

PLASTIC POLLUTION

1. What are plastics ? : They are synthetic materials made from oil or natural gas. They are made by linking thousands of monomers (like bisphenol-A (BPA) and vinyl chloride.
 1. Polyethylene-bottles ,jars, bags and cups
 2. Polystyrene- cups and pellets
 3. Polypropylene-bottle caps and drinking straws
 4. PVC- shoes pipes and furniture
2. Various compounds produced by polymerization capable of being moulded, extruded or cast into shapes and films or drawings into filaments and then used as textile fabrics is known as plastic.
3. World's First fully synthetic plastic: Bakelite, invented in New York by Leo Hendrik Beckland. While producing Synthetic Varnish found new formula to make "plastic" (term coined by him) from coal tar. And he named it "Beckelite" - once formed could not

be melted. The term plastic comes from greek word “**Plasticos**” which means “**fit for moulding**”.

4. Plastics now are derived from **petroleum and coal tar**
5. **Hermann Staudinger: Father of polymer chemistry (SPC)**
6. **Herman Mark: Father of polymer physics.**
7. During the First World War plastic took off and acted as a substitute for wood, glass, metal during the hardships and after world war newer plastic were used.
8. **Terylene, Darcon Cloth and Hawaii chapels getting popularized in early 1960s.**
9. With this we entered into a **plastic Age** and it was considered as a “**common**”, a symbol of consumer society (It was inexpensive till then).
10. “High tech plastics”: Used in demanding field such as health, aviation and technology.

Thermoset	Thermoplastic
Material that strengthens when heated but cannot be remoulded after initial forming.	Materials which can be reheated, remolded and cooled as needed without causing and chemical changes.
They are rigid and hard	They are flexible and soft

11. **Anthropogenic materials**: materials that are created or influenced by human activities, rather than occurring naturally
12. Reasons for plastic pollution:
 1. Inexpensive
 2. Lightweight
 3. Strong
 4. Durable
 5. Easy to use
13. **About three metric tones of plastic is estimated to be entering the oceans every 15sec**
14. Polymers is composed of many

simple molecules that are repeating structural units called monomers. A single Polymer molecule may consist of hundreds to a million monomers and may have. Linear, branched or network structure. These polymers are:

1. easily moulded into complex shapes
 2. stiff and hard or flexible and soft
 3. have high chemical resistance
 4. more or less elastic
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14. Plastics—plastic pollution when they are not disposed off properly.
 15. In India plastic made a vigorous beginning in 1957 with the production of **polystyrene**
 16. “The market for plastic” was seeded by set owned Indian petro chemicals and it was in 1994 that plastic soft drink bottles became a visible source of annoyance

IMPACT OF PLASTIC ON

BIODIVERSITY

ANIMALS

1. Effects in Cattles: injecting plastic
 2. Entanglement: plastic wires se
 3. Effects in marine animals:
 1. Effects in corals
 2. Impacts of fishing gears(Ghost Fishing)
 3. Ingestion by marine animals
 4. Effects in Birds
 5. Spread of invasive species.
- Over 1000000 sea birds and 100000 marine animals and 1000s of sea turtles are killed by plastic every year

The ocean is heavily polluted because of plastics released from ships and rivers that flow into ocean. Dead beached whale are commonly found with stomachs full of plastics

Pollution

1. Phones and computers generate

e-waste like lead, brominated flame retardant and chromium which is carcinogenic.

2. Extrapolation of plastic waste generation data from 60 major cities shows that around 25940 tonnes of plastic waste is generated per day in India.
3. Plastic bags clog the drainage system causing floods in towns and big cities.
4. The cheap recycled plastic bags contain chromium, cadmium or lead based chemicals especially colored bags harmful to health: they leach into vegetables, meat and food items causing health hazards.
5. India's consumption of plastic bags is one of the highest in the world.
6. The slide highlights the conflict between traditional "waste nothing" values and modern consumerism, causing widespread plastic pollution.

It emphasizes the lack of awareness and proper waste disposal infrastructure. Moreover, it stresses the environmental impact, noting that hundreds of cows die annually from choking on plastic bags while consuming vegetable waste in garbage.

7. Ganges and two nearby waterways are responsible for pumping three billion microplastics into the Indian Ocean

OCEAN PLASTIC POLLUTION

1. Large plastic pieces can entangle marine animals while tiny peices broken down by the action of water and the sun cause harm by entering the Marine food chain
2. Once plastic reaches the oceans it is spread throughout the world by wind and global ocean currents
3. Fishing nets are usually made of plastics and van be left or lost in the

ocean by fishermen. They are known as ghost nets and these entangle fish dolphins, sea turtles , sharks dugongs seabirds crabs and other creature.

4. Impact: plastic restrict their movement, cause them to starve .
Laceration-damaging soft tissues and causing infections and causes suffocation to those who needs to return to the surface to breathe.
5. Plastic debris when bulky or tangled is difficult to pass and may become permanently lodged in digestive tracts of the animals which blocks the passage of the food and causes their death by starvation or infection
6. 80% of marine debris is plastic which has been increasing from the end of world war 2
7. Plastics photodegrade(to microplastics) on exposure to the sun causing their breakdown but they do so under proper dry conditions. But water inhibits this process and in marine environments plastics

photodegrade into ever smaller pieces while remaining polymers and even down to molecular level.

8. When floating plastics photodegrade down to zooplankton sizes, jellyfish attempt to consume them and in this way plastics enter the ocean food chain and many of these long lasting pieces of plastics end up in the stomachs of marine birds and animals including sea turtles and black footed albatross.

9. Microplastics bioaccumulate in fish and shellfish and then biomagnify through the food chain

10. There are five major circular currents Called gyres that plastic pollution accumulates in. (Gyres: large system of rotating ocean currents). They are namely: North Pacific, North Atlantic, south pacific, south Atlantic and indo-oceanic

11. The ocean cleanup has developed a trawl net to skim plastic from the

gyre and about 10 tonnes was collected from 79000 tons

12. **Boyan Slat (CEO of Sean cleanup):** Dutch inventor invented first ocean plastic cleanup system and he not be on the ship when it launches because he is seasick. Best inventions of 2015: *System 001*

- After five and a half years of hard work, **the 23-year-old Slat** will watch from dry land as *System 001* — a floating barrier **nearly 2,000ft long** — snakes its way out under **the Golden Gate Bridge** into the Pacific.
- Its destination is the Great Pacific Garbage Patch, a gyre of plastic waste twice the size of Texas held in position by ocean currents **between California and Hawaii.**

BISPHENOL A (BPA): A POTENTIAL HEALTH HAZARD

1. **BPA leaches from plastics and resins when exposed to hard use or at high temperatures** like in microwave or hot milk bottles.
2. **BPA is and endocrine disruptor because it mimics estrogen a natural**

hormone

3. It increases the incidents of heart diseases, diabetes , liver disorders, infertility , brain and homormone development problems in fetus and young children. It promotes breast cancer; brings about early puberty in girls and decreases sperm count in men.(Children are more exposed to BPA 93% BPA + out of those whose urine was tested)

BURNING PLASTIC

1. Burning of plastic released toxic poisonous gas called **DIOXIN**(polychlorinated dibenzo-p-doxin and polychlorinated dibenzopurans)
2. It contains chlorine and produced when chlorine and hydrocarbons are heated at high temperatures.
3. **Inhaling Dioxin can lead to lung cancer**

BANNING THE USE OF PLASTIC

1.in idgamandalam district of tamilnadu and Simla of UP the use of plastic bags is completely banned. MoEf has banned the use of plastics of particular dimensions.

RECYCLING OF PLASTIC

1. **Primary Recycling** – Similar or original product
2. **Secondary Recycling**– Product different from the original
3. **Tertiary Recycling** –Production of basic chemicals and fuels
4. **Quaternary Recycling** —Retrieves energy content by burning/incineration

They break down into tiny toxic particles that contaminate the soil and waterways and enter the food chain when animals accidentally ingest them.

The problems surrounding waste plastic bags starts long before they photodegrade.

Our planet is becoming increasingly contaminated by our unnecessary use of plastic bags.

A plastic bag can take between 400 to 1,000 years to break down in the environment.

As it breaks down, plastic particles contaminate soil and waterways and enter the food web when animals accidentally ingest them. ...

Plastic, comprising 8% by weight and 20%

by volume of municipal waste, is a visible and dominant pollutant due to its low density and slow decomposition.

Recycling scrap plastic is successful and economical, but recovering discarded plastic from consumers is challenging. Manual sorting of garbage for recycling is time-consuming and expensive.

Automated sorting, based on various physical, optical, or electronic properties of plastic, has been successfully developed and employed. However, these methods are difficult due to the variety of sizes, shapes, and colors of plastic.

Recycle refers to rubbish into useful products.

Recycling reduces the pollution by minimizing the energy spent during the manufacturing process which in turns reduces the greenhouse gases in the environment.

Recycling saves natural resources.

Plastic waste disposal through Plasma

Pyrolysis Technology(PPT) is the inversion of plastic waste into liquid fuel. Biodegradable plastics

DEGRADABLE PLASTIC

1. One success story was introducing **carbonyl groups** into polyethene by mixing **carbon monooxide with ethylene** during synthesis.
2. These carbonyl groups are **chromospheres that lead to chain breaking upon the absorption of UV light**
3. Bags made from corn starch has been introduced in India by greendiamz biotech ltd.
4. TRUEGREEN
5. AmpAcet
6. The compostable biodegradable plastic bags gets converted into invaluable compost under normal composting conditions which help to improve the nutritional quality of the soil.

