Terminology for biorelated polymers and applications (IUPAC Recommendations 2012)*

Michel Vert[1], Yoshiharu Doi[2], Karl-Heinz Hellwich[3], Michael Hess[4], Philip Hodge[5], Przemyslaw Kubisa[6], Marguerite Rinaudo[7], and François Schué[8]

[1]University Montpellier 1-CNRS, Montpellier, France; [2]RIKEN, Saitama, Japan; [3]Postfach 10 07 31, Offenbach, Germany; [4]Universität Siegen, Siegen, Germany; [5]University of Manchester, Manchester, UK; [6]Polish Academy of Sciences, Łódz, Poland; [7]CERMAV-CNRS, Grenoble, France; [8]University Montpellier 2, Montpellier, France

Like most of the materials used by humans, polymeric materials are proposed in the literature and occasionally exploited clinically, as such, as devices or as part of devices, by surgeons, dentists, and pharmacists to treat traumata and diseases. Applications have in common the fact that polymers function in contact with animal and human cells, tissues, and/or organs. More recently, people have realized that polymers that are used as plastics in packaging, as colloidal suspension in paints, and under many other forms in the environment, are also in contact with living systems and raise problems related to sustainability, delivery of chemicals or pollutants, and elimination of wastes. These problems are basically comparable to those found in therapy. Last but not least, biotechnology and renewable resources are regarded as attractive sources of polymers. In all cases, water, ions, biopolymers, cells, and tissues are involved. Of particular interest is the domain of the so-called "degradable or biodegradable polymers" that are aimed at providing materials with specific time-limited applications in medicine and in the environment where the respect of living systems, the elimination, and/or the bio-recycling are mandatory, at least ideally.

The aim of the recommendations is to provide a terminology usable without any confusion in the various domains dealing with biorelated polymers, namely, medicine, surgery, pharmacology, agriculture, packaging, biotechnology, polymer waste management, etc. This is necessary because (i) human health and environmental sustainability are more and more interdependent, (ii) research, applications, norms, and regulations are still developed independently in each sector, and (iii) non-specialists like journalists, politicians, and partners of complementary disciplines are more and more implicated and need a common language.

Keywords: biodegradability; biomaterials; biomedicine; bioresorbability; degradability; dentistry; environment; IUPAC Polymer Division; polymers; pharmacology.

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For full paper please see the following:

Pure Appl. Chem., **84**(2), 377 – 410 (2012)
http://dx.doi.org/10.1351/PAC-REC-10-12-04

*Sponsoring body: IUPAC Polymer Division
‡Corresponding author

TERMS WITH RECOMMENDED DEFINITIONS

Abiotic
Abiological
Absorption (chemistry)
Acute toxicity
Adhesion
Adsorption
Aerobic biodegradation
Aggregate
Agglomerate
Anaerobic biodegradation
Artificial
Artificial organ
Artificial polymer
Autocatalytic reaction
Bioactive
Bioactivity
Bioadhesion
Bioalteration (polymer)
Bioassay
Bioassimilation
Bioattachment
Bioavailability
Biobased
Biocatalyst
Biocompatibility
Biocompatibility (biomedical therapy)
Biodegradability
Biodegradable
Biodegradable (biorelated polymer)
Biodegradation
Biodegradation (biorelated polymer)
Biodisintegration
Bioerosion
Biofilm
Biofragmentation
Biological activity
Biomacromolecule
Biomass
Biomaterial
Biomedical
Biomineralization
Bioplastic
Biopolymer
Bioprosthesis
Bioreactor
Biorelated
Bioresorbability
Bioresorbable
Bioresorption
Biostability
Biotechnology
Biotic
Bone cement
Bulk degradation
Carcinogenicity
Catalyst
Chain scission
Chain cleavage
Chiral
Chirality
Chronic toxicity
Complement
Compost
Composting
Conditioning film
Conjugate
Controlled delivery
Controlled release
Degradability
Degradable
Degradable macromolecule
Degradable polymer
Degradation
Degradation (biorelated polymer)
Degree of bioassimilation
Degree of biodegradation
Degree of biodisintegration
Degree of biofragmentation
Degree of biomineralization
Degree of degradation (biorelated polymer)
Degree of disintegration
Degree of fragmentation
Degree of mineralization
Denaturation
Depolymerase
Depolymerization
Deterioration
Disintegration
Dissolution (polymer)
Drug
Drug carrier (biorelated polymer)
Drug delivery
Durability
Ecocompatible
Ecotoxicity
Environmentally degradable polymer
Environmentally friendly
Enzymatic decomposition
Enzymatic degradation
Enzyme
Erosion
Excipient
Foreign body reaction
Fragmentation
Genetic engineering
Graft
Green chemistry
Green polymer
Heterogeneous degradation
Homogeneous degradation
Host response
Hybrid artificial organ
Hydrolases
Hydrolysis
Immunogenicity
Implant
Inhibitor
Life cycle assessment
Litter
Macromolecular drug
Macromolecular prodrug
Macromolecule
Material
Maximum degree of biodegradation
Medical device
Medicine
Micelle (polymers)
Microcapsule
Microparticle
Microsphere
Mineralization
Mulching film
Nanocapsule
Nanoparticle
Nanosphere
Opsonin
Pharmaceutical
Pharmacodynamics
Pharmacokinetics
Pharmacologic
Pharmacological
Pharmacologically active
Pharmacology
Plastic
Polymer
Polymer molecule
Polymerase
Polymeric molecule
Polymeric drug
Polymerization
Prodrug
Prolonged delivery
Prosthesis
Resorption
Scaffold
Smart polymer
Solid dispersion (polymer)
Solid solution
Solvolysis
Stealth (biomedical polymer)
Stimulus-responsive polymer
Sustainability
Sustainable chemistry
Sustained delivery
Swelling
Synthetic biopolymer
Targeting
Theoretical degree of biodegradation
Therapeutic polymer
Thrombogenicity
Tissue engineering
Toxicity
Transplant
Ultimate degradation
Waste
Waste management
Weathering