THE CSS POINT

Yes We Can Do It!

Greenhouse Effects + Plastics

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Greenhouse Effects

- The heating that occurs when gases such as carbon dioxide trap heat escaping from the Earth and radiate it back to the surface; so-called because the gases are transparent to sunlight but not to heat and thus act like the glass in a greenhouse.

  OR

- The overall warming of the earth's lower atmosphere primarily due to carbon dioxide and water vapour which permit the sun's rays to heat the earth, but then restrict some heat-energy from escaping back into space.

Greenhouse Gases:

i) Carbon dioxide CO2
ii) Methane
iii) Water Vapour
iv) Chloro Fluoro-Carbon (CFC)
v) Nitrous oxide

Mechanism of Greenhouse Effects:

- Our Earth receives most of its energy, called radiation, from the Sun.
- This energy is electromagnetic radiation in the form of Visible light, with small amounts of Infrared (IR) and Ultraviolet (UV).
- The incoming Visible solar energy has a very short wavelength and passes right through the atmosphere.
- The Earth's surface absorbs the solar energy and releases it back to the atmosphere as Infrared (IR) radiation, some of which goes right back into space.
- But some of the IR radiation emitted by the Earth is absorbed by greenhouse gases in the atmosphere and sent back towards the Earth's surface.
- That warms the Earth's surface. Three main gases in our atmosphere that contribute to the greenhouse effect are carbon dioxide, methane, and CFC.
- These gases absorb the infrared radiation emitted by the Earth and re-radiate the energy as heat back towards the Earth, causing a warming known as the greenhouse effect.
- The warming due to greenhouse gases is expected to increase as humans add more greenhouse gases to the atmosphere.

Sources Of Greenhouse Gases:

- **Carbon dioxide (CO2)** is a colourless gas that's a by-product of the combustion of organic matter. Today human activities are pumping huge amounts of CO2 into the atmosphere, resulting in an overall increase in carbon dioxide concentrations.

  Methane occurs naturally when organic material decomposes. Man-made processes produce methane in several ways:
  - By extracting it from coal
  - From large herds of livestock (i.e., digestive gases)
  - From the bacteria in rice paddies
  - Decomposition of garbage in landfills

Importance Of Greenhouse Effect:

- Following is the importance of greenhouse effect.
- i) Without greenhouse effect, the Earth would not be warm enough for humans to live.
- ii) Without greenhouse gases, heat would escape back into space and Earth's average temperature would be about 600 F colder.

Plastics

Plastics

- A synthetic material made from a wide range of organic polymers such as polyethylene, PVC, nylon, etc., that can be molded into shape while soft and then set into a rigid or slightly elastic form.
- Polymer is a large mixture of monomers, these monomers are joined together through process called polymerization.

Thermoplastics:

- Substances that become plastic on heating and harden on cooling and are able to repeat these processes

OR

A type of plastic that can be softened by heat, hardened by cooling, and then softened by heat over and over again.

Properties of Thermoplastics:

Thermoplastics have wide ranging properties.

- These plastics do not resist heat very well and so can be easily formed into other shapes.
- They can be very much like rubber, or as strong as aluminium.
- are light in weight,
- Can withstand temperature extremes of up to 600 F, while others retain their properties at -100 F.
- Thermoplastic materials have no known solvents at room temperature.
- Most thermoplastic materials are excellent insulators, both electrical and thermal.
- Are recyclable materials that are used frequently today to create objects such as foam cups, polyethylene squeeze bottles, acrylic lenses and safety helmets.
- In general the combination of light weight, high strength, and low processing costs make thermoplastics well suited to many applications.

Thermoplastics:

- **Uses:**
  - They are useful for a variety of applications, including consumer goods, machine parts, medical equipment and packaging and storage materials.

  Examples:
  - PVC/Vinyl
  - Polystyrene
  - Polyethylene
  - Cellulose Acetate
  - PTFE/Teflon
  - Nylon/Polyamide
  - Polyester

Thermoplastic	Properties	Uses
Polyamides (nylon)	Tough, resists abrasion, self lubricating	Ropes, fishing line, gears, zips
Acrylics	Good impact strength and transparency	Goggles, windows, lenses
Polycarbonates	Strength, toughness, resists impact	Bottles, safety helmets
Polyethylene	Differing densities, resists chemicals	Buckets, toys, small components
PVC	Cheap, rigid or flexible, poor strength Low resistance to heat	Floor tiles, hose pipes, cable coatings
ABS	Can be moulded with fine details	Telephones, car trim, boat hulls
Polystyrene	Easy in use, many colours	Packaging trays, vending cups, ceiling tiles

Thermosetting plastic

- These are stronger and harder than thermoplastics. They resist heat and fire and are often used for objects like pan handles and electrical fittings.
- Plastics that can be melted only once are known as thermosetting plastics.
- They become hard after melting.
- These plastics cannot be shaped again and again.
- Examples: Bakelite.

Thermosetting plastic	Properties	Uses
Melamine formaldehyde	Strong hard and heat resistant	Plastic tableware, kitchen worktops
Phenol formaldehyde	Hard and brittle	Cookware handles
Urea	Tough, attractive	Electrical fittings
Polyester resin	Strong when reinforced with glass fibre	Car bodies, boat hulls, mouldings such as baths