

# ALTERNATIVE TO *PLASTIC*



# INTRODUCTION

- ▶ The word plastic is derived from the Greek (plastikos) meaning capable of being shaped or molded.
- ▶ *Plastics are a range of synthetic or semi-synthetic polymerization products that can be molded into a permanent object having the property of **plasticity**.*

## Properties of Plastics

Resistant

Durable

Insulator

Inexpensive

Easy to  
produce

About 100 million tones of plastic is produced each year.



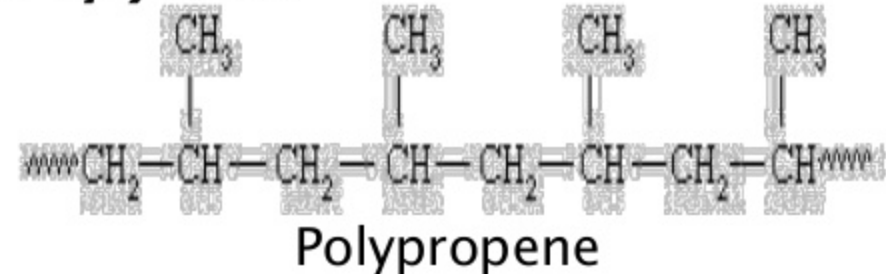
# COMPOSITION

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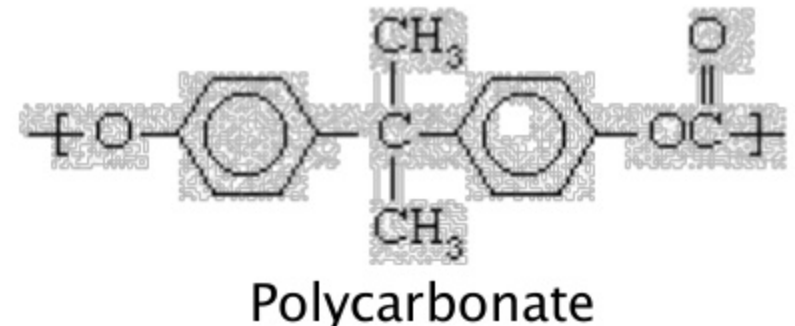
- ▶ Most plastics contain *organic polymers*. *The vast majority of these polymers are based on chains of carbon atoms alone or with oxygen, sulfur, or nitrogen as well.*
- ▶ ▪ Most plastics contain **Additives** (0 to 50%). *The average content of additives is 20% by weight of the polymer.*
- ▶ ▪ **Fillers** are used to improve performance and to reduce costs.
- ▶ ▪ **Stabilizers** like fire retardants are used to lower the flammability of the material.

# COMPOSITION

- Plastics that are made up of polymers having only aliphatic (linear) C atoms in their backbone chains. *Ex-polypropylene*



- Plastics that are made up of hetero chain polymers contain O, N, S in their backbone chains, in addition to C. *Ex -polycarbonate*



# CLASSIFICATION

## Thermoplastic

- Plastics that do not undergo chemical change in their composition when heated and can be molded again and again.

## Thermosetting

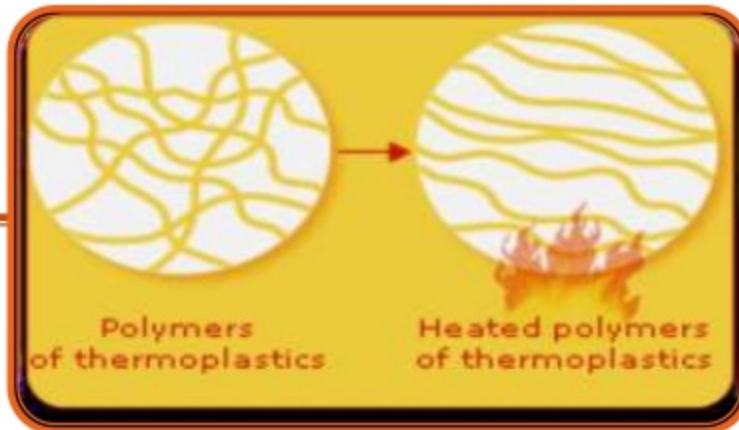
- Thermosets are permanently "set" once they're initially formed and can't be melted.

**Thermosetting 80% of the plastics produced are thermoplastics and of these Polyethylene, Polypropylene, Polystyrene and Polyvinylchloride(PVC) are most commonly used (70%)**



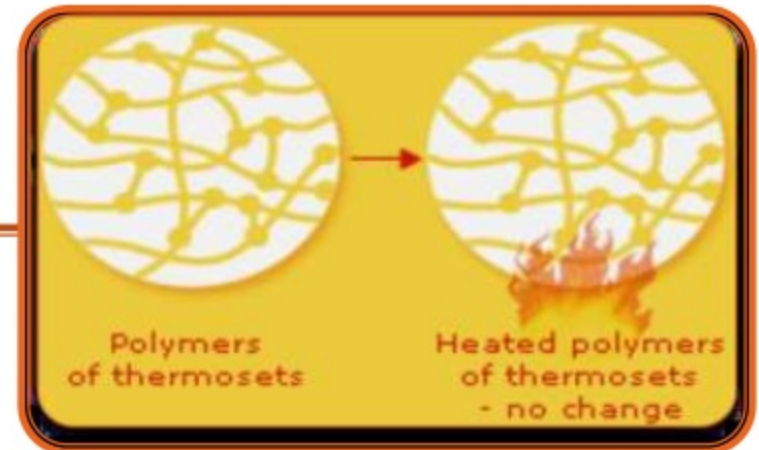
# REACTION ON HEATING

## Thermoplastic



**Thermoplastic Uses includes plastic wrap, food containers, lighting panels, garden hoses, and the constantly encountered plastic bag.**

## Thermoset



**Thermoset Uses includes kitchen tools, glues, varnishes, electronic components (circuit boards).**

# POLLUTANTS FROM PLASTICS

- ▶ ▪ **Plastics Release Pollutants:**
  - ▶ • Poly brominated di-phenyl ethers (PBDE)
  - ▶ • Nonylphenols
  - ▶ • Bisphenol A
  - ▶ • Phthalates
- ▶ ▪ **Plastics Absorb Hydrophobic Pollutants:**
  - ▶ • Polychlorinated biphenyls (PCBs)
  - ▶ • Dichloro Diphenyl Trichloro ethane (DDT)
  - ▶ • Dichloro Diphenyl Dichloro ethylene (DDE)

PVC when burned result in emissions of the deadly poisons named *dioxin*.

Dioxins are highly persistent compounds, with the potential to become increasingly concentrated in living tissues as they move up the food chain. It is often considered to be the man-made compound most toxic to animals.



# WHY IS THERE PLASTIC POLLUTION??

- ▶ • We currently recover only 5% of the plastics we produce.
- ▶ • Pollution exists today due to the society's lack of environmental awareness & the ease of simply littering plastics.





# WHO IS AFFECTED??

- ▶ *The species that is most affected is the marine, aquatic population.*
- ▶ To a sea turtle, a floating plastic bag looks like a jellyfish.
- ▶ When they eat these plastics, it clogs their intestines, and they miss out on vital nutrients, and ultimately the turtles starve to death.
- ▶ Other types of loose plastics entangle birds, fish and mammals, making it difficult, if not impossible to move or eat, which too leads to their ultimate demise.



# WHO IS AFFECTED??

- ▶ -0.05% of plastic pieces from surface waters are pellets
- ▶ -They comprise about 70% of the plastic eaten by seabirds.
- ▶ -These plastic particles have been found in the stomachs of 63 of the world's approximately 250 species of seabirds.
- ▶ -Birds and other marine animals gets trapped in plastic shopping bags, which suffocate them to death.



# PLASTICS > STATISTICS

Each year, an estimated 500 billion to 1 trillion plastic bags are consumed worldwide. That's over 1 million plastic bags used per minute.

Scientists estimate that every square mile of ocean contains about 46,000 pieces of floating plastic.

Plastic bags can take up to 1,000 years to break down.

At least 267 different species are known to have suffered from entanglement or ingestion of plastic marine debris.

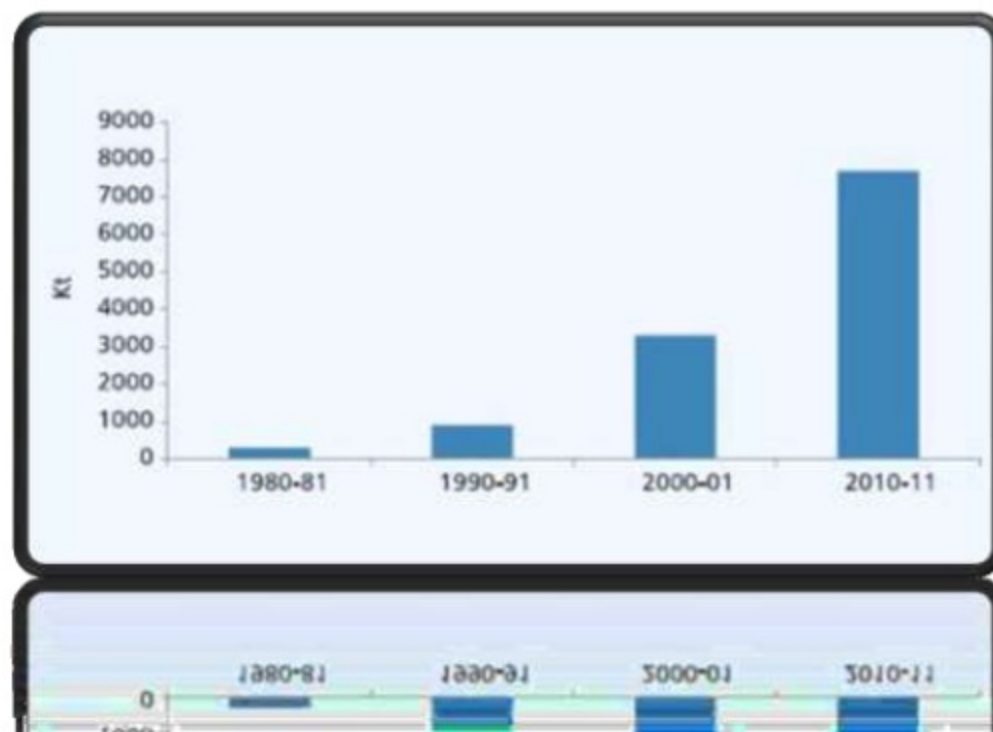
Only 14% of plastic water bottles are recycled.

Packaging now accounts for 1 / 3 of all household waste..

# PLASTICS > STATISTICS

## STATISTICS

• The per capita consumption of plastic in the country is *10.2 kg in 2012. It is expected to go up to 12 kg by 2014.*



• By 2012, India is also projected to be the third largest consumer market for plastic goods with a consumption of *12.5 million tonnes per annum, behind US and China.*

# PERCENTAGE OF PLASTICS USED IN DIFFERENT FIELD

## PLASTIC BAG STATISTICS

Total number of plastic bags used worldwide annually	1 trillion
Total number of plastic bags China consumes everyday	3 billion
Total number of plastic bags used every minute	1 million
Total number of years it takes for a plastic bag to degrade	1,000 years
Total amount of plastic bags that were discarded in 2008	3.5 million tons
Total amount of plastic floating in every square mile of ocean	46,000 pieces
Average plastic bags consumed per family in 4 trips to the grocery store	60
Percent of plastic made every year that will end up in the ocean	10%
Percent of household waste that is plastic	11%



# SOME FACTS ABOUT PLASTIC

- ▶ •When we eat or drink things stored in plastic, plastic is incorporated into us
- ▶ •Plastic is one of the few chemical materials which pose environmental problem.
- ▶ •Plastic is biologically quite inert, hence regarded to be more an *aesthetic nuisance than a hazard*.
- ▶ •Plastic is cheap, it gets discarded easily, and, its persistence in the environment can do great harm.
- ▶ •It causes immune and enzyme disorders, hormonal disruption leading to endocrinal disorders and even infertility and is also considered as carcinogenic (cancer).
- ▶ •Not only human health, it dangerously effects other animal life and alters the environmental (air, water and soil) sustainability causing hazardous pollution.



# HOW DOES PLASTIC IMPACT OCEAN



- ▶ *Plastic is accumulating at an alarming rate in our oceans – wreaking havoc on wildlife, polluting our beaches and entering our food chain.*
- ▶ *Our addiction to use-and-toss items is causing this growing problem.*
- ▶ *Plastic bags pose a serious danger to birds and marine animals that often mistake them for food.*
- ▶ *Thousands of marine animals and more than **1 million** birds die each year as a result of plastic pollution.*



# IMPACT ON ENVIRONMENT

- ▶ • Plastic is ubiquitous in our lives because it is convenient and relatively inexpensive.
- ▶ • Its convenience comes from being lightweight and its ability to absorb impact shock without breaking.
- ▶ • Plastics are so versatile in use that their impacts on environment are extremely wide ranging, posing serious challenge for disposal.

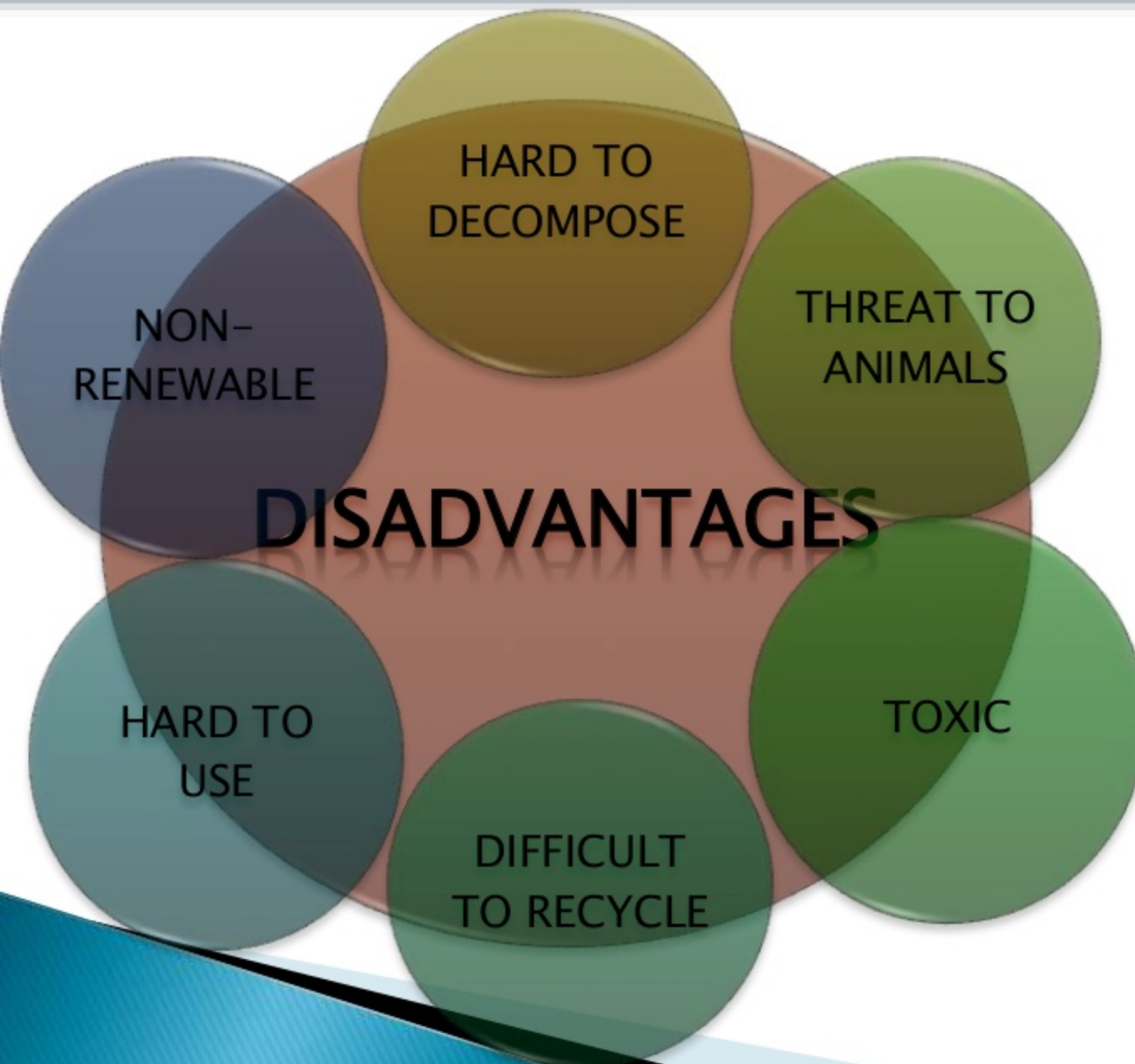
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# DISADVANTAGES OF PLASTIC BOTTLES



Plastic bags, once ingested, cannot be digested or passed by an animal so it stays in the gut. Plastic in an animal's gut can prevent food digestion and can lead to a very slow and painful death.

# DISADVANTAGES OF PLASTIC BOTTLES

**Glass bottles can be melted and easily reused, as can tin cans. Recycling plastic is not so simple.**

**Water bottles are often reused in the home but become less and less sturdy over time and are ultimately thrown away.**

**Plastic is manufactured using oil by-products and natural gas, materials that could be used in numerous other applications or conserved were plastic usage lower.**

# PLASTIC ALTERNATIVES

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- ▶ GLASS and CERAMIC
  - ▶ STAINLESS STEEL
  - ▶ OTHER METALS
  - ▶ ANIMAL-DERIVED
  - ▶ PLANT-DERIVED
  - ▶ WOOD
  - ▶ KHADI
- 