Design of Biocompatible Gels from Pseudopeptidic Compounds

Laura González, M. Isabel Burguete, Santiago V. Luis, Vicente Martí-Centelles, Jenifer Rubio

Deparment of Inorganic and Organic Chemistry, University Jaume I, Avd. Sos Baynat s/n 12071, Castellón, Spain.
lmendoza@uji.es

Keywords: *Pseudopeptides, organogelators, thermal stability*

The preparation of gelating compounds has attracted the interest among chemists due to their many applications, including alimentary industry, cosmetics or medicine. Gels are formed when a compound present in a solution forms a highly cross-linked fibrillar network in which the solvent molecules remain entrapped. The resulting material have intermediate character between solids and liquids. Usually, gels are classified according to the nature of the solvent involved. Thus, hydrogels refer to gels formed in the presence of water, while organogels are those in which organic solvents are involved. The efficiency of a given gelator is defined by: the minimum concentration of the compound in a given solvent at which the gel is formed; the solvents for which the compounds are able to act as the gelator; and the stability of the gel in the presence of external stimuli such as pressure, temperature or pH changes.

Most of the commercial gels, based on polymeric gelators, are becoming a new class of emerging pollutants. According the use of low molecular weight gelators has an increasing interest. Moreover, because these materials are built by the self-assembling of building blocks using non-covalent interactions that are reversible and highly controllable. This allows a more efficient design and fine-tuning of gelating agents. In general, good gelators can act in concentrations as low as 1–5% (w/w), or even lower.

As a consequence, a large number of technological and industrial applications have recently been reported, such as cosmetics, development of separation processes or controlled drug release. Moreover, gels can be formed/destroyed by changes in temperature, pH, or a particular biomolecule. First of all, topical application in the form of gel increases the contact time, thus favoring the action of the active principles. In addition, this limits the application to the specific desired area, reducing the side effects on other areas, i.e., local irritation.

In this context, we will present our efforts towards the design and preparation of biocompatible organogelating based of pseudopeptidic structures similar to those depicted in Figure 1.[1–3] The simple and very efficient synthetic procedure allows a modular variation of a large number of structural parameters. Very interestingly, many of the compounds obtained, based on natural amino acids as starting materials and therefore biodegradable, have revealed to act as very efficient organogelators, reflecting their intrinsic chirality in the self-assembly fibers, provide in-situ gelation in water/alcohol systems,[2] or give place to high-temperature stable gels in a large variety of solvents at low concentrations.[3]

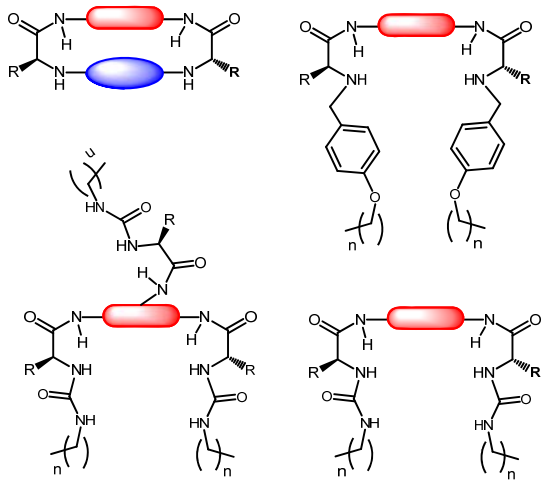

Figure 1. General structure of the organogelating compounds.

Acknowledgements

Financial support has been provided by MINECO (CTQ2012-38543-C03-01), GV (PROMETEO/2012/020 and ACOMP 2012/117) and BALTGELS (VAL-2012+01).

References

1 J. Becerril, M. I. Burguete, B. Escuder, F. Galindo, R. Gavara, J. F. Miravet, S. V. Luis, G. Peris *Chem. Eur. J.* **2004**, *10*, 3879-3890

2 J. Rubio, I. Alfonso, M. I. Burguete, S. V. Luis *Chem. Commun.* **2012**, 48, 2210-2212

3 J. Rubio, V. Martí-Centelles, M. I. Burguete, S. V. Luis *Tetrahedron* **2013**, *69*, 2302-2308