

This book was written by Joanne Rowling as a goodbye with the series of novels about Harry Potter. There are 7 copies of the book, and all of them had been written by hand and illustrated by the author. All the books were leather covered and decorated with silver and semiprecious stones. J. K. Rowling gave 6 copies to her close friends. The last copy, moonstone edition, was put up for auction in 2007. Revenue was donated to charity. Estimated cost of the book was about 100 000\$, but the book was sold for 4 000 000 \$.

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POLYMERS: THE USE OF POLYMERS IN DENTISTRY AND COSMETOLOGY

Look around! Practically all objects around us contain plastics or polymers. For example, it is a plastic bag in a supermarket or a window in a new block of flats, shellac for lady's manicure, hair-brushes, overwraps and many other things we use every day. More than that, we also have polymers inside of us.

The goal of our research is to find and analyse the ways of use of polymers in dentistry and cosmetology. Healthy and beautiful teeth and skin are very important for each woman.

The term "polymer" is commonly used today in the plastics and composites industry. It is often used as a synonym for "plastic" or "resin." A polymer is a chemical compound with molecules bonded together in long repeating chains. Because of their structure, polymers have unique properties that can be tailored for different uses.

Polymers can be of different origin: man-made and naturally occurring. Rubber, for example, is a natural polymeric material that has been used by man for thousands of years. It has excellent elastic qualities. It is the result of a molecular polymer chain created by mother-nature. The most common natural polymer on earth is cellulose, an organic compound found in the cell walls of plants. It is used to produce paper products, textiles, and other materials such as cellophane.

Man-made or synthetic polymers include materials such as polyethylene (the most common plastic in the world, found in everything from shopping bags to storage containers) and polystyrene (the material used to make packing peanuts and disposable cups). Some synthetic polymers are

pliable (thermoplastics), while others are permanently rigid (thermosets). Still, others have rubber-like properties (elastomers) or resemble plant or animal fibers (synthetic fibers). These materials are found in all sorts of products around the world, from swimsuits to cooking pans.

Bones and teeth, the hard tissues in the human body, are made partly of organic and partly of inorganic material. The modern era's use of dental polymers began with natural rubber for dentures. Vulcanized rubber, a plant-derived latex **crosslinked** with sulfur, was introduced as a *denture base* material in 1853. At about the same time, celluloid, a nitrocellulose material was adapted as a **denture base** material. Both materials offered advantages over the wood, bone, ivory, and ceramics used at the time, but each also had substantial drawbacks. An early advance was a combination of the two materials as a "composite" structure.

As described above, polymeric materials are used in a variety of dental applications. Hardly a single clinical procedure is accomplished without the use of one or more of these products, typical applications of which include the following:

Prosthodontics: denture bases and teeth, soft liners, custom trays, impression materials, core buildup materials, temporary restoratives, cementing/luting materials, and maxillofacial prostheses;

Operative Dentistry: dentin bonding agents, cavity fillings, resin and glass-ionomer cements, pit and fissure sealants, splinting materials, and veneers;

Orthodontics: brackets, bracket bonding resins and cements, and spacers;

Endodontics: gutta-percha points, root canal sealants, and rubber dams;

Equipment: mixing bowls and spatulas, mouth guards (sports equipment), and protective eyewear.

Polymeric resins are increasing in use for restoring and replacing tooth structure and missing teeth. These resins can be bonded with other resins, directly to tooth structure, or to other restorative materials such as amalgam. If all teeth are missing, a denture base with attached denture teeth can be made to restore chewing ability. Most of these restorative and prosthetic applications are based on methacrylate resins. More recently, epoxy resins and related silorane materials, based on ring-opening mechanisms, have been introduced.

Pick up a cream, shampoo, conditioner, foundation, mascara, or nail polish and read the ingredients. You will find a lot of polymers there. Originally, cosmetics and beauty products used natural plant and mineral ingre-

dients, including castor and olive oils, aromatic oils, beeswax, rosewater, henna, carbon, gelatin, egg whites, safflower, and rice powder. Natural makeup was used to some extent on every continent until the 20th century when — influenced by the movie industry — the mass production of cosmetics began.

Let's take a closer look at the polymers used in cosmetics nowadays. Water-based formulations are often quite fluid in nature, and polymers are used to change their rheology, i.e., to increase viscosity, thicken, or gel them. Natural polymers such as starch, alginates, polysaccharides, pectin, gelatin, agar, and cellulose derivatives can be used to this end. On the synthetic side, polyacrylate derivatives and polyacrylamide polymers are most popular for this purpose. Hair products typically use cationic polymers, since hair is negatively charged. Natural products include polysaccharides, such as starch and cellulose derivatives, natural gums, and hydrolyzed proteins. Synthetic hair-friendly polymers include polyvinyl pyrrolidone and acetate, polyvinylamides, polyacrylates and polymethacrylates, polyurethanes, and silicones. Polymers can serve as delivery systems for active cosmetics components, such as antioxidants and antimicrobials. Natural antioxidants, such as vitamins C and E, grape seed extract, horse chestnut extract, and celery or cucumber extracts are used, along with synthetic extracts like butylated hydroxyanisole or butyl hydroxyl toluene. Polymer carriers can physically entrap the active component, preserving its biological stability, or the bioactive component can be incorporated chemically into a polymer chain or pendant group, then released through hydrolysis.

Polymers are a big part of our everyday life. We find them literally in every object we can see or touch. Every year the application of polymers increases rapidly. In future we hope to invent a new type of chemicals to easier human's life.

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POISONS

Poisons are substances that, even taken in small doses, cause a disruption of the body vital activity: poisoning, disease, pathological conditions and death.

Poisons may be classified