

Biodegradable plastics

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What is plastics ???

- ▶ Organic polymers such as **Polythylene**, **PVC** , **nylon** etc that can be moulded into shape, while soft and then set into a rigid or slightly elastic form.
- ▶ But nowadays plastics are major problems

What is biodegradable plastics??

- ▶ Biodegradable are plastics that can be decomposed by the action of living organisms (microbes into water, carbon dioxide and biomass).
- ▶ Biodegradable plastics are commonly produced with renewable raw material, microorganisms, petrochemical or combination of all three.
- ▶ Biodegradable plastics was introduced by **Calia Bastioli** (european patent office).

- ▶ Purpose ; less environment pollution. When biodegradable plastic breakdown (harmless , non-toxic elements).
- ▶ Made up ; bioplastic and compostable plastics(plant biomass- such as cotton, starch, sugarcane or wheat)
 1. Biodegradable plastic : poly(lactic acid) PLA
 2. Biodegradable plastic: polyethylene(bio- PE)
 3. Bio- based plastics : oil based plastics, Derived from plant-based material.

- ▶ **How it made :** Biobased plastic, made up of extracting sugar from plant like corn and sugarcane to convert into polylactic acid (PLAs).

History ;

- ▶ Plastic was first invented in 1862.
- ▶ 1862 : the first ever man made plastic was a bio-plastic it was made from cellulose nitrate and was called parlesine.

Types of Biodegradable plastics:

- ▶ Biobased plastic ; bioplastics are plastic materials produced from renewable biomass sources, such as vegetable fats and oils, corn starch, straw, woodchips, sanddust, recycled food waste etc.
- ▶ Bio- plastic - breaking down 60 percent or more, within 180 days or less.

- ▶ Bio- based plastics need water, heat and aeration.
- ▶ Takes longer time to decompose in landfills because of non- availability of aeration.
- ▶ The Bio-based plastic are non- recycled, eg; an example bio- based plastic is the cellulose fiber plastic, reconstituted cellulose and Ze.

- ▶ **Thermal plastic** ; A thermoplastic polymer used in a wide variety of applications used in everything from reusable plastic, containers, diapers, ropes, carpets, sanitary pads, piping system, car batteries, electrical cable insulation and filters for gases and liquids.
- ▶ Common examples of thermoplastics include **acrylic, polyester, polypropylene, polystyrene, nylon and teflon**.

- ▶ A thermoplastic or thermosoft plastic, is a plastic polymer material that become pliable or moldable at a certain elevated temperature and solidifies upon cooling.
- ▶ Oxo- biodegradable plastic
- ▶ Hydrodegradable
- ▶ Microdegradable

Examples ;

- ▶ **Polyhydroxybutyrate** ; PHB is a poly(hydroxyalkanoate) PHA, a biodegradable plastic produced by microorganisms first discovered by **Lemoigne in 1925**.
- ▶ It was found that several other bacterial strains could also produce PHB.
- ▶ PHB, most common polymer, a linear polyester of **1(-)- 3-hydroxybutyric acid**.

- ▶ **L and D lactic acid** ; many microorganisms produce lactic acid, *Lactobacillus* strains are particularly useful due to that high and tolerance and relative ease of genetic manipulation.

Advantages and disadvantages ;

- ▶ Advantages ;
 1. Carbon emission reduction.
 2. Consumes less energy.
 3. Less landfill area needed
 4. recyclable

► **Disadvantages ;**

1. Need for composter
2. Engineering issue
3. Risk of contamination

Applications ;

- ▶ Bioplastics can be used manufacturing of shopping bags.
- ▶ Sony has replaced its employees ID cards using bioplastics, so it is evident that it can be developed into large scale practices.
- ▶ Utensils can be made from the bio- plastics.
- ▶ It is been used for making auto parts in toyota plants.

Conclusion ;

- ▶ Important and exciting new field.
- ▶ Promises to help save the environment slows the depletion of non- renewable resources.
- ▶ Still a technology in its infant phases.
- ▶ Implementation of the correct disposal methods and corresponding infrastructure are vital if the bioplastics industry is to flourish and deliver environmental benefits.

Antibiotics

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What is antibiotics ??

- ▶ “**Antibiotics**” is used to kill or suppress the growth of other microorganisms.
- ▶ Substances derived from a microorganism or produced synthetically (sulfonamides & Quinolous).

- ▶ **Definition of Antibiotics** ; chemical substances produced by various miroorganisms that have capacity to inhibit or destory other microorganisms.
- ▶ Nowadays, they are chemically synthesized drugs.
- ▶ Antibiotics will not cure infections **caused by viruses**.

- ▶ **Antibiotics** ; chemical substances produced by microorganisms that inhibits the growth or kills other microorganisms.
- ▶ **Antimicrobial Agents** ; chemical substances from a biological source or produced by chemical synthesis that kills or inhibits the growth of microorganisms.

History of Antibiotics ;

- ▶ 1928 : Alexander Fleming, Accidentally discovered penicillin.
- ▶ Fungus growing it one of his culture. Fungus was inhibiting the bacteria.
- ▶ Fungus : penicillin notatum, later named - penicillin.

Types of Antibiotics ;

- ▶ Antibiotics are the most widely used chemotherapeutic agents.
- ▶ The following are the most used groups of antibiotics.
- ▶ **Penicillin** : penicillin are produced by penicillin species of fungi. they are harmful to gram positive bacteria they inhibit cell wall synthesis of bacteria.

- ▶ **Streptomycins** : streptomycins are produced by the bacterium *Streptomyces Griseus*. They are harmful to grampositive and gramnegative bacteria. It inhibit protein synthesis.
- ▶ **Tetracycline** : it is produced by the bacterium *Streptomyces Aureofaciens*. It inhibit protein synthesis

Penicillin ;

- ▶ Penicillin is a **secondary metabolite** produced by certain bacteria, which is used an **antibiotics**.
- ▶ Penicillin was discovered by accident in **1928** by **Alexander Fleming** , is the first antibiotics.
- ▶ Penicillin antibiotics include Ampicillin, Phenoxyethylpenicillin, Amoxicillin 1st- 4th generation.
- ▶ 50 drugs that are now classified as penicillin.

- ▶ It is an effective agent against Staphylococcus, Streptococci, Pneumococci, Meningococci and a few other bacteria.
- ▶ It is effective medicine for the treatment of **Syphilis**.
- ▶ Structure ; Penicillin exists in many forms, such as **Penicillin G, Penicillin V, Amphicillin** etc.

- ▶ Penicillin G is obtained from the cultures of Penicillium sp.
- ▶ Penicillin V obtained from the culture when it is added with Phenoxyacetic acid.
- ▶ Ampicillin is a semisynthesis penicillin.

- ▶ Production of Penicillin : **P.Chrysogenum** is high yielding strain and therefore most widely used as production strain.

Inoculum Preparation : Develop a pure inoculum in an adequate amount.

1. After getting growth on solid media, one or two growth stages should allowed in shaken and create suspension and transferred to seed tanks for further growth.(24-28 hours)



► Therapeutic uses of Penicillin :

1. Pneumonia
2. Respiratory Infection
3. Tooth and germ infection
4. Veneral diseases(Syphilis and gonorrhea)

Applications ;

- ▶ Compound that kill or inhibit the growth of other microorganisms.
- ▶ Most antibiotics are produced by filamentous fungi or Actinomycetes.
- ▶ Derived from microorganism & other living organism and produced on an industrial scale using fermentation process.

Conclusion ;

- ▶ The epidemiology of antimicrobial resistance is complex.
- ▶ Antibiotics clearly save lives.

References ;