17. MAN MADE MATERIALS

Q 1) Try to find it.

a. Plastic shows..... property, hence it can be molded to any shape.

Ans. Plasticity

b. Motor cars are coated with.....

Ans. Teflon

c. Thermocol melts at..... *°C*

Ans. more than 100 *°C*

d. ..... glass dissolves in water.

Ans. Alkali - silicate

Q 2) Who is my partner?

'A' column	'B' column
a. Lead glass	i. plates
b. Bakelite	ii. Mattresses
c. Thermocol	iii. Electric bulb
d. Optic glass	iv. Electric switch
e. Polypropylene	v. Lens

Ans.

'A' column	'B' column
a. Lead glass	Electric bulb
b. Bakelite	Electric switch
c. Thermocol	Plates
d. Optic glass	Lens
e. Polypropylene	Mattresses

Q 3) Answer the following.

a. Thermocol is produced from which material?

Ans. Thermocol is produced from a thermoplastic material called polystyrene.

b. Write uses of PVC.

Ans. PVC is used in manufacturing the ropes, electric cable insulation, bottles, toys, , raincoat, pipes, handbags, shoes, and furniture.

c. Write the natural or manmade raw material of the following items.

(Mattress, beakers, bangle, chair, gunny bag, broom, knife, pen)

Ans.

Sr. no.	List of items	Raw material	
		Natural	Manmade
1.	Mattress	Cotton, jute	Polypropylene
2.	Beaker	-	Silica glass or borosilicate glass
3.	Bangle	Gold, silver, copper	Glass, plastic
4.	Chair	Wood	Plastic (PVC)
5.	Gunny bag	Jute, cotton	Plastic (PVC)
6.	Broom	Cornhusk	Plastic
7.	Knife	Metal as iron	Plastic
8.	Pen	Metals	Plastic

d. Which are the main ingredients of glass?

Ans. The main ingredients of glass are limestone, sand (silica), magnesium oxide, soda, coloring metal oxides (if required) and other metal oxides dependant on type of glass.

e. How the plastic is produced?

Ans. I) Ingredients to make plastic-1) Plastics are produced from natural, organic materials that are cellulose, coal, natural gas, salt, crude oil.

2) Process of production- 1) At the beginning, the distillation of crude oil in an oil refinery is done. The distillation process splits the heavier part of crude oil in lighter parts. Naphtha, is required for production of plastic. 2) The processes involved in plastic production are addition and condensation, polymerisation and polycondensation. 3) Long polymer chains are linked from small unit monomers in polymerization process. These are then melted, cooled and converted into small pellets. 4) Each polymer possesses its own properties, structure and size which are dependent on the various types of basic monomers used. The pellets are

then processed using methods such as extrusion, injection molding, blow molding, rotational molding, etc. to form required plastic products.

3) Extrusion: This process is to make plastic films.

4) Injection molding: This process is to make plastic containers.

5) Blow molding: This process is to make plastic bottles.

6) Rotational molding: This process is to make large, hollow items like toys, furniture, tanks, etc.

Q 4) Distinguish between.

a. Manmade material and natural material

Manmade materials	Natural materials
1. Materials that process naturally available materials are manmade materials.	1. Materials that process materials available in nature are called natural materials.
2.The source of these materials is scientific laboratory. 3. Manmade materials do not degrade.	2. The source of these materials are from nature. 3. Natural materials degrade.

4. Examples: glass, plastic, artificial threads, thermocol.	4. Examples: wood, rock, minerals, water.

b. Thermoplastic and thermosetting plastic.

Thermoplastic	Thermosetting plastic
1. The plastic that can be molded according to our need and can be remolded on heating is called Thermoplastic.	1. The plastic that cannot be molded again after heating, once a specific shape is given is called Thermosetting.
2. Different types of Thermoplastics are a) Polyvinyl chloride E. g: Bottles, raincoat b) Polystyrene E.g, Covers of CD and DVD. c) Polytheylene E.G. Milk bags d) Polypropeylene E. g: ropes, mattresses	2.. Different types of thermosetting plastics are a) Bakelite E.g: cabinets of radio, T.V b) Melamine E.g. PLates, cup-saucers c) Polyurethane E.g. Surfing boards, small boats d) Polyester E.g.: Fiber glass, toners of laser printers

Q 5) Answer the following in your own words.

a. Explain the effect of following materials on environment and human health.

1. Plastic

Ans. 1) Plastic is a non-degradable substance and it acts as an environment pollutant. 2) Plastic materials on burning emits harmful greenhouse gases which are highly toxic to human health, if inhaled may cause bronchitis, asthma and other respiratory problems. 3) If plastic products are thrown in water bodies. It kills marine animals. If plastic bags are thrown in open areas, grasslands, etc animals consume it, that proves fatal for the animals. 4) Dumping of plastic in landfills, interacts with water and form chemicals that penetrate in soil and are hazardous for soil organisms. It also destroys beauty of the place. 4) The Plastic packing material contains hazardous chemicals that can cause cancers, reproductive problems and metabolic diseases such as obesity.

2. Glass

Ans. 1) Glass is a non-degradable material so it is a major environmental pollutant. 2) In the process of making glass very high temperature $\leq 1500\ ^{\circ}C$ to melt the raw materials. It impacts the atmosphere as emissions from melting activities release CO_2, SO_2 and NO_2. 3) Pieces of glass material if flown into a water body, affects water ecosystem. On consumption by aquatic animals they may choke to death.4) Drainage may get blocked due to pieces of glass.

3. Thermocol

Ans. 1) Thermocol is a non-degradable material and takes too much time to degrade naturally. 2) If a person is in contact with thermocol for a prolonged period may lead to blood cancer, leukemia and lymphoma. 3) People working in thermocol production factory may suffer from eyes problems , skin, and respiratory system, digestive system, diseases et. 4) If food cooked in thermocol is heated, styrene may dissolve in that food and will lead to health problems like problems of eyes, respiratory system, skin, digestive system. 5) Liquid styrene in thermocol may cause skin-

burns. 6) People who try to destroy plastic by burning is hazardous as it releases toxic gases in the atmosphere. 7) If thermocol plates and cups in which food, tea, coffee is offered if reheated may cause severe health issues.

b. Which measures will you arrange to minimize the environmental problems arising due to non-degradable plastic?

Ans. 1) Reduce – Minimum use of non-degradable materials.

2) Ignoring micro beads: a) Small plastic particles used in cosmetics, soap etc are micro beads should be avoided.

3) Recycling- Plastic items should always be recycled. Materials like disposable plates, cutlery, cups, glasses etc should not be thrown around.

4) Recover- Waste materials should be converted after reuse and recycling into useful resources as fuels, heat energy, etc using thermal and biological means.

5) Replace- a) Replace plastic carry bag by jute, paper or cloth bags. b) Replace milk packs by tetra packs. c) Food wraps made out of beeswax, coated cotton material can be

used. These are reusable and biodegradable d) Melamine cutlery can be replaced by corn starch and it's highly durable.

Q 6) Write short notes.

a. Glass production

Ans. 1) Glass is a non-crystalline and hard material formed by mixture of sand, soda lime and little amount of magnesium oxide that is heated in furnace. 2) Sand, that is chemically silicon dioxide, melts at 1700^{o} C. This temperature is extremely high so the pieces of discarded glass are added to lower the temperature to 850^{o} C.

3) When the mixture is liquefied, it is heated up to 1500^{o} C and immediately cooled.4) Because of rapid cooling , mixture forms homogenous, amorphous and transparent instead of being crystalline.

b. Optic glass

Ans. 1) Optic glass is produced from a mixture of sand, soda, limestone, barium oxide and boron. 2) Optical glass is a type of pure glass and is of high quality 3) This type of pure glass

is used in production of spectacles, lenses, microscopic lenses, cameras, telescopes and glass prisms.etc.

c. Uses of plastic

Ans. 1) Plastic is versatile, hygienic, lightweight, flexible and highly durable substance. 2) It is used for numerous packaging applications such as containers, bottles, drums, trays, boxes, cup and vending packaging, baby products and protection packaging. Making syringes, microwave utensils, Teflon is used to remove scratches from vehicles, polyacrylic is used in making artificial teeth etc.

Plastic is of two types: a) Thermoplastic and b) Thermosetting plastic

i	Thermoplastic	Uses
a	Polyvinyl chloride (PVC)	Shoes, electric cable Bottles, raincoat, pipes, handbags, insulation, furniture, ropes, toys, etc.

b	Polystyrene (PS)	Thermo-insulating parts of electric appliances such as gears of machines, refrigerators, toys, protective coverings like covers of CD and DVD, etc
c	Polyethylene (PE)	Milk bags, packing bags, flexible garden pipes, etc.
d	Polypropylene (PP)	Parts of loudspeakers and vehicles, ropes, mattresses, laboratory appliances, etc.

ii	Thermosetting plastic	Uses
a	Bakelite	Cabinets of radio, T.V., telephones, electric switches, toys, coverings over handles of cookers, etc.

b	**Melamine**	**Domestically useful items like cup-saucers, plates, tray, some spare parts of airplane engines, electric and sound insulating coverings, etc.**
c	**Polyurethane**	**Surfing boards, small boats, furniture, seats in vehicles, etc**
d	**Polyester resins**	**Fiber glass, toners of laser printers, textile industry, etc.**

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