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Where organosilicon chemistry is going?

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This special issue was the occasion to collect the contributions of the scientists working in organosilicon chemistry in order to provide, in the direction of the international scientific community, an up-to-date overview of the main interests of organosilicon chemistry at present.

The field of research covered by organosilicon chemistry is very broad from biochemical aspects to electronics going through out all the aspects of chemistry. Both molecular and macromolecular chemistries are open widely to silicon containing molecules. Furthermore, organosilicon compounds are also an important way in material science. Although the field of ceramics is not sponsored anymore, the scientific results obtained in this field were of great interest since the organosilicon chemists succeeded in spinning and coating materials which exhibiting high thermomechanical properties. Moreover, some of these materials were also potentially high-temperature working semi-conductors. On the opposite side, the biochemical aspects of organosilicon chemistry are of interest since some drugs have been discovered. However, the more important aspect in this area is the biocompatibility of organosilicon compounds, which can open up the use of organosilicon compounds as possible additives to drugs. For instance the use of polysiloxanes as drugs delivery regulators is certainly very promising.

Organosilicon chemistry is included in all the aspects of chemistry: molecular and bio molecular, coordination and inorganic, macromolecular, solid-state and physical chemistries are concerned by organosilicon chemistry. It is also interesting to point out that this chemistry has provided many interesting tools in organic synthesis (allylsilanes, enoxysilanes, hydrosilanes, etc.).

Furthermore, very interesting theoretical problems, completely different from those found in carbon chemistry, have been found by the chemical behaviour of organosilicon compounds. The σ bonds involving silicon are not the copy of carbon bonds: many interesting and original problems based on the chemistry of some σ bonds involving silicon have been considered: polysilanes, silicenium ions, hyper coordination, silylenes, etc. Original theoretical solutions have been proposed successfully.

However, at the moment, one of the most exciting fields of investigation which starts explosively corresponds to the possibilities given by the introduction of organosilicon chemistry in material science. Silica is the most used matrix for the inclusion of physical properties. However, the use of polysilsequioxanes instead of silica or mixed with, permits greatly the extension with the field of possibilities. For instance this gives some mechanic and dielectric properties. Moreover this way, which corresponds to hybrid materials chemistry, permits also the introduction, in the material, new kind of properties, connected with the organic part: physical (optical, magnetic, electric...) or chemical (catalysis, selective separation...). It is interesting to point out that the polycondensation of silicon, which occurs in very mild conditions, permits also the self-organisation of organic moieties in the solid in the micrometric scale.

Another important field which offers many new opportunities to organosilicon chemists corresponds to the access to nanoporous materials. This methodology can provide well-organised devices, and the possibility to introduce functional groups either in the channels or in the framework. These materials are creating a tremendous amount of potentialities especially in the field of physical properties. In this area the absolute compatibility between silicon and carbon chemistries provides many opportunities to organosilicon chemists to couple different properties in well-organised materials.

Most of these scientific goals are well illustrated in this issue.

In conclusion, organosilicon chemistry will be involved at least in part in a new chapter of chemistry. The knowledge already achieved creates new fields of research oriented in terms of properties. In this area the only limitation for the chemist is mainly his own creativity.

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