Date: / / Page no:

Polymer

The word polymer is coined from two Greek word Poly means many and mer means unit. The term polymer is defined as a very large molecule having high molecular mass $10^3 - 10^7$p these are also reffered to as macro molecule which are formed by joining repetitive structural unit on a large scale. The repeating structural unit are derived from simple and reactive molecules known as monomer. The process of formation of polymers from respective monomers is called as polymerization

Diff b/w polymers and macro molecules

Polymers are called as Macro molecules due to large size but the converse is not always true A macro molecule may or may not contain monomer unit ex:- Chlorophyll ($C_{55}H_{72}O_5N_4Mg$) is a macro molecule but not a polymer since there is no

monomer unit. So we can conclude that all polymers are macromolecules while all macro molecules may not be polymers.

Classification

→ Based on origin

- Natural:- These polymers are found in plants and animals ex:- protein, cellulose, starch, some resins, rubber
- Synthetic:- A variety of synthetic polymer as plastic (polythene), nylon 6,6, synthetic rubber like buna-S are ex of man made polymer.
- Semi-synthetic:- Cellulose derivation such as cellulose acetate and cellulose nitrate are ex of this category

→ Based on structure

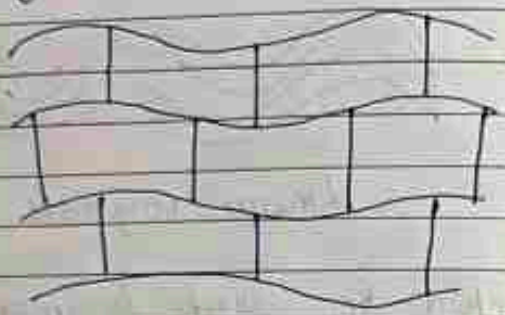
- Linear:- These are the polymers in which monomer units are linked to form long linear chains. These linear chains are closely packed in space. The closed packing result in high density, high tensile strength and high MP & BP
ex:- HDP (High density polythene), nylon, polyster are linear polymer

Linear polymer

- Branched:- In such polymer the monomer units are linked to form the some long chains of different length. As a result of branching these polymers are not closely packed in space then they have low density, low tensile strength as well as low MP and BP
ex:- are low density polythene (LDP) starch, glycogen

Branched polymer

- Cross linked:- In such polymer the monomer units are linked together to form 3D network. These are expected to quite hard, rigid and brittle
ex:- Bakelite, glifetil, malimins, formaldehyde.



Cross linked polymers

→ Based on Molecular forces

- Elastomers:- These are rubber like solid polymers in which the polymer chains are held together by inter molecular forces ex:- Neutral rubber BUNA-S, BUNA-N etc. The weak binding force permits the molecule to be stretch a few cross linked are introduced in b/w the chain which helps the polymers to retract to its original position after the force is released

- fibres:- fibres belong to the class of polymers which are thread like and can be woven into fabrics these are widely used for making clothes, nets, ropes etc. fibres posses high tensile strength because the chain posses strong intermolecular forces such as Hydrogen bonding the fibres are crystalline in nature and have sharp MP ex are Nylon 6,6, terilene, polyacrilonitrile

- Thermoplastics:- These are linear polymers and have weak Vander wall forces acting in various chain. These force are intermediate of the forces b/w elastomers and fibers when heated they melt and form a fluid which sets into a hard mass on cooling thus they can cast into diff. shapes by using suitable moulds ex are- polythene and polystyrene.

- Thermosetting:- These are normally semi-fluid substances with no molecular

mass, when heated they become hard and infussible due to cross linking b/w the polymer chains as a result they form 3D structure. two ex of thermosetting polymer are Bakilite & Melamin formaldehyde

→ Mode of polymerisation

- Addition :- The polymers formed by polymerisation of monomers containing double or triple bonds (unsaturated) compound (unsaturated compounds are called addition polymers

Addition formula have same empirical formula as their monomers Addition polymer is further classified as two

(i) Homopolymer (ii) Copolymer

⇒ Homopolymer = The polymer which are obtained by the polymerization of a single type of polymer they are called as Homopolymer.

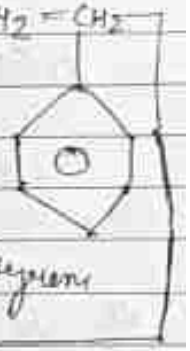
ex:- $n(CH_2=CH_2) \rightarrow (CH_2=CH_2)_n$

ethene Polythene

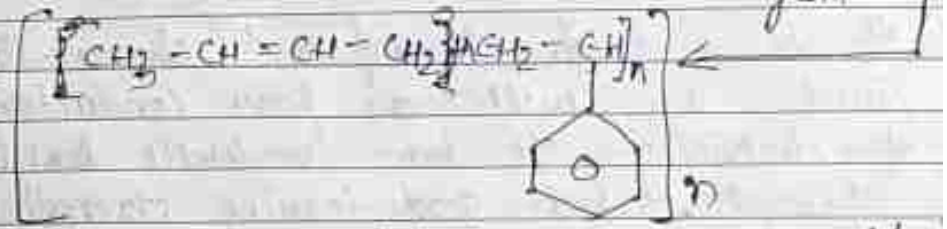
⇒ Copolymer = The polymer which are obtained by the polymerisation of two or more monomers are called as copolymer

ex:- $(H_2C=CH-CH=CH_2) + n\,CH_2=CH_2$

1,3 butadiene



Styrene



buna-S (butadiene styrene rubber)

- Condensation polymer :- The polymers which are formed by the combination of monomers with the elimination of small molecule of water, alcohol, HCl are called condensation polymerisation

$H_2N(CH_2)_6NH_2$ + $HOOC(CH_2)_4COOH$

Hexamethylene diamine — Adipic acid

$\downarrow$

$H_2N(CH_2)_6NHOC(CH_2)_4COOH$

Date 05.09.22

Preparation of different types of Polymers

→ Low density polythene

$$n(CH_2=CH_2) \xrightarrow[1000-2000\,atm]{350K-570K} (CH_2-CH_2)_n$$

ethene [Peroxide initiators] (LDP)

It is a tough, transparent, chemically inert as well as poor conductor of electricity. It has moderate tensile strength but good tearing strength. Monomer of ethene when heated at 350K - 570K under pressure of 1000 to 2000 atm in presence of per-oxide undergoes polymerisation to form low density polythene.

⇒ Uses :-

- It is used in insulation of electricity carrying wires and manufacture of squirty bottles toys and flexible pipes.

→ High density polythene

$$n(CH_2=CH_2) \xrightarrow[6-7\,atm]{333K-343K} (CH_2-CH_2)_n$$

[Ziegler Natta catalyst] (HDP)

Monomers of the ethene undergoes polymerisation at 333K - 343K temp under pressure of 6-7 atm in presence of Ziegler Natta catalyst to give high density polythene. It has high density due to close packing, it is also chemically inert and more tougher and harder. It is used in making containers electric insulation etc.

→ Teflon :- (OR Poly tetra fluoro ethene)

$$n(CF_2=CF_2) \xrightarrow[\text{High Pressure}]{\text{Catalyst } (NH_4)_2S_2O_8} (CF_2=CF_2)_n$$

fluoro ethene Teflon

Teflon is manufactured by heating tetra fluoro ethene in presence of per-oxide or ammonium per sulphate at high pressure. Teflon is flexible and inert to true solvents and boiling acids and as well as aqua regia because of its great chemical inertness and

high thermal stability. Teflon is used for making non-stick utensils. It is also used to make seals, valves, non lubricated bearing etc.

→ Nylon 6,6

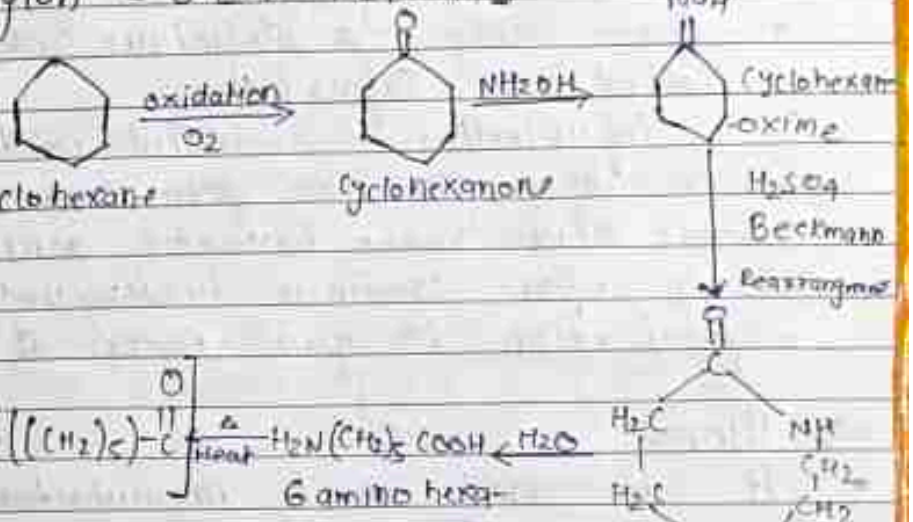
$H_2N(CH_2)_6NH_2$ + $HOOC(CH_2)_4COOH$
Hexamethylene diamine | $-H_2O$ | Adipic acid

$H_2N(CH_2)_6NHOC(CH_2)_4COOH$
Nylon 6,6

Nylon 6,6 is manufactured by polymerisation of adipic acid and Hexamethylene diamine, acid and amine first react to form a salt which when heated to 525K under pressure & undergoes polymerisation with elimination of steam and nylon 6,6 is produced in molten state

⇒ Uses :-
- It is used in fibres in textile and and carpets
- It is used to make 3D structural objects, conveyor belts, electro insulating elements, it is also used in gaskets, nut material

→ Nylon 6 :-[OR PERLON]



Cyclohexane → Cyclohexanone → Cyclohexamine → Caprolactum → Acidic Compound → Nylon 6

Caprolactam needed for the purpose is manufactured from cyclohexane. Cyclohexane on oxidation form cyclohexanone

which when treated with Ammonium hydroxide gives you cyclohexanone oxime this further undergoes beckmann rearrangement to form a seven ring structure which is called as Caprolactam.

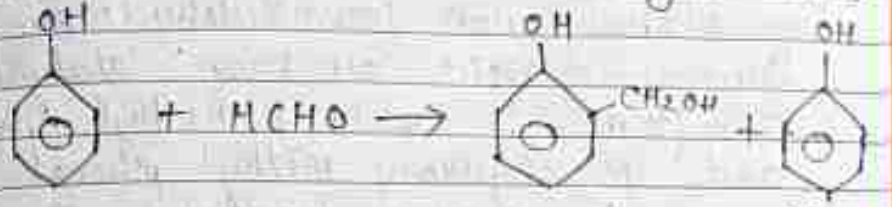
Caprolactam is heated with traces of water to form amino caproic acid famine hexanoic acid. which upon continue heating undergoes polymerization to give nylon 6

⇒ Uses :-

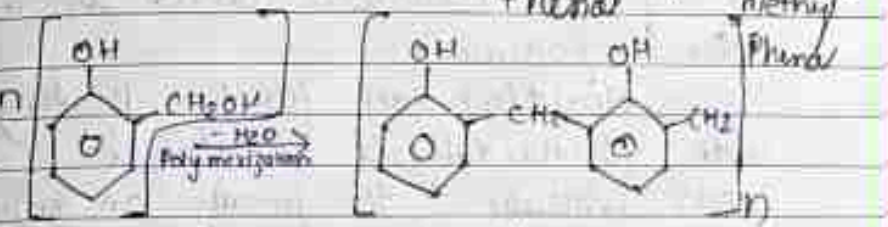
- It is used in a manufacturing of tyre cords fabrics and mountaineering ropes.

10.09.22

→ Bakelite (Phenol formaldehyde resin)

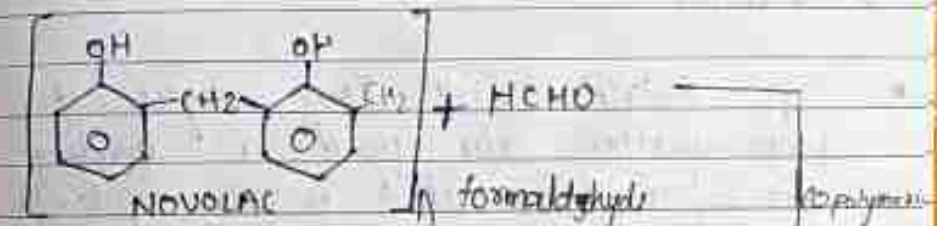


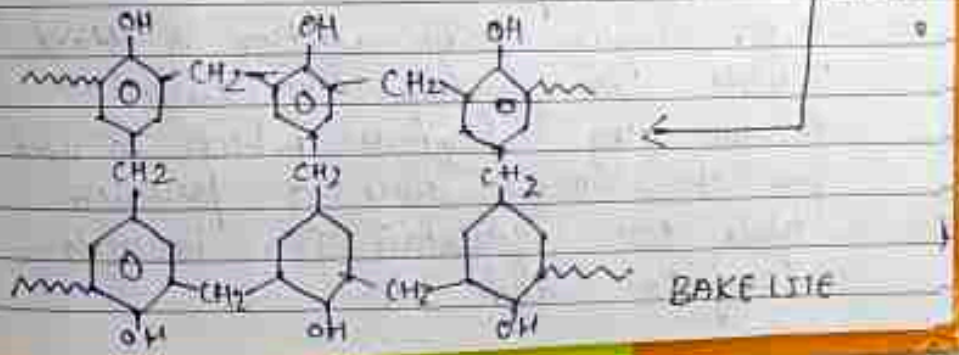
Phenol formaldehyde O-hydroxymethyl Phenol Para-hydroxy methyl Phenol



O-hydroxy methyl phenol

NOVOLAC





BAKELITE

Bakelite is obtained by condensation of phenol with formaldehyde in presence of acid or base catalyst to form O- hydroxy methyl phenol and p- hydroxy methyl phenol.

The major product is O- hydroxy methyl phenol which further undergoes polymerisation with condensation to form novolac which is a linear polymer.

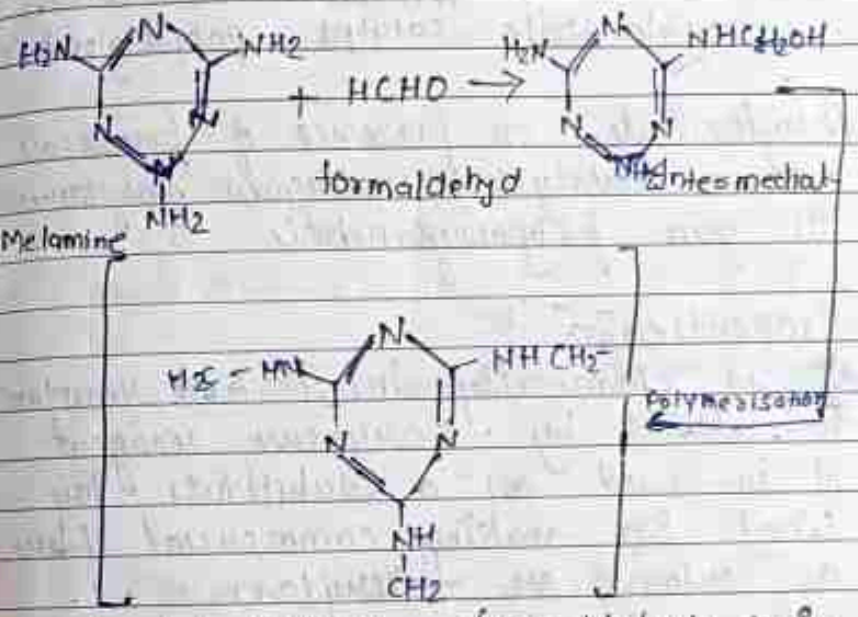
Novolac on further heating with formaldehyde undergoes cross-linkage to form an infusible solid called Bakelite

⇒ Uses:

- Soft Bakelite with low degree of polymerisation are used as binding glue for laminated wooden planks in warmship
- High degree polymerisation of Hard Bakelite is highly cross linked thermosetting polymer which is used for the manufacture of formica-table tops, fountain pen barrels, computer disk etc
- It posses excellent electrical insulating property and hence it is widely used in making electrical goods

12/09/22

⇒ Melamine formaldehyde resin



Melamine formaldehyde resin

It is a copolymer which is formed by the polymerisation of melamine which is a heterocyclic amine and HCHO to give an intermediate

It is very hard and tough. It has great importance now a days, particularly in making crockeries. It do not

break even if it is dropped from height

→ Polyacrylonitrile (PAN) [ORLON]

$n(CH_2=CHCN) \xrightarrow[\text{Peroxide Catalyst}]{\text{Polymerisation}} (CH_2CHCN)_n$

acrylonitrile — polyacrylonitrile

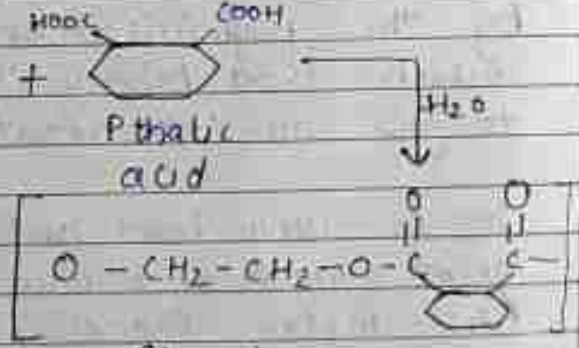
Acrylonitrile in presence of peroxide as a catalyst undergoes polymerisation to give polyacrylonitrile

⇒ Properties :-

- It is chemically inert and resistant to attack by corrosive reagent
- It is used as a substitute for wool in making commercial fibres as orlon or acrylan

13/09/2022

→ Glyptal :-



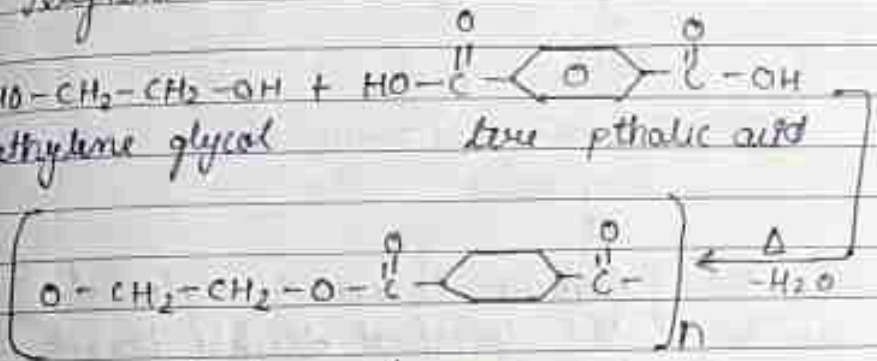
Glyptal

It is a polyster having cross links. It is thermo setting plastic. It is obtained by condensation of ethylene glycol and Pthalic acid to give Glyptal. When it solution in a suitable solvent is evaporated it leaves a tough but not flexible film

⇒ Uses :-

- Used in paints & lacquers

→ Terylene :-



Terylyn dacron

Terylyn is highly resistant to the action of chemical and biological agents. Its fibres are quite strong and durable. It can also be blended with wool or cotton to obtain fabrics of desired composition

⇒ Uses :

- Manufacture of variety of clothes such as Terrycot, terywool, terysilk
- For preparing magnetic recording tapes, conveying belts, aprons for industrial works etc

Natural Rubber

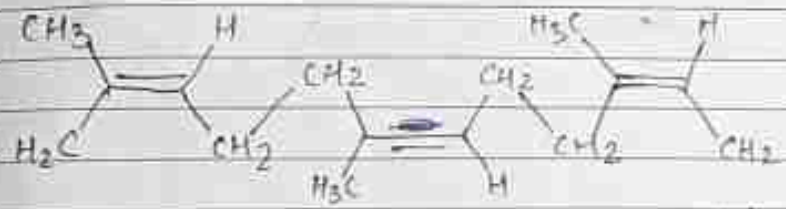
Natural rubber is coiled linear ~~1,4~~ 1,4 polymer of iso-prene

Isoprene

In the polymer chain of Natural rubber the residual double bonds are located b/w C_2 and C_3 of isoprene unit. All these double bonds have cis configuration and thus natural is cis 1,4-polyisoprene.

In natural rubber there are no polar substituent, only intermolecular force are vandewaal type. The cis configuration gives the polymer chain of natural rubber a coiled structure. As a result it can be stretched. By the application of the force. When the force is removed the chain return back to its original coiled shape.

Natural rubber is soft & sticky, it has high water absorbed capacity. It is attacked by oxidising agent and organic solvent so it cannot be used extensively for commercial purpose.



Polymer chain of natural rubber

Vulcanisation of Rubber

The property of natural rubber can be modified by introducing -S-S- cross links (sulphur, disulphur) polysulphide cross links in its structure. The process of introducing S-S cross links on the structure of natural rubber by heating the

Sulphur at 110°c is called vulcanisation of Rubber

The vulcanisation is carried out by adding sulphur (3-5%) & ZnO (oxide) to the rubber and then heating the object at about 110°c for about 20-30 min. ZnO accelerates (catalyst) the rate of vulcanisation

Vulcanisation introduces polysulphide bonds b/w the adjacent chains

19.09.2022

Solar Energy

⇒ Advantage
- Renewable
- No, pollution
- Sustainable form of energy
- Useful for commercial purpose

⇒ Disadvantages
- Installation cost
- Needs space
- Weather dependent

Renewable Energy → Term used to refer energy that are naturally obtained from the environment and from sources that can be replenished. These include solar energy, wind energy, Geothermal energy, hydro-power & bio-mass.

The term renewable energy should not be confused by alternative energy which describes sources of energy outside the regular forms like gasoline that are considered more environment friendly or less harmful

⇒ Advantages of renewable energy

- Less maintanence cost
- They are economical and can cut cost spend on fossil fuel
- They emmit little or no waste in the environment.
- Renewable energy do not depleate Therefore these have better prospect for future

Non - Renewable energy :- Non Renewable resource include coal petroleum, Natural gas, mineral ores, Diamonds. These resources are formed in million of years and hence will be exhausted eventually

Judicials use of these resources would help in making them last longer.

Definition :- A non renewable resource is a resource that do not renew itself at sufficient rate for sustainable economic extraction in meaningful human time frame

Solar energy :- It is a resource i.e not only sustainable for energy consumption but is also renewable

⇒ Advantages of solar energy :-

- It is a renewable source of energy
- It can be harvest in all areas and is available every day
- Reduced energy bill :- Electricity generated by solar panel will help to reduce the electricity bill
- diverse application :- It is used to power satellite in space. It can be used to run trains, buses etc
- No pollution

⇒ Disadvantages :- The efficiency of solar panel is dependent on the weather. It increases using sun but decreases during cloudy days

- Energy storage expensive :- It has to be stored in large battery

these batteries are used in off grid. It has to be charged during the day that the energy can be used in night

- Uses a lot of space :- due to large in size and so it requires a lot of space on the roof or on land
- Installation cost of these pannels are expensive
- Weather dependent

Wind Energy :- It is produced to generate electricity. Wind turbine converts the K.E in the turbines into mechanical power. A generator can convert mechanical power into electricity

In Golden time the wind mill were used to draw water out of the wells and to grind flour.

⇒ Advantages :-

- The wind is free and with modern technology it can be captured efficiently
- Although wind turbines are very tall each takes a small plot of land this means that land below can be used for agricultural purpose
- Many people find wind farms as a feature of landscapes
- Remote areas which are not connected to the electricity power grid can use wind turbine to produce their own supply
- Wind turbines are available in range of sizes which means that vast range of people can use them single household, small town, villages may make good use of wind turbines available today

⇒ Disadvantages

- The strength of the wind is not constant and is very strong 0 to storm force. This means that wind energy is totally weather dependent

→ Wind turbines are noisy each one can generate the same level of noise thus causing noise pollution.

→ Large land farms are needed to provide entire community with enough electricity

→ It can be a threat to wild life birds get killed or injured when flying near the wind Turbines.

Hydral energy :- The energy in the flowing water can be used to produce electricity. Hydropower is one of the best cleanest source of energy although with large dams there are many environmental and social problem like in case of 'Tehri' & 'Narmada' project. Small hydro power plants are more relevant, the small hydropower plants can serve the energy needs of remote rural areas.

⇒ Advantages:-

→ Once a dam is constructed electricity is produced at constant rate

→ If electricity is not needed the gates can be shut, stopping the electricity generation. The water can be saved for the use another time when the electricity demand is high

→ The lakes that are formed behind the dams can be used for water sports and leisure activities, often large dams becomes tourist attraction in their own way

→ The lake water can be used for the irrigation purpose.

→ When in used electricity produced by the dam system do not produce green house gasses, they do not pollute atmosphere.

Disadvantages

→ Dams are extremely expensive to build & must be built to a very high

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Standard

→ The flooding of large areas of land means that the natural environment is destroyed. People living in the villages and town have to move out due to flood. This means that they loose their farms and business

→ Building large dams alter the natural water table level. for ex- the building of aswan dam has altered the level of water table this is slowly leading to damage of ancient monuments as salts and minerals are deposited on stone work

30/09/22

Geothermal Energy :- It is obtained from the hot rocks present inside the earth It is produced due to the fission of radioactive material in the earth's core and some places inside the earth becomes very hot these are called Hot pot. They cause water deep inside to form the steam as a result the steam which is formed gets compressed at high pressure and comes out in the form of Hotspring

⇒ Advantages

→ It is renewable source of energy

→ It is non polluting

→ There is no wastage or generation of by products

→ Geothermal energy can be used since in ancient time people used to cook food and keep their homes heated & warm etc.

→ Maintainance cost is less

→ Geothermal powerplants do not occupy large space

→ Unlike solar energy it is not weather depend

⇒ Limitation

→ Only few sites have the potential of geothermal energy

→ Most of the sites where geothermal energy is produced are far from market & cities where it is needed to be ctied.

→ Total generation potential of this source is too small.

→ There is always danger of eruption of a volcano.

01/10/2022

Hydrogen Energy

Hydrogen is generated as a bi product in industries earlier it is used ~~partially~~ widely for non-energy appln but presently it is utilised for the production of chemical and energy appln. The Hydrogen atom is made of single proton and single electron. It is very abandant but it does not exist in the separate form of neither. To separate Hydrogen gas from companion substance takes alot of effort but it produces clean source of energy.

As a gas it can be used as a fuel cells to power engines Hydrogen gas is extracted from water by the process called electrolysis

non energy appln produced for Hydrogen industry, petroleum industry. Hydrogen fuelt small power generation sets are used for busses, 3 wheeler, 2-wheelers.

⇒ Advantages :-

→ It is renewable energy source. it means that there is no possibilities of it running out like other sources of energy.

→ Numerous sources to produce Hydrogen locally. Hydrogen gas can be produced from methane, gasoline, biomass coal & water.

→ It is practically the clean energy source when Hydrogen is gone to produce coal the byproducts are safe. Aeronautical companies us Hydrogen as a source of drinking water

→ Hydrogen energy is non toxic, this means that it friendly towards the environment and does not cause any harm or destruction to human health

→ It does not cause pollution, the use of Hydrogen fuel cell does not release CO_2 and other green house gases.

→ It is far more efficient than other sources of energy. Since it has the ability to convey a lot of energy for every pound of fuel compare to diesel or gas this means that automobiles utilizes Hydrogen energy will travel more miles than the one with equal amount of gasoline used for powering spaceship

A Sustainable production system

⇒ Disadvantages

→ Hydrogen energy is expensive. Electrolysis & Steam reforming are the two main processes of hydrogen abstraction which are extremely expensive So today it is used to power most hybrid vehicle

→ Storage complications - Hydrogen is having lower density than gasoline this means that it has to be compressed to liquid state and store at lower temp that's why the hydrogen must be stored & transport at under high pressure

It is not the safest source of energy although gasoline is little more dangerous than Hydrogen.

Hydrogen is highly flammable and volatile substance. Compared to gas hydrogen lack smell which

make any leak detection.

Hydrogen energy can't sustain the population. As the cost of harnessing the hydrogen is very high it limits the extensive utilisation

07/09/22

Solid Waste Management

The term Solid waste encompasses the highly heterogeneous mass of discarded material or thrown away from urban community as well as the more homogeneous accumulation of waste generated by agriculture Industrial and mining activities

⇒ Sources & Classification of Solid waste

→ Muncipal solid waste :- It consist of household waste, construction and demolition debris sanitation residue and waste from street This garbage is mainly generated from residential and Commercial Complexes.

→ Hospital waste :- It is generated during the diagnosis treatment or immunisation of human beings or animals or in research activities in this field. It may include waste like disposable anatomical waste, cultures discarded medicines chemical waste, bandages. These waste is highly infectious and can be a serious threat to human health if not managed in scientific & discriminate manner

→ Industrial Waste :- These include chemicals, paints, sand, metal-ore processing, Sewage treatement sludge etc. These waste can be self igniting explosive toxic or radioactive Chemical and process industries generated variety of waste both Organic & inorganic

→ Agricultural waste :- These includes from animal manure, crop residue, animals and vegitable waste contains valuable minerals and nutrients

⇒ Causes of Solid waste

- Over population :- Due to increasing industries and population large quantities of waste are being generated in diff. forms such as Solid liquid sludge & gases. Each city produces tonns of Solid waste daily from household, hospital industry offices, market centres. waste are carelessly thrown away on the street, city garbage etc. which later fills up and chokes city drainage
- Urbanisation :- Due to pressure of Urbanisation most of the cities are growing fast earlier waste disposal did not cause problem due to less population and lack of public awareness but due to rapid urbanisation there is increase in domestic and industrial waste
- Technology :- With the development of technology there is a shift from natural woods to artificial ones which are not biodegradable by nature such as plastic, DDT etc
- Affluence :- With the Affluence there is a tendency to discard item as been in or out of fashion and the items which are out of fashion are resulting in Solid waste ~~paper~~ pollution

Effects of Solid waste Management :-

1) Hazardous Solid waste are injurious to human health. Improper disposal of such waste has resultant in the death of human of animals to Contamination of Crops and water Cycles.

2) Solid waste disposal increases the rate of Spreading of disease factor primary mosquitoes rats.

3) There is danger of water population when the Solid waste dump enters the surface water or ground water resources

4) In addition to uncontrolling burnings of open dumps can cause objectionable order and air pollution

5) Improper handling of solid waste causes damage to the environment

⇒ Management of Solid wastes :-

1) The activities like collection of the disposal or recovery are known as solid waste management Here 4 R's are followed
1) Refuse 2) Reuse 3) Recycle 4) Reduce

I) Refuse ⇒ Instead of buying new things / Containers from market use the ones which are in house. Refuse the things

II) Reuse ⇒ Instead of throwing old clothes, old newspapers, old cold drinks cans use them in making something useful.

(III) Recycle ⇒ use of shopping bags made up of Jute which can be used again Come under recycle Segregate your waste to make sure that it is collected and use them as pencil stand

(IV) Reduce ⇒ Reduce the generation of unnecessary waste. Carry your own shopping bags when you go to the market

Nitrogen Cycle

Nitrogen is another important chemical on earth and is present in living organism in the form of protein Amino acids and nucleic acids. It exists in the molecular form N_2 and in the form of some oxides in the atmosphere. 78% of Nitrogen is present in Air. It is in the pure form which cannot be used by majority of organisms first it has to converted into Nitrates (NO_3) for the use of plants. The bacterias like Azotobacter and Rhizobium converted the atmosphere Nitrogen into useful Soluble nitrates by the nodule

of legumenous plants like pea and gram beam etc this proces is called as Nitrogen fixation

during lightening the nitrogen from atmosphere comes in the contact of ocean water to form dilute nitric acid. the nitrates are absorbed by plants and utilized for making protein when the animal consume the plant protein it breaks down and form new animal protein. After animal excretes urea or uric acid or after the animal or plant die certain bacteria carry out Ammonification

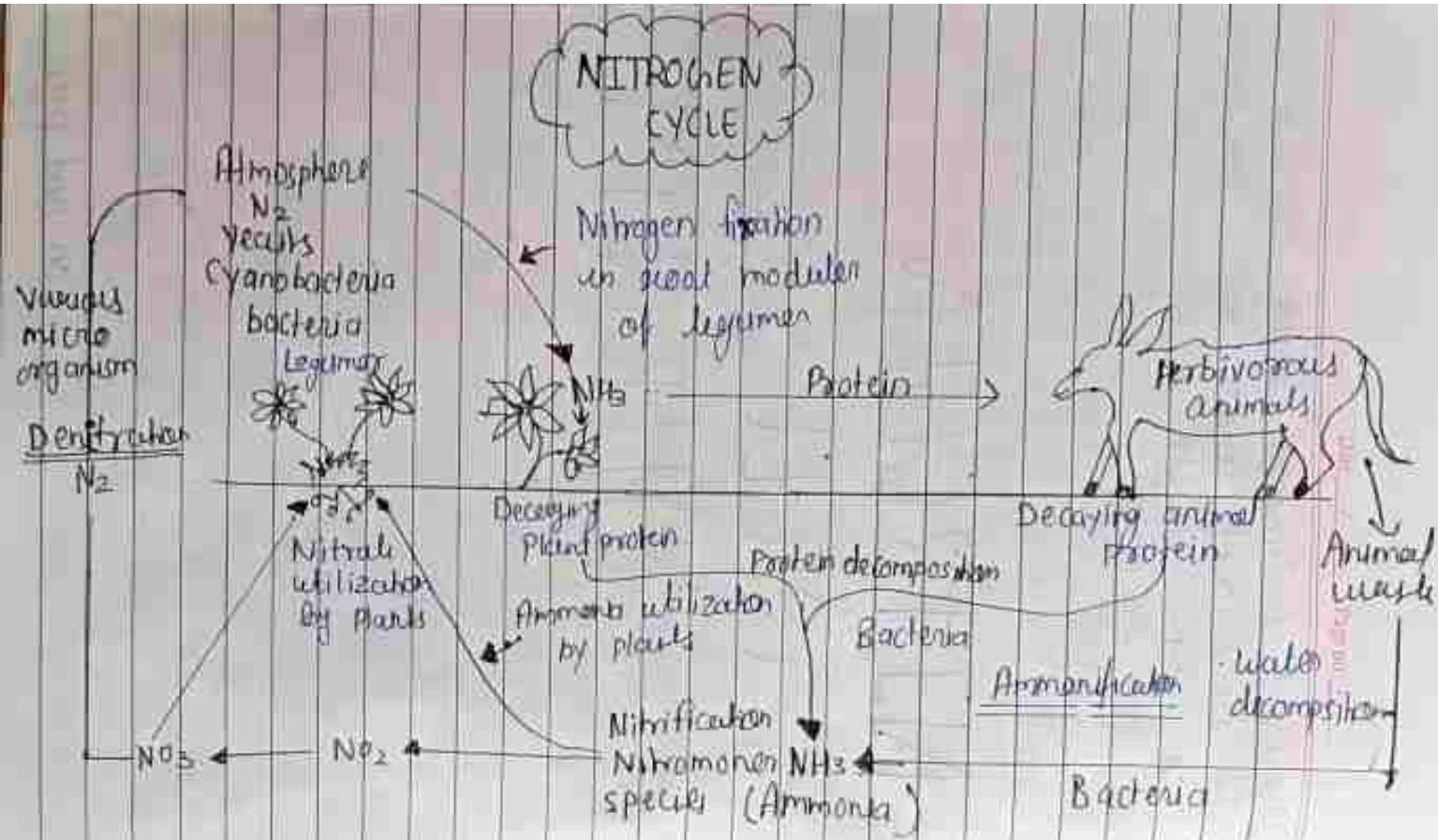
They produce ammonia and the nitrosomas bacteria converts the ammonia (NH_3) into Nitrate (NO_2) this process is called Nitrification there are some bacteria which are called decomposers that is pseudomanas which reduces the nitrate (NO_3) into Nitrogen (N_2) this process is called denitrification

then free Nitrogen return to the atmosphere pool and crops are taken up by plants

NITROGEN CYCLE DIAGRAM

on next page...

NITROGEN CYCLE



Carbon Cycle

Carbon Cycle:- It can be defined as the process where carbon compounds are interchange among the biosphere geosphere, hydrosphere, atmosphere of the earth

Carbon Cycle steps:-
Carbon present in atmosphere is absorb by plants for photosynthesis These plants are consumed by animals and carbon get accumulated into their bodies
when the plants and animal die and they are decomposed back into the atmosphere some of the carbon that is not released into the atmosphere, eventually become fossil fuels These fossil fuels are used for man made activities which pumps more carbon back to the atmosphere

Oceanic Carbon Cycle:-
This is essentially a carbon cycle that within the sea. Ecologically ocean absorbs more carbon than it gives out Hence it is called a carbon sink. Marine animals converts the carbon to Carbonate & this forms the raw building material required to make the hard shells almost like oysters. When Organism with Carbonate shells die their body decomposes leaving their hard shell These accumulate on the sea floor & are eventually broken down by the waves & compacted under enormous pressure forming limestone. When these limestone deops are exposed to air they get weathered and carbon is released back into the atmosphere as CO_2

⇒ Importance of Carbon Cycle.
Even though CO_2 is found in small places within the atmosphere, it plays an important role in balancing the energy and tracks the long wave radiation from the sun therefore it acts as a blanket over the planet
If the carbon cycle is disturb it will end in several consequences like global warming, climate change etc.

Global Warming

The green house effect is the process in which the earth has a higher temperature than it would have without it. The gases which radiate heat also known as green house gases absorb the energy radiate it out by the earth & reflect it back to the earth receives from the sun part of it around 26% is reflected back to space by atmosphere and clouds 15% is absorbed by the atmosphere, the rest heats the grounds and heats the surface of the earth. The absorbed energy is radiated out of the earth in the form of infrared red waves. The green house gases responsible are water vapour, CO_2, CH_4, CFCs etc. The excessive burning of fossil fuel such as petrol, coal & diesel resulted in the increase of green house gases

Causes of green-house effect :-

* Deforestation :- Due to the reduction in the release of oxygen and absorption of CO_2 by the plants

* fossil fuel burning :- Oil, coal, natural gases are used as means of energy release harmful gases in the air

* Population :- As population increases the need for space increases which result in deforestation

⇒ What is global warming

It is a gradual increase in earth's temp generally due to green house effect caused by increased level of CO_2, CFC's & other pollutants

⇒ Causes of global warming :-

- Man-made :-

① Deforestation affects the release of aerosoles and chemical compounds that affect clouds and changes in wind pattern causing change in precipitation level. As we know

Know CO_2 is one of the leading heat trapping gases for global warming and environmental imbalance

(b) Transportation & use of vehicles :- Use of vehicles even for covering short distances emit many gases which causes air pollution. which results for the global warming

(c) Emission of CFC :- The atmospheric ozone layer is responsible for protecting the earth's temp from UV radiation but due to the increased use of technical appliances. Such as A.C & refrigerators there is an extra layer of CFC added to the air, which depletes the ozone layer

(d) Emission from industries & power plant The rising ways of electricity and heat global warming has increased to a great extent

(e) Agriculture & land surface change - The changes in the land surface disturbs the natural process of carbon storage and affect the reflection and absorption of sunlight. Soil erosion, deforestation & chemical fertilizer application increasing the pollutants into water resources & finally oceans

• Natural -

(a) Volcanic eruption :- The constitute one of the natural cause because of the increased release of gases and smoke from the eruption

(b) Natural forest fires :- when there is significant blaze in forest there is rise in green house gas emission which leads to global warming

(c) Solar activities - Changes in Solar irradiant in wavelength & other variance such as solar flares can have direct impact on global warming

& Effect of global warming :-

• Rise in temp increase ice melt

melting glacier will cause severe water shortage & draught

- Ecological risk :- Mostly eco-system & animal life will be affected by higher CO_2 levels and global temp. leading to climate change which will result in extinction of many species
- Threat to marine life :- Global warming can lead to destruction of marine & coral life under water. Higher content of CO_2 causes damage to natural resources
- Health factors :- There are various indirect effect such as mal-nutrition inflicted by

- Sound pollution :- The word noise is derived from latin word nausia which means sickness. Measured in decibels. Noise is a unpleasant

⇒ Types :-

- Transport noise :-
- Neighbourhood noise -
- Industrial noise :- High intensity sound
- Construction noise -

⇒ Effects :-

- Hypertension :- It is the direct result of noise pollution due to elevated blood levels
- Hearing loss :- Constant exposure of human ear to loud noise that are beyond the range of sound that human ear can damages the eardrums resulting in hearing loss
- Sleeping disorder :- Noise pollution hampers the sleep cycle leading to irritation & uncomfortable state of

mind :-

- Cardio-vascular issues :- heart related problems such as strokes blood pressure levels may increase due to the noise pollution

⇒ remedies to prevent

- honking should be stopped
- Sound proof walls should be built in the building
  Plantation
  Earplug should be given to the labour working in industries

Ozone layer depletion

⇒ What is an Ozone layer
The ozone layer layer is mainly found in the lower portion of the earth's atmosphere. It has the potential to absorb 97-1. to 99-1. harmful UV radiation coming from sun that can damage life on the earth
Ozone layer depletion is the thinning of the ozone layer present in the upper atmosphere this happens because the Cl and Br atoms comes in contact with ozone and destroy ozone atom one Cl can destroy 1lakh molecule of ozone such compounds are called as ozone depleting Substance These substances contains CFC's carbon tetra chlorid (CCl_4), H. methyl chloroform. Whereas the ozone depleting substance contains Br are Halons, methyl bromide (CH_3Br) and Hydro bromo - fluro carbons. Montrial protocol was proposed in 1987 to stop the use, production & import of ozone depleting substances

* Causes of Ozone layer depletion

1. CFC is the main cause of ozone layer depletion these are released by solvent spray aerosols, ACs etc
   The molecules of CFC in stratosphere are broken down by UV radiation and release Cl atom

2 Unregulated Rocket launch :- Research says that unregulated launching of rocket result in mor depletion of ozone layer than CFC do ~~this might~~ If not controlled this migh result in huge loss of ozone layer by the year 2050

3 Natural cause :- Natural procee such as sun spots and strato spheric winds also are responsible for ozone layer depletion

* Effects on human health

It results in serious health issues such as skin diseas, cancer quic ageing

* Effect on animal
Direct exposure to UV ray can cause skin and eye Cancer to animals

* Effect on environment

strong UV rays may lead to minimal growth flowering and photosynthesis in plant

* Effects on marine life
plantons are greatly affected by the exposure to harmful UV ray these are higher in aquatic food chain

Environmental ethics :- It is branch of applied philosophy that studies the moral and ethical relationship of human beings with the environment

Q Why it is imp. to study ?
With the deteoration of ecological system and worsening of environmental issues humans have realised that they can not fix environmental pollution and ecological imbalance just by economical, technologic & judicial means only ~~of the~~ after adapting a proper attitude towards nature and forming a new ethical relationship b/w humans and nature we will kep

able to appreciate and cope up with the challanges like pollution and ecological imbalances

⇒ Types of environmental ethics (Principle)

(1) Anthropocentrism :- It suggest that human beings are most imp. than all other living beings. others are only accessories that would acess for the survival

(2) Non Anthropocentrism :- This principle gives value to every object, every animal in nature. It is a principle that believes in every thing that sustain itself in nature.

(3) Psychocentrism :- This principle believes that human beings hold more value in the environment since their mental capability are better developed and far more complex than any other element

(4) Biocentrism :- This holds not only ecology by the political value. This principle ensures proper balance of ecology in the planet.

(5) Resourceism :- This principle says that nature is considered to be valuable because it has many resources to be provided.

(6) Speciesism This principle justify the superiority of human race it also justify the exploatation and maltreatment of animals by human kind

Air pollution :- It is a release of pollutant such as gases particle, biological molecules etc. into the air that is harmful to human health

⇒ What is Air pollution :-
Air pollution refers to any physical chemical or biological change there is a certain percentage of a gases present in the atmosphere an Yes and Yes in composition of these gases is harmfull to the survival This imbalance in the

gaseous composition has resulted in an ↑ in Earth's temp. which is known as Global warming

⇒ Types of air pollutant

- Primary pollutant :- The pollutants that directly cause air pollution are called primary pollutants. eg - sulphur dioxide emmited from factories
- Secondary pollutant :- The pollutants formed by intermingling & reaction of primary pollutant are known as Secondry pollutant. Smog formed by the intermingling of smoke and fog is a secondary pollutant

⇒ Causes of air pollution

- Burning of fossil fuels :- The combustion of fossil fuel emmits a large amount of sulphurdioxid, carbondioxid which results in air pollution
- Automobiles :- The gases emmited from vehicles pollute the environment these are major source of green house gasses

Assignment

Q How is the waste Management done in Indore

Q If the renewable resources are completely exhausted from mother earth what other alternative you will suggest

- Agricultural activities :- Ammonia is one of the most hazardous gas emmited during agricultural activities the insecticides, pesticides emmits harmful chemical in the atmosphere
- Factories and industries :- They are the main source of carbon monoxide hydrocarbons, organic compounds and chemicals
- Mining activities :- In mining process the minerals below the earth are extracted using large piece of equipment the dust and the chemicals released during the process not only pollute the air but also deterate the health of the workers.
- Domestic sources :- The household cleaning products and paints containing toxic chemicals are released in air

range of Balance factor (BF) - 1, 0, 1

effects of Air pollution

→ Diseases respiratory, cancer, asthma
→ Global warming
→ Acid rain
→ Ozone layer depletion

#
Clean energy source
less use of ACs
do plantation
vehicles should be tested

Q) what is the significance of environmental chemical to MCA student

Biodiversity It can be define as a community of living organism on the earth and diversity among them from all the ecosystem Biodiversity is thus the variability b/w the species within the species and b/w the ecosystem

⇒ Importance of Bio diversities

- Ecological role of bio diversity :- They play an imp. role in the production and decomposition of organic waste fixing atmospheric gases and regulation of water and nutrients throughout the ecosystem the stability of ecosystem ↑es with diversity of the species.
- Economical role of Biodiversity :- Biodiversity acts as a source of energy and has a major role in producing raw material for industrial purposes such as oil, perfumes, Dyes, paper, wax, rubber etc. The importance of plants species for various medicinal use has been known for ages more than 70% of anticancer drugs are derived from plants in tropical rainforest
- Scientific role of Biodiversity :- Each species of ecosystem contributes to provide enough evidence that how the life evolved on the planet and role of each species in maintaining the sustainability of the ecosystem

⇒ Types of Biodiversity

- Genetic Biodiversity :- Every individual of particular species differ from each other in its genetic make up this genetic variability among the members of any plant and animal species is known as genetic bio diversity

- Species Biodiversity - It can be defined as variety of species within a particular region or habitat this type of diversity can be found in natural ecosystem & artificial ecosystem.
- Ecosystem diversity - Ecosystem varies with each other as per their habitat this includes grassland forest, deserts and mountains.

⇒ Causes of loss of Biodiversity

1) Several trees are cut down every year for the construction of industries highways settlements and so on to fulfill human demands
2) Hunting of wild animal for commercialisation purposes of their products has been the major reason for the loss biodiversity
3) The exploitation of medicinal plants for several laboratories purposes has resulted in extinction of these species
4) Natural calamities like earthquake forest fires also responsible for loss of Biodiversity
5) Air pollution has a major role in the loss of biodiversity, rapid cutting down of the trees has resulted in increase in CO_2 leading to climate Change