

Bio-polymer
chemistry
assessment task
flashcard



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Production of Materials: Chemistry Assessment Task Part A: Biopolymers

Definition: The term “ Biopolymer” refers to polymers that are produced by living organisms. Since these are polymers, biopolymers contain monomeric units that are covalently bonded to form larger structures. Biopolymers are divided up into 3 main classes. These are: Polynucleotides (which include RNA and DNA), Polypeptides (short polymers of amino acids) and Polysaccharides. Examples of some Biopolymers include: Cellulose, Starch and Proteins. Source: <http://en.wikipedia.org/wiki/Biopolymer#Polypeptides>

Biopolymer: Polylactic acid

Formation: PLA is produced from a renewable source. For example corn. Corn is harvested and then milled to extract the starch from the raw materials. From the starch, dextrose is produced. The dextrose is then fermented, transforming into lactic acid. The lactic acid is altered into a polymer by the process of condensation, then forming long chain molecular compounds into polylactic acid. The organism is Lactic Acid. Source: <http://www.hitachi-pt.com/products/ip/process/pla.html> Properties and Uses: Being able to degrade into lactic acid, PLA is used as medical implants in the form of screws, pins, rods and as a mesh.

PLA can also be used as a compostable packaging material. Cups and Bags have been made out of PLA. In the form of film, PLA shrinks upon heating allowing it to be used in shrink tunnels. PLA is also useful for producing loose-fill packaging, compost bags and disposable tableware. PLA can also be used in treatment in the body. Depending on the exact type used, it breaks down in the body within 6 months to 2 years. This degradation is

desirable for a support structure because it gradually transfers the load to the body as the organ heals.

Source: http://en.wikipedia.org/wiki/Polylactic_acid#Manufacturers

Assessment: The impact of PLA on the society is that due to the high demand for PLA products from resources such as corn, corn growers have been tampering with the genes of the corn to produce higher yields in order to suffice the demand. Even though PLA is biodegradable it still takes at least three months in a controlled environment to properly break down into its components. However it is estimated to take 100 to 1000 years to decompose in landfill.

PLA is also from a different origin than regular plastics, therefore it needs to be kept separate when recycling. PLA is an alternative to the common plastic bag or plastic cup since it can be recycled which can be useful to the society.

Source: <http://www.scientificamerican.com/article.cfm?id=environmental-impact-of-corn-based-plastics>

Judgement: Even though PLA is an alternative to common plastic due to it being recyclable and biodegradable, PLA still needs to be refined to make it more efficient to produce, be cost effective and to be able to degrade at a much faster rate.

Part B: Batteries Sources: Vertex Learning Centre: Book, HSC chemistry, Vertex Learning Centre: Book, Production of Materials Section 6 and 7 Button Cell Plastic seal Zinc case Graphite rod Electrolyte Negative terminal Positive terminal Plastic seal Zinc case Graphite rod Electrolyte Negative terminal Positive terminal Leclanche Cell (Dry Cell) Sources: <http://www.comf-hk.com>

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