



Polymers in our daily life

Hasan Namazi^{1,2*}

¹Research Laboratory of Dendrimers and Nanopolymers, Faculty of Chemistry, University of Tabriz, Tabriz, Iran

²Research Center for Pharmaceutical Nanotechnology, Tabriz University of Medical Sciences, Tabriz, Iran

Article Info



Article Type:
Editorial

Article History:

Received: 1 June 2017
Accepted: 10 June 2017
ePublished: 16 June 2017

Keywords:

Macromolecule
Monomer
Natural polymer
Polymer
Synthetic polymer

Summary

Polymers are widely used advanced materials, which are found almost in every material used in our daily life. To date, the importance of polymers has been much more highlighted because of their applications in different dominions of sciences, technologies and industry – from basic uses to biopolymers and therapeutic polymers. The main aim of this editorial is to accentuate the pragmatic impacts of polymers in human daily life.

Author's Biosketch

Professor Hassan Namazi received his PhD in natural polymer chemistry from University of Dalhousie, Canada in 1995 with a minor in dendrimer and carbohydrate chemistry.



He joined to the University of Tabriz as the staff member in 1996 and now serves as full professor. He has published 4 books and 138 scientific papers in highly ranked journals. In 2010, he won an award and honor diploma from Iranian Academy of Medical Sciences as the top distinguished researcher in Iran. He has also received many academic awards and national medals of merit for outstanding research activities in 2000, 2001, 2003 and 2004.

The polymers, a word that we hear about it a lot, is very vital and one cannot imagine the life without it. Polymers, a large class of materials, consist of many small molecules named monomers that are linked together to form long chains and are used in a lot of products and goods that we use in daily life.¹

Since many years, people used polymers in their life but they did not know it well almost until World War II. There were relatively few materials available for the manufacture of the article needed for a civilized life. Steel, glass, wood, stone, brick, and concrete for most of the construction and cotton, wood, jute, and a few other agricultural products for clothing or fabric manufacture were used.

The rapid increase in demand for the manufactured products introduce the new materials. These new materials are polymers, and their impact on the present way of life is almost incalculable. Product made from polymers are all around us: clothing made from synthetic fibers, polyethylene cups, fiberglass, nylon bearings, plastic bags, polymer-based paints, epoxy glue, polyurethane foam cushion, silicone heart valves, and Teflon-coated

cookware. The list is almost endless.²

The word “polymer”, or sometimes “macromolecule”, is derived from classical Greek *poly* meaning “many” and *meros* meaning “parts”. The polymer molecule has very high molecular weight (between 10 000-1000 000 g/mol) and consists of several structural units usually bound together by covalent bonds.^{1,3}

Polymers are obtained through chemical reaction of monomers. Monomers have the ability to react with another molecule from the same type or another type in the suitable condition to form the polymer chain. This process in nature has resulted to the formation of natural polymers, while the synthetic polymers are man-made.

Polymers have been around us in the natural world since the very beginning (e.g., cellulose, starch, and natural rubber). Man-made polymeric materials have been studied since the middle of the nineteenth century. Today, the polymer industry has rapidly developed and is larger than the copper, steel, aluminum and some other industries combined.⁴

Both natural and synthetic polymers are remarkably



*Corresponding author: Hasan Namazi, Email: namazi@tabrizu.ac.ir



© 2017 The Author(s). This work is published by BioImpacts as an open access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by-nc/4.0/>). Non-commercial uses of the work are permitted, provided the original work is properly cited.

involved in comfort and facilitation of human life and are responsible for life itself, for medication, nutrition, communication, transportation, irrigation, container, clothing, recording history, buildings, highways, etc. In fact, it is difficult to imagine human society without synthetic and natural polymers. In our ever-increasing technological world, science plays a crucial role in providing solutions to critical problems of food, clean and abundant water, air, energy, and health. The knowledge of polymers and related texts provide both the information and insights of their better understanding in our life. The information collected from the basic science courses lead to understanding the polymers. This information includes factual, theoretical, and practical concepts presented in science. It is of use to those who want to be simply well educated, as well as to those who like to pursue medicine, engineering, physics, chemistry, biomedical sciences, law, business, etc.^{2,3}

Synthetic and natural polymers could be used in the form of inorganic and organic polymers; coatings, elastomers, adhesives, blends, plastics, fibers, caulks, ceramics, and composites. The basic principles that are applied to one polymer category are applied to all other categories along with a few simple fundamental rules. These fundamentals are integrated into the fabric of the polymer texts.⁴

It is not surprising that nearly all material scientists and more than half of all chemists and chemical engineers, a large number of physicists, textile technologists, mechanical engineers, pharmacists and other scientific groups are involved in research and development projects related to polymers.⁵ In addition, the fact that pharmacy, biomedicine, molecular biology, biochemistry, and biophysics are the fields that polymers and polymer chemistry play a significant role in the development of their new areas. It is obvious why the study of giant molecules is one of the most attended and the fastest growing fields of science. Therefore, it seems that polymer is not a specialized interdisciplinary or branch of chemistry.

Instead, it is a specialized, broad and unique discipline that could cover some parts of chemistry and several other scientific fields as well. The fields of science have always become very active when research groups trained in one specialized field turn their interests to a related field. This has always been and in the future, will be especially true in polymer research works. The requirement in polymer is the application of ideas and chemistry knowledge and techniques to complex materials and macromolecules. This is a fundamental task, and it demands the very best ways that chemistry could provide.⁶

Perhaps polymer chemistry, more than any other research field, crosses over and cuts the traditional lines of all branches of chemistry, biology, physics, material, engineering, pharmacy, and even medicine. And, a newcomer to polymer science requires enough ability to mix together the vast knowledge from all aforementioned fields. Therefore, this editorial has been written to show the very significant and unforgettable roles of polymers in human life.

Competing interests

The author declares no competing interests.

Ethical approval

There is none to be declared.

References

1. Elias H-G. An Introduction to Polymer Science. Weinheim: VCH; **1997**.
2. Belgacem MN, Gandini A. Monomers, Polymers and Composites from Renewable Resources. Elsevier; **2011**.
3. Billmeyer FW. Textbook of Polymer Science. New York: Wiley-Interscience; **1971**.
4. Karak N. Fundamentals of Polymers: Raw Materials to Finish Products. PHI Learning Pvt Ltd; **2009**.
5. Pillai O, Panchagnula R. Polymers in drug delivery. *Curr Opin Chem Biol.* **2001**;5:447-51.
6. Chanda M, Roy SK. Industrial Polymers, Specialty Polymers, and Their Applications. Boca Raton: CRC Press; **2008**.