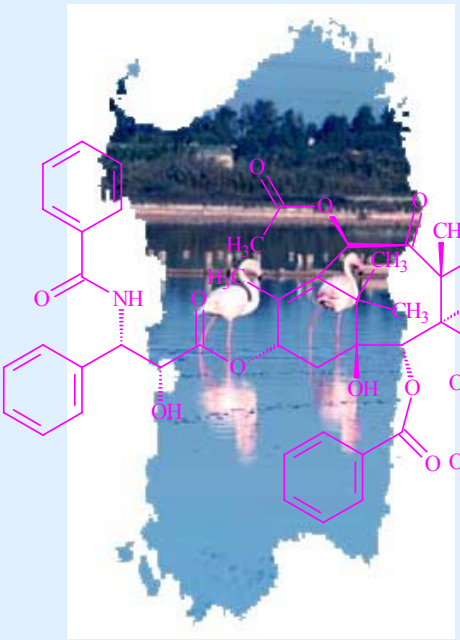
SardiniaChem 2006

GIORNATA DI STUDIO DEDICATA ALLA CHIMICA ORGANICA DELLE MOLECOLE BIOLOGICAMENTE ATTIVE

5 Giugno 2006, Complesso Universitario di Monserrato, Cagliari



COMITATO ORGANIZZATORE:

Salvatore Cabiddu - Università di Cagliari, Giovanna Delogu - CNR Sassari,

Pier Paolo Piras - Università di Cagliari, Giampaolo Giacomelli - Università di Sassari

HANNO CONTRIBUITO ALLA REALIZZAZIONE DEL CONVEGNO:

UNIVERSITÀ DI CAGLIARI; UNIVERSITÀ DI SASSARI-Dipartimento di Chimica; CNR-Istituto di Chimica Biomolecolare, Sezione di Sassari; SIGMA-ALDRICH Srl; EXACTA+OPTECH Sardegna S.r.l., CARLO ERBA REAGENTI; VWR INTERNATIONAL s.r.l.

STUDY OF HYDROGELS BASED ON POLYACRILAMIDE AS NEW CONTROLLED RELEASE DOSAGE FORMS PRODUCED BY FRONTAL POLYMERIZATION

R.Sechi[1], E.Gavini[1], A.Mariani[2], S.Bidali[2], M.C.Bonferoni[3], V.Sanna[1], G.Rassu[1], G.Pirisino[1], P.Giunchedi[1]

[1]Dipartimento di Scienze del Farmaco, University of Sassari
[2]Dipartimento di Chimica, University of Sassari
[3]Dipartimento di Chimica Farmaceutica, University of Pavia

Hydrogels based on polyacrylamide and N-isopropylpolyacrylamide are known as temperature sensitive polymers (1) which undergo relatively large and abrupt, physical or chemical changes in response to temperature changes. Because of these properties, they are used in the pharmaceutical field for the preparation of controlled release dosage forms.

Frontal Polymerization (FP) is a technique recently used for the synthesis of macromolecules (2,3), in which the heat released during the conversion from monomer to polymer is responsible for the formation of a hot front which is able to self-sustain and propagate throughout the whole reactor. The front is generated as a result of the ignition (thermal, catalytic or with a source of light) of the reaction of polymerization in a localized zone of the reactor. When the front has formed and it has reached the stationary state, further external contributions of energy are not necessary for the reaction to propagate.

The work purpose was the evaluation of the potential application of the Frontal Polymerization (FP) technique as a new method for the preparation of controlled release dosage forms based on polyacrilamide, in which the drug loading and the polymer preparation occur at the same time.

Diclofenac sodium salt was chosen as a model drug. Polyacrylamide systems, characterized by two different degrees of cross-linking, were obtained using the FP. Similar systems were also prepared by polymerization *in bulk* (classical polymerization) for comparison. Drug-free samples were prepared by both synthetic methods.

The stability of the drug during the sample preparation was evaluated by IR analysis. The obtained samples were characterized in terms of drug content, morphology, *in vitro* drug release and swelling properties. Samples were studied as powder or disks.

The results show that the drug does not modify during the the polymerization reaction. Samples characterized by the low degree of cross-linking show drug loading (%) values always higher than samples with high degree of cross-linking regardless the preparation method employed. The *in vitro* drug release rate and the swelling ratio decrease when the degree of cross-linking increase. Loaded-samples swell more than drug-free samples; moreover the degree of swelling is higher in the sample prepared by FP compared to those obtained by classical polymerization. An opposite behaviour has been observed in the case of the samples characterized by high degree of cross-linking. From these preliminary results the systems prepared could be proposed as new controlled release dosage forms .

1) Eun Seok Gil, Samuel M. Hudson, Stimuli-responsive polymers and their bioconjugates, Prog. Polym. Sci. 29 (2004) 1173–1222

2) A.Mariani, S.Bidali, S.Fiori, G.Malucelli, E.Sanna, e-Polimers 2003 n.*044.*

3) S.Fiori, A.Mariani, L.Ricco, S.Russo**,** First Synthesis of a Polyurethane by Frontal Polymerization, *Macromolecules 2003,* (36) ,2674.