

PHOTODEGRADATION OF DRUGS IN WASTEWATER, COMPARATIVE CORRELATED RECALCITRANCE ANALYSIS AND RELATED PROBLEMS

G.Visco*, M. Ricci**, F. Bellanti*, M. Castrucci* & L. Campanella*

* Rome University, Chemistry Department, La Sapienza, Rome, Italy

** Palmer, Parco Scientifico e Tecnologico del Lazio Meridionale, Latina, Italy

The World Health Organization defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity". Therefore the pharmaceutical production of the last 10 years has been not only addressed to cure the illnesses as existing, but also to contribute to the reaching of this wealth.

All that, however, has risked and still it risks, to cause an unjustified drug abuse with deleterious consequences both on the health itself of the man, and on the delicate ecosystems; in fact, the drugs reach the water courses spreading easily in the environment.

The presence of such substances negatively affects the ecosystem organisms and, for the mechanisms of bioaccumulation, it is possible their transfer into the food chain.

The importance of such problems is also highlighted by several initiatives of EU (ERAPharm, AquaStress, Rempharmawater, Eravmis, Poseidon) with the purpose to monitor the presence of drugs in the environment and to look for methods for their correct and effective abatement.

Such molecules, in fact, are on purpose synthesised in such a way to make their nominal content constant for long time in adverse environmental conditions.

The public opinion has become well aware, also because of heavy accidents, of the diffusion and riskiness of other substance categories as, for instance, pesticides, herbicides, parasiticides and, even if at small concentration, the industrial dyes.

In the environment the complex organic molecules are spontaneously subjected to a process called "photodegradation" for which UV rays of the solar radiation produce the C-C bonds break and, in longer times, the break of the entire molecule.

This work wants to compare the resistance to photodegradation (recalcitrance) of some drugs, that constitute a "new one" type of pollutants, with other already mentioned well more known categories.

By means of the simultaneous action of two light sources and of microwaves our research instrumentation, is able to promote very efficient photodegradation without however reaching the complete mineralisation of the molecule allowing us to obtain a recalcitrance scale.

For the study the following molecules were used: Terbutylazin, Nifuroxazide, Clofibrac Acid, Sulfamethoxazole, Ofloxacin, Acid Blue 29.

Substantially their recalcitrance resulted nearer to that one of dyes rather than of pesticides.