PLASTIC RECYCLING

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Overview

- The arrival of the “Age of Plastic” in 1950s
- Plastic is a material consisting of any of a wide range of synthetic or semi-synthetic organics that are malleable and can be molded into solid objects of diverse shapes.
- Its popularity is part of the problem: we now use about 20 times more plastic than we did 50 years ago.

- Plastic is one of the world's most-used materials.
- Technically sophisticated, lightweight and cheap, plastics suit a broad spectrum of uses.
- The problem with plastic lies not in how it is used, which is generally harmless, but in end-of-life management of products made from it.
- Since 1950, close to half of all plastic has ended up in landfill or dumped in the wild, and only 9% of used plastic has been adequately recycled.

- Every year, it is estimated that 4 to 12 million metric tons of plastic waste ends up in the oceans.
- How plastic waste is processed remains extremely variable from country to country, and recycling remains considerably under-used.
- On the one hand, developed economies with regulations that encourage it have recycling rates around 30%.
- On the other hand, developing economies with a minimal industrial base have recycling rates close to 0%.

- And yet recycling is the best solution for processing plastic waste because it limits environmental impact and generates significant socioeconomic gains.
- However, at every stage of the plastic life cycle, there remain a large number of impediments to the development of recycling.
- By taking steps to promote recycling, manufacturers of plastic products, regulators, waste managers and consumers can all exert significant influence on the development of the recycling sector.
- However, we can optimise the lifespan of plastics by reusing and recycling items as many times as possible.

The different types of plastic

- Biodegradable plastic.
- Compostable plastic.
- Degradable plastic.
- Non-biodegradable plastics

biodegradable, degradable and compostable bags cannot be directly recycled

Biodegradable plastic

- Biodegradable plastics are plastics that can be decomposed by the action of living organisms, usually microbes, into water, carbon dioxide, and biomass.
- Biodegradable plastics are commonly produced with renewable raw materials, micro-organisms, petrochemicals, or combinations of all three.

- there is no particular timescale specified for this degradation – under some conditions it can take many years.

Compostable plastic

- Compostable means that a plastic will break down into natural elements, but only in a compost setting.
- made from plants and other organic materials, such as corn starch, bagasse, or PLA (Polylactic Acid- corn starch, sugar cane) plastic.
- break down much faster, many in roughly 90 days.
- break down into nutrient-rich products, which generates healthy soil for the planet.

- cost-efficient, non-petroleum plastic production.

Degradable plastic

- Degradable products are mostly oil-based and they break down through chemical reactions rather than organically by microorganisms.
- do not break down completely and turn into organic material.
- they break apart into microscopic pieces which can still affect the environment.
- degrade and turn into small pieces, which animals ingest, causing major issues in the food chain.

Non-biodegradable plastics

- cannot be decomposed by the biological processes
- A kind of plastic which cannot be broken down by natural organisms and acts as a source of pollution.
- The term non-biodegradable describes polymers that do not break down to a natural, environmentally safe condition over time by biological processes.
- low cost, versatility and durability.

- Non-biodegradable wastes that can be recycled are known as “Recyclable waste” and those which cannot be recycled are known as “Non-recyclable waste”.
- cannot be easily handled.

Difference between Biodegradable and non-biodegradable

S.No	Biodegradable	Non Biodegradable
1	Degradation process in Biodegradable waste is is rapid	Degradation process in Non-Biodegradable waste is slow
2	Biodegradable waste is decomposed and degraded by microbes	Non-Biodegradable waste is cannot be decomposed by microbes
3	Biodegradable waste are not accumulated but are used up in short time	Non-Biodegradable waste often accumulate
4	Biodegradable waste become part of biogeochemical cycles and give back rapid turnover	Most of Non-Biodegradable waste never enter into biogeochemical cycles, very slow and toxic
5	Biodegradable waste are used to produce energy manure, compost and biogas	Non-Biodegradable waste can be separated and recycled but the process is very expensive

PET

Polyethylene Terephthalate

Common Items: Water and pop bottles, some food packaging.

Recyclable: Yes, most common and easily recycled plastic. All Dakota County haulers accept PET in your curbside bin.

HDPE

High Density Polyethylene

Common Items: Milk jugs, detergent and cleaning bottles, hair care products.

Recyclable: Yes, HDPE is relatively simple to recycle and a cost-effective process. All Dakota County haulers accept HDPE in your curbside bin.

PVC

Polyvinyl Chloride

Common Items: PVC pipes, blister packs, children's' and pets' toys, and clamshell containers.

Recyclable: No, PVC contains numerous toxins and thus cannot be recycled. The exception to this rule is plastic clamshell containers as most Dakota county haulers now accept this material.

LDPE

Low Density Polyethylene

Common Items: Shrink wraps, squeezable bottles, and grocery, bread, and frozen food bags.

Recyclable: Depends on the item so check with your hauler. Items like plastic bags can be brought to drop-off locations like grocery stores to be recycled.

PP

5

Polypropylene

Common Items: Yogurt containers, straws, margarine and liquid bottles, and medicine bottles.

Recyclable: Depends on item so check with your hauler.

PS

6

Polystyrene

Common Items: Styrofoam, CD cases, meat trays, and plastic cutlery.

Recyclable: Generally no. Styrofoam is also extremely hazardous to the environment when thrown away, so it is best avoided if possible.

OTHER

7

Mixed/Miscellaneous

Common Items: Sports water bottles, baby bottles, lids, and electronic parts.

Recyclable: Usually not as it is such a broad category, but check with your hauler.

Harmful effects of Non-Biodegradable Plastic Products

- Life-Span of Non-biodegradable Materials
  - we are inadvertently framing a toxic legacy of plastic waste that will play havoc with future generations for centuries to come.
- Ground Water & Food Chain Contamination
  - Long-term exposure of synthetic materials to air, water & sunlight cause the release of highly toxic pollutants that can leach into water supplies.
  - over time these plastics oxidize & give out poisonous copper salt that pollute the land & enter the food chain.
- Air Pollution
  - Constant exposure of plastics to heat melts those resulting in the emission of gases into the atmosphere
  - toxic fumes to be released into the atmosphere.
  - Causes tuberculosis & other forms of respiratory tract infections.

Plastic recycling

- destroying plastics to reduce landfill wastage is not an option.
- Nearly all types of plastics can be recycled, however the extent to which they are recycled depends upon technical, economic and logistic factors.
- As a valuable and finite resource, the optimum recovery route for most plastic items at the ‘end-of-life’ is to be recycled, preferably back into a product that can then be recycled again and again and so on.

Plastic recycling

- Plastic recycling is the process of recovering scrap or waste plastic and reprocessing the material into useful products, sometimes completely different in form from their original state.
- Since plastic is non- biodegradable, recycling it is a part of global efforts to reduce plastic in the waste stream, especially the approximately eight million metric tonnes of waste plastic that enter the earth's ocean every year.

Benefits to be gained by the responsible recycling of plastics;

- ✓ Provides a sustainable source of raw materials to industry
- ✓ Greatly reduces the environmental impact of plastic-rich products
- ✓ Minimises the amount of plastic being sent to landfill sites
- ✓ Avoids the consumption of the Earth's oil stocks
- ✓ Consumes less energy than producing new, virgin polymers
- ✓ Encourages a sustainable lifestyle among children and young-adults

- By optimising the lifespan of plastics by reusing and recycling items as many times as possible, for example, by recycling used plastic bottles into new ones, we can reduce our need to create new plastic. This means we can:
  - conserve non-renewable fossil fuels (oil)
  - reduce the consumption of energy used
  - reduce the amount of solid waste going to landfill
  - reduce the emission of gases like carbon dioxide into the atmosphere.

How is it recycled?

- sorted
- Shredded
- Washed
- Melted
- pelletised.

It is a two-stage process:

1. sorting is mainly done automatically with a manual sort to ensure all contaminates have been removed
2. plastic is either melted down directly and moulded into a new shape, or shredded into flakes then melted down before being processed into granulates.