Radiation Pollution: Types, Sources, Effects, Control of Radiation Pollution

Radiation is the process by which radiant energy is transferred from one place to another in the form of electro-magnetic waves. The various types of radiation differ from one another by their frequency or wavelength. Higher the frequency or lower the wavelength of a radiation, higher will be its energy. Again, higher the energy of the radiation, it will cause higher damage to the living organisms.

Non-ionising Radiation:

These are the radiations which induce the ionisation of atoms and molecules. An atom is ionised when energy supplied to it separates one or more of its electrons. Ionisation of a molecule produces two fragments. The radiation pollution is mainly caused by non-ionising radiation.

Alpha (α), beta (β), and gamma (γ) radiations are mainly responsible for radiation pollution. Alpha radiation contains energetic -alpha particles. Each alpha particle carries two units of positive charges and interacts strongly with living tissues.

Beta, radiation is made up of energetics electrons. Each beta particle carries one unit of negative charge and interacts strongly with matter.

Gamma radiations are made up of high energy photons. Photons bring about strong electro-magnetic interaction with matter.

Sources of Radiation Pollution:

Radiation sources are mainly natural but partly manmade

The natural sources of radiation may be:

1. Radioactive minerals;
2. Cosmic rays;
3. Radio nuclides.

1. Radioactive Minerals:

The minerals containing Uranium- 235 (U235), Uranium-238 (U238), Thorium-232 (Th232), Plutonium- 239 (Pu239) etc. are capable of emitting energetic radiations causing pollution.

2. Cosmic Rays:

The cosmic rays containing highly energetic particles reach the surface of the earth causing pollution. The intensity of cosmic rays depends on latitudes and altitude of the place. The intensity is maximum at the poles and minimum at the equator.

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3 .Radio nuclides:

The unstable radio-nuclides in the atmosphere can be splitted up into smaller parts emitting energetic radiation. The smaller radio-nuclides enter into the body of organism along with air during respiration.

The various sources of manmade radiation pollutions may be:

1. Nuclear power plants;
2. Radio-active wastes;
3. Nuclear explosions; and
4. Radio-isotopes.

1. Nuclear Power Plants:
Nuclear power plants emit radiation to a very smaller extent except accidental leaks (Chernobyl accident of undivided USSR).

2. Radio-active Wastes:
The nuclear power plants produce a lot of nuclear radio-active wastes. The disposal of these wastes has become a global problem. Some countries producing large quantity of nuclear wastes dump them in ocean near other countries.

3. Nuclear Explosion:
During nuclear explosion, a large number of radio-nuclides are generated in the atmosphere. The radio nuclides settle down with rain contaminating the soil and water bodies. Finally, these enter into food chain causing serious problem to the living organisms.

4. Radio-isotopes:
Radio-isotopes are also prepared artificially either by nuclear fusion or by nuclear fission. If these radio-isotopes are not properly handled, these emit radiations causing pollution.

5. Television Set:
Television sets produce radiations which can also cause cancer.

Effect of Radiation Pollution:

When radiation passes through different living organisms the following dis-orderness takes place:

1. Radiation splits the molecules of the tissues into ions and free radicals and causes mutation by breaking DMA (Deoxy ribo-nucleic acid) molecules in the nucleus.
2. Radiation in bone marrow may cause leukemia.
3. Radiation may cause skin burns which may lead to skin cancer.
4. Radiation at pelvic regions of pregnant ladies, cause damage to the foetus.

Control of Radiation Pollution:

Radiation pollution can be controlled in the following ways:

1. Care should be taken to check manmade radiation pollution at source.
2. Nuclear reactor should be perfectly maintained to avoid accidental leakage.
3. Nuclear tests should be banned