

MODULE –II

ENVIRONMENTAL POLLUTION

2.9 NUCLEAR HAZARDS (RADIO ACTIVE POLLUTION)

- **Causes of nuclear Hazards**
- **Consequence of nuclear hazards**
- **Control measures of radio active pollution**



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The visions a nuclear disaster can bring are horrific to say the least. In the past, they have been known to cause catastrophic destruction and loss of life. Unfortunately, these are just the immediate results. Those people who do survive may deal with chronic illness, physical, mental, and emotional disfunction, and an increased incidence of disease manifestations such as cancer.

By definition, radiation is a form of energy. It comes from man-made sources such as X-ray machines, from the sun and outer space, and from some radioactive materials such as uranium in soil. Small quantities of radioactive materials occur naturally in the air we breathe, the water we drink, the food we eat, and in our own bodies. Radiation that goes inside our bodies causes what we refer to as internal exposure. The exposure that is referred to as external comes from sources outside the body, such as radiation from sunlight and man-made and naturally occurring radioactive materials. Eighty percent of typical human exposure comes from natural sources and the remaining 20% comes from artificial radiation sources, primarily medical X-rays.

These adverse health effects can range from mild effects, such as skin reddening, to serious effects such as cancer and death, depending on the amount of radiation absorbed by the body, the type of radiation, the route of exposure, and the length of time a person is exposed. Exposure to very large doses of radiation may cause death within a few days or months. Exposure to lower doses of radiation may lead to an increased risk of developing cancer or other adverse health effects.

The following is a list of major nuclear disasters of the world.

- Fukushima, Japan - 2011
- Chernobyl, Russia - 1986

- Three Mile Island, US - 1979

Radioactive materials are composed of atoms that are unstable. An unstable atom gives off its excess energy until it becomes stable. The energy emitted is radiation.

- The process by which an atom changes from an unstable state to a more stable state by emitting radiation is called radioactive decay or radioactivity.
- Radioactive materials are dangerous because of the harmful effect of certain types of radiation on the cells of the body. The longer a person is exposed to radiation, the greater the risk.
- People receive some radiation exposure each day from the sun, radioactive elements in the soil and rocks, household appliances like television sets and microwave ovens, and medical and dental X-rays.
- Radiation cannot be detected by sight, smell, or any other sense.

Causes of nuclear Hazards

1. Nuclear Hazards are takes place by two sources.

- Natural sources
- Man-made sources.

2. Natural sources

- The very important natural source is space, which emit cosmic rays.
- soil, rocks, air, water, food, radio active radon-222 also contain one (or) more radio active substances.

3. Man made sources

Man made sources are nuclear power plants. X-rays, nuclear accident, nuclear bombs, diagnostic kits, etc., where radio active substances are used.

Consequence of nuclear hazards

- Radiation cause gene mutation. It leads to genetical defects in future generation.
- Internal bleeding and blood vessel damage may show up as red spots on the skin.
- It causes birth of dead babies, defects in new born babies ,destruction of cities, animal& plants, loss of hair, anemia, reduction in fertility.
- It causes carcinoma (cancer), Leukemia (Blood cancer), Thyroid cancer, Bone cancer, mental retardation.
- It inhibit the mitosis (cell division) process.
- Pine tree forests are destroyed by gamma radiations of cobalt (or) cesium.
- Population & ecosystem are destroyed.
- It inhibit the enzyme secration.
- Continuous exposure of a person with radiation may lead to cummulative radiation damage and death.

Control measures of radio active pollution

- Atomic bomb explosion must be stopped.
- Radio active wastes must be stored in under ground tanks where they gradually decay in a harmless manner.
- The workers should wear radiation indicators to know the total amount of radiation to which they have been exposed.
- Reactors must be insulated in broad concrete walls to prevent the penetration of radiations.
- Use of glass spectacles will protect the eyes from UV light because UVL Cannot penetrate into the glass.
- production of isotopes should be minimized.
- Nuclear medicines & radiation therapy should be applied when absolutely necessary with minimum doses.
- Use of high chimneys & ventilation at the working place where radio active contamination is high. It is a effective way for dispersing radio-pollutants.

- Out of the ionizing radiation types (Alpha particles, Beta particles, Gamma rays and X-rays) Alpha particles can be stopped by a sheet of paper and cannot penetrate the human skin. Beta particles can be stopped by clothing or a thin sheet of aluminium. Whereas the Gamma rays and X-rays can be stopped only by thick concrete or lead walls.

