Toxicology Toxic chemical substance discharged into air, water and soil produced harmful effects on the life of plants animals and human beings. The study of damaging effects Environmental it is a branch of applied Ecology. many pollutants in the soil water are toxic in nature. these pollutants may be categorised by the

Toxic metal pollutants
Toxic gases pollutants
Toxic organic pollutants

Effects of toxic chemicals

1). Genetic, Hormonal changes caused by toxins in the environment.
2). harmful effects of toxins on the immune system and nervous system
3). Cardiac, respiratory and other problems because of air pollution
4). Mercury can cause this Irreversible neurological damage in children.
5). Ozone can create respiratory diseases
6). Nitrate can create digestive problems and cancer lungs effects.
7). High exposed to pesticides causes nervous damage
8). Dyes , soaps , resins, cosmetics generally irritants by nature.
9). Corrosive chemical exposure results.

pesticides pesticides are the organic chemicals used to control unwanted and dangerous species of plants and animals pesticides are the worst enemy of man on the earth planet they not only contaminate the lithosphere but also pollute the atmosphere too.

Classification

1). Fungicides
2). Herbicides
3). Insecticides
4). Molluscicides
5). Rodenticides
6). Piscicides
7). Nematic cides
8). Other (Synthetic pesticides)

1). Fungicides The are toxic to fungi and are used to control plant diseases.

2). Herbicides These are used to kill weeds or unwanted vegetation.

a) Those herbicides which interfere with the photosynthesis activity thus causing to plant to die from lack of energy.

Ex Monuron, Simazin

b) In second type at low concentrations herbicides are used for causing increased retention of leaves and fruits

Ex 2,4 dichloro phenomy acetic acid

3). Insecticides These are used to kill insects in field these are enter into stomach of insects can cause harm to digestive system

Ex: dichloro diphenyl trichloroethane BHC, Gamaxyne

4). Molluscicides These are used to control Snails.

Ex: Frescon is most effective and has no bad effect on non target organisms

5). Rodenticides These are used to kill rodents (rats &mice)

6). Piscicides These are used to control fish and other aquatic specie's

7). Nematic cides They inhibit nematodes. They are present in traces in vegetables, fruits a well as in drinking water

8). Other (Synthetic pesticides) These are more effective and penetrate into plant tissues.
Ex chloro phenoxy acid

Biochemical effect of pesticides Exposure to pesticides in small amount over time leads to chronic health effects. Some pesticides also undergoes metabolic changes as well as biodegradation. the Residue formed by the degradation of pesticides is more dangerous than the parent compound. pesticides are generally breakdown in the environment through a number of process such as oxidation, reduction, dehydrogenation. pesticides reduce maybe cross carcinogenic and causes a serious threat to mankind.

Lithosphere and Atmosphere both act as a sink for pesticide because chlorinated hydrocarbons are migrated in the air.

pesticides in the environment, enter human body through the food and water cause harm to human beings.

In generally pesticides are attack are almost every part of the body that can cause ear infection, respiratory diseases, leukaemia, dermatitis, brain cancer, kidney infection.

Ex1). **Lindane:** *. It effects the central nervous. & it causes liver cancer, It damages immune system.
2). DDT :- It damages the nervous system.
3). Endosulphane:- It effects Kidney and liver& breast cancer.
4). Malathian:- It causes bone marrow & chromosomal effects.

Toxic chemicals in environment

in 1987 the American scientist anel, some environmental organisations are discovered mainly 24 substance are having toxic in nature in environment. These substances are enter into our body in least amount (or) very large amount to cause harm to human beings. This phenomenon is called as chemical toxicology. Toxic Chemicals are generally obtained in the form of gaseous, liquids, & solids.
the following toxic Chemicals are present in air. They are benzene, arsenic, CFC, Vinyl chloride, chromate, Ozone, SO2, beryllium, cadmium, lead, Mercury etc. biochemical functions are classified into the following types.

1) Mutagens
2) Carcinogens
3) Pesticides
4) Food additives
5) Organo chloro substances.

Toxic effects of Cyanide

Cyanide is a more poisonous pollutants for all human beings. The toxic limit for HCN is 0.1-1.0 mg/lt. Hence it cause death when enter into our body at very low amount.

Sources the seeds of apples, cherries, peaches are having cyanide.
1). White clover plants, sargam plants are having cyanide in the form of amygdalin. It is on hydrolysis gives HCN.
2. Fumigating agents are released cyanide into atmosphere.
3. On cleaning of metals , on synthesis of chemical substances and on electro paintings to release cyanide into atmosphere.

Properties

There are several chemicals forms of cyanide these are

1). HCN it is pale blue (or) colourless liquids at room temperature and is a colourless gas at high temperature . it gas a bitter almond odour.

2). sodium cyanide(NaCN) and potassium cyanide white powders which may have bitter almond like order

3). Cyanogen chloride it is a colourless liquefied gas that is heavier than air and has pungent order.

Effects

action of Cyanides in the body after exposure Cyanides quickly entering the blood stream. the body handles small amount of Cyanides

In small doses, Cyanides in the body can be changed to Thio Cyanides which is less harmful and is excreted in urine

In small amount of Cyanide can also be combined with another chemical to form vitamin B12 which helps maintain healthy RBC's

But in large doses cyanide prevent cells from using Oxygen and these cells are died .

the health effects from high level of Cyanide exposure can being in second to minutes.

some symptoms of Cyanide poisoning are

1). weakness& confusion

2). Headache

3). difficult in breathing

4). cardiac arrest

Treatment for Cyanide poisoning

1).Initial first aid for inhaled cyanide is getting the victim to fresh air.

2). Lower doses of inhaled cyanide may be controlled by antidotes that detoxify cyanide.

3). avoid direct contact with poisoning

4). regularly conduct medical examination of workers.

Toxicity of lead lead is used as a pigment in paint it also enhance their stability and durability

sources

1). The main sources of lead is gallena

2). Lead is enters into the atmosphere due to combustion of petrol and gasoline.

3). The rain water mixed to let compounds and streams to rivers, lakes and ponds.

4). Paint, varnish, hair dyes, lead storage cells are contains lead.

5). Lead is also released due to metal extraction process

Effects of Lead Lead effect Virtually every part of the body. organic lead compounds are more poisonous than inorganic compounds. respiratory Lead absorption more dangerous. lead content in human blood exceeding 40 PPM is considered dangerous.

1). Lead causes damage to the central and peripheral nervous system

2). It has severe effects on children in brain development.

3). It interferes with metabolism of calcium and Vitamin D

4)It effects of Kidneys

5).it causes mental retardation and learning disabilities.

6). Lead deposited in bones

7) Lead effects male sexual glands

8) it also reduced the sperm protein

Lead poisoning the ions has a tendency to react with sulfhydryl groups of the proteins. it is known that it Pb+2 inhibit at least two enzymes that catalyse the reactions for haemoglobin biosynthesis consequently one symptom of lead poisoning in anaemia.

chronic lead poisoning it is generally found in

*. Young children from sucking lead paint are toys

*. In paint and printing industries in petroleum Industries where TEL is used

*. Muscle weakness and leading subsequently to Paralysis

*. TEL is more poisonous then Pb^{+2} ions it cause brain damage in children

Treatment of lead poisoning lead poisoning is generally treatment with chelating agent such as EDTA and BAL. These agents can from stable Complex with Pb^{2+} . They excreted through the kidney and liver.

2). Lead poisoning is generally treated with d-pencil-amine is given to victims.
3). Barbiturates are used to control TEL poisoning.

Toxicity of cadmium Cadminum is the waste product from industrial processes. many people are exposed to cadmium via cigarette smoke contaminated food and Water .workers are exposed to the harmful effect of cadmium while manufacturing and recycling Nickel cadmium batteries.

Cadmium is toxic to living organisms, even in low concentration. it is cumulative poison and can remain in the body more than a decade

Sources

Cadmium batteries, photography, electroplating, alloys.

Effects of cadmium

1).disturb the human DNA repair system that causes to prevent cancer.
2). cadmium is a neurotoxin.
3). it can cause various liver and kidney problems.
4). it can causes of Cough, cyanosis.
5). It prevents reactions of adenosine triphosphates choline- several enzymes.
6).Due to cadmium poisoning Cu, Fe, Zn mineral deficiency is happened in our body.
7). Due to presence of cadmium kidney damage, anaemia, liver damage are happened .
8)Plants due to cadmium poisoning chlorosis disease is happened.

controller cadmium poisoning

1). H2S passing into water Cadmium is removed in the form of CdS.
2) By absorption process cadmium present in water is removed.
3) By adding Allum (or) Feso4 coagulates to water to remove cadmium.
4) By using Ca-EDTA complex Cd^{2+} removed in the form of Cd- ETA complex.

Cadmium poisoning

1). Cadmium in Lindane: *. It effects the central nervous. & it causes liver cancer, It damages immune system.
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Toxicity of Mercury

sources

*. It is available in Earth crust for 0.003 % in the form of sinnabar mineral(HgS).
*. it is it is also available in the form of Fungicides.
*. Hg is entered into atmosphere in the form of Hh vapour lamps, Hg batteries and paper Paints Industries.
*. It is also enter e from the electrolytic production of NaoH, Cl2. where Hg is used as cathode.

Toxicity Effects of Mercury

*. Mercury pollution is discovered at first in japan in 1953 in the form of Minamata disease.
*. Mercury vapours is toxic and in held can cause lungs damage and brain damage.
*. Compounds such as $HgCl_2$,Hg_2Cl_2,and HgO are poisonous if eaten.
*. Mercury is a cumulative poison. There is no methods for excreting if from the body.
*. Alkyl & aryl Mercury compounds causes brain damage giving numbness, loss of vision, deafness, Madness, and finally death .
*. It causes electrolyte imbalance, liver damage.
*. Methyl mercury effects chromosomes and decompositions.
*. The mercury poisons causes vomiting's and headache.

control methods

1). the best treatment for Mercury poisoning is a dosage of a of chelating Agent like EDTA. It can form stable complex with Hg+2.
2). To control mercury based fungicides, pesticides industries.
3). Diafram cells are used instated of Hg.

Toxicity of Arsenic

Arsenic is not found in nature a free element but exists in combination with other elements.
The important ores of arsenic are:
1). Realgar or Arsenic disulphide.
2). Orpiment or Arsenic Tri sulphide
3). Arsenopyrite or ferrous Arsenic sulphide.
Inorganic arsenic is more toxic than organic arsenic and trivalent form is about 60 times more toxic than the pentavalent arsenic form, and is more soluble in water. the causes of arsenic in water may be natural as well as human made.
Bangladesh and West Bengal states of India are most affected as in drinking water.
Sources arsenic is a metalloid pollutant present in earth about 2PPM concentration.
2). arsenic is highly contains in pesticides
3). on combustion of coal in refineries, arsenic released into the atmosphere.
4). sea water contains about to 2-5 PPM arsenic
5). in vegetable, fruit, curd, meat, milk are having 0.5 to 1 PPM arsenic.

Toxic effects of arsenic

1). arsenic reacts -SH group in enzymes to control enzymes reactions.
2). arsenic (III) compounds are coagulates to protein the change into poisonous.
3). it is also caused vomiting, Diarrhoea in poisoning.
4).In severe poisoning death may occur with in a short period.
5). It cause liver enlargement, myocardial degradation..
6). It causes goitre and skin cancer.

Control methods

1). Adsorbtion In tis method activated alumina, iron coated and, ion exchanges resins are used to absorbs arsenic from the water.
2). Co-precipitation In this method arsenic precipitated with the addition of aluminium and ferric salts. After settlement of precipitate, it can be removed.
3) membrane technology RO and electrodialysis are the two examples of membrane technology. In this method rain water is passed through the membrane, which filtrate out arsenic.
4). To provide arsenic free water to affected people, a filter with the name shapla filter is being promoted by UN to remove arsenic at the household levels.
5.2,3-Dimer capto propanol is used as anti dose of arsenic poison.

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