CSS 2002

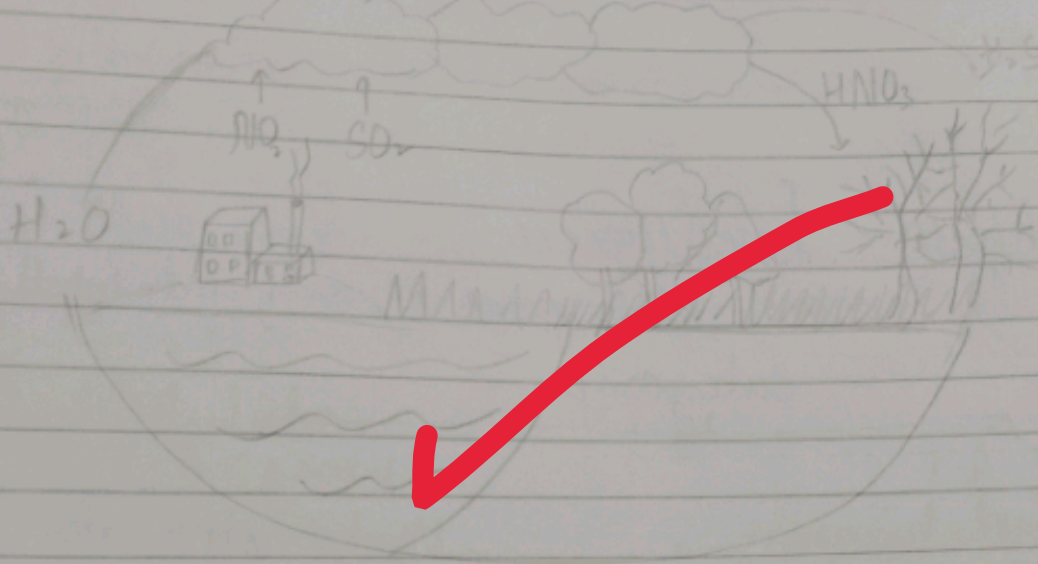
General Knowledge Paper - I

Every day Science

Q: Write a short note on following:

i) Acid Rain.

Note: Acid Rain



It is form of precipitation with a pH of less than 5 whereas regular rain has a pH of around 5.6. Acid rain is caused by a chemical reaction that begins when compounds like sulfur dioxide (SO_2) & nitrogen oxides (NO_x) are released into the air. These substances rises very high into the atmosphere, where they react with water, oxygen & other chemicals to form more acidic compound.

$$SO_2 + \tfrac{1}{2}O_2 + H_2O \rightarrow H_2SO_4$$

$2NO_2 + \frac{1}{2}O_2 + H_2O \longrightarrow 2HNO_3$

Acid from atmosphere return back to earth in one of two forms:

① WET → falls as rain, fog, snow & vapour
② DRY → over trees and soil.

Causes of Acid Rain:

- Caused by large scale emission of acidic gases into the atmosphere from thermal power plants, industries, fossil fuel combustion & vehicle emissions.

- Other human activities which contributes in acidic rain are deforestation, waste incineration, chemical manufacturing & mining activities.

Effects of Acid Rain:

- Lethal to marine & fresh water inhabitant
- It causes leaching of essential mineral & soil.
- Acid rain corrodes metal, marble, painted surface, slate & stones.
- Reduces rate of photosynthesis.
- Attacks plant foliage & roots which make it prone to pests, diseases & other pollutants

Short Note: Pesticides

Pesticides are chemical compounds that are used to kill pests including insects, rodents, fungi & unwanted plants (weeds). Over 1000 different pesticides are used around the world. Pesticides are used in public health to kill vectors of disease, such as mosquitoes & in agriculture to kill pests that damage crops.

Types

- Biodegradable
- Non-Biodegradable

Pesticides are also referred to by the type of pest they control:

- Biodegradable Pesticides: that break down into harmless compounds by bacteria & other living organisms.
- Non-Biodegradable Pesticides: they take month & years to break down.

Classification by Pest Types they kill:

- Insecticides — Insects
- Herbicide — Plants
- Rodenticides — Rodents (Rats & Mice)
- Bactericides — Bacteria
- Fungicides — Fungi
- Larvicides — Larvae

add more details

Short Note: Endocrine System

The endocrine system is a network of glands in your body that make the hormones to maintain countless bodily functions. Its gland create & release hormones that control almost all processes in your body. They coordinate your metabolism, growth & development, & control your emotion, mood, sexual function, and even sleep. Endocrine system control how hormones are released, & send those hormones into your bloodstream so they can travel to other body parts.

Main Glands Of The Endocrine System

- Pituitary gland (Master gland)
- Thyroid gland
- Adrenal gland
- Pancreas
- Ovaries (in females)
- Testes (in males)

Hormones are chemical messengers that help regulate various body functions. The endocrine system works together with the nervous system to maintain

Umbra

The shadow formed by a point source of light when an opaque object is placed in front of it is called UMBRA

- UMBRA is a dark shadow
- It is formed alone on screen

Penumbra.

The shadow formed along with UMBRA from an extended source of light when an opaque object is placed in front of it is called PENUMBRA

- PENUMBRA is a faint shadow
- It is formed along with UMBRA.

Add more arguments

Heavy Water

- Heavy water is a form of water where the hydrogen atom is replaced by deuterium
- Primarily of interest in nuclear reactors & some chemical reactions due to its unique properties
- Denser than regular water due to the presence of deuterium

Hard Water.

Hard water is water that contains high level of dissolved minerals primarily calcium & magnesium ions.

- Can cause scaling in pipes & appliances due to buildup of minerals.
- Density is similar to that of regular water.

Add more arguments

Q7: What are minerals? For most of the part minerals are constituted of eight elements, name any six of them. State the six characteristics that are used to identify minerals.

Minerals:

Minerals are those elements on the earth & in food that our bodies need to develop & function normally.

1- Oxygen
2- Silicon
3- Aluminium
4. Iron
5. Calcium
6. Sodium
7. Potassium
8. Magnesium

Characteristics:

- Color
- Density
- Luster
- Refraction
- Magnetism
- Hardness
- Radioactivity

Discuss these characteristics in detail

Q3: Define any five with examples.

a. Polymerization:

It is a chemical reaction in which small molecules (monomers) combine to form large molecules (polymers).

Example:

1. Amino Acid + Amino Acids ⇒ Protein

2. $CH_2 = CH_2 \Longrightarrow CH_2-CH_2-CH_2-CH_2-$

Ethene → Polyethylene

3. Other examples include:
   - ⇒ Formation of polyvinylchloride from vinyl chloride.
   - ⇒ (Propene) monomers combine to form Polypropylene (Plastic)

b. Ecosystem:

An ecosystem is a community of living & non-living things that interact with eachother in a specific environment. It includes: Biotic factors (Plants, animals & microorganisms) & Abiotic Factor (water, air, soil, sunlight, Temperature)

Example: A pond Ecosystem

Biotic Factor	Abiotic Factor
Plants: Algae, Water Lilies Animals: Fish, Frogs, Insects Microorganisms: Bacteria, Protozoa	Water, Sunlight, Soil, Temperature.

c. Antibiotics:

Antibiotics are drugs that kill or inhibit the growth of microorganisms, such as bacteria, fungi or protozoa. They are used to treat infections caused by these microorgs. mains.

Examples:

1. Beta-lactam antibiotics: Penicillin, Cephalosporin
2. Macrolides: Erythromycin, Azithromycin.
3. Fluoroquinolones: Ciprofloxacin, levofloxacin.
4. Tetracyclines: Tetracycline, Doxycycline.
5. Aminoglycosides: Streptomycin, gentamycin.
6. Antifungal Antibiotics: Fluconazole (Diflucan)
   Nystatin (Mycostatin).

d. Renewable energy resources:

Natural resources that can be replenished over time & are a sustainable way to generate ~~elect~~ energy. They are an alternative to fossil fuel, which are finite & contribute to climate change.

Examples:

1. Solar Energy
2. Wind Energy
3. Hydro Energy
4. Geothermal Energy
5. Biomass Energy
6. Hydrogen Energy.

e. Gene:

Gene is basic unit of heredity that carries information from one generation to next It is segment of DNA that encodes a specific set of instructions for the development, growth, and function of an organism.

Example:

The gene for blue eye color is located on chromosome 15 with a specific sequence of nucleotide (A, C, G & T) that codes protien for eye color.

This is how one person has particular gene on specific location on DNA -

f. Software:

Software refers to a set of instructions or programs that tells a computer what to do. It is a collection of data, algorithms & instructions that are stored electronically & used to operate computers, manage data & interact with users.

Examples:

1- Operating System
2- Web Browsers
3- Mobile Apps
4- Anti-Virus Software
5- Graphics & Design software