis conditions is an emerging research field.

In this talk the reactivity and the structural modifications induced by pressure will be reviewed for several model molecular systems, from simple diatomics to aromatic crystals. In addition to the obvious relationship between structure and reactivity also the role that temperature and light play, in combination with pressure, on the reactivity will be also taken into account. The control of the three parameters represents an important source of information for understanding the reactive mechanisms at the molecular level and then for making the synthesis conditions as little drastic as possible. A particular attention will be dedicated to the recent synthesis of carbon nanothreads which represent an enlightening example of the role that anisotropic stress can play in high pressure reactions.

Tuesday 5 February 2019 at 4.00 P.M.

COFFEE AND TEA WILL BE SERVED AT 3.45 P.M. IN FRONT OF THE SOLVAY ROOM

SOLVAY ROOM
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