Radiation protection

Radiation protection sometimes known as radiological protection is the science of protection people and the environment from the harmful effect of ionizing radiation which include both particle radiation and high energy electromagnetic radiation.

Ionizing radiation is widely used in industry and medicine but present as significant health hazard. It causes microscopic damage to living tissue resulting in skin burns and radiation sickness at high exposure and cancer, tumor and genetic damage at low exposure.

ALARP is an acronym for an important principle in exposure to radiation and other occupational health risk and stands for "**A**s **L**ow **A**s **R**easonably **P**racticable". The aim is to minimize the risk of radioactive exposure or other hazard while keeping in mind that some exposure may be acceptable in order to further the task at hand.

The equivalent term **ALARA** " **A**s **L**ow **A**s **R**easonably **A**chievable", is also commonly used.

There are four major ways to reduce radiation exposure to workers or to population:

a. Shielding use proper barriers to block or reduce ionizing radiation.

b. Time spend less time in radiation fields.

c. Distance increase distance between radioactive sources and workers or population.

d. Amount reduce the quantity of radioactive material for a practice.

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Basic concept of radiation protection

Time The amount of radiation exposure increases and decreases with the time people spend near the source of radiation. In general, think of the exposure time as how long a person is near radioactive material. It's easy to understand how to minimize the time for external direct exposure. Gamma and x-ray are the primary concern for external exposure.

However, if radioactive material gets inside your body, you cant move away from it, you have to wait until it decays or until your body can eliminate it. When this happen the biological half-life of the radionuclide controls the time of exposure.Biological half life is the amount of time it takes the body to eliminate one half of the radionuclide initially present. Alpha and beta particles are the main concern for internal exposure.

Distance The farther away people are from a radiation source the less their exposure .however close to a source of radiation can you be without getting a high exposure? It depend on the energy of the radiation and the size (or the activity) of the source. Distance is prime concern when dealing with gamma rays, because they can travel long distances. Alpha and beta particles don’t have enough energy to travel very far.

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Shielding The greater the shielding around a radiation source, the smaller the exposure. Shielding simply means having something that will absorb radiation between you and the source of the radiation (but using another person to absorb the radiation doesn't count as a shielding). The amount of shielding required to protect against different kinds of radiation depends on how much energy they have.

α Alpha a thin piece of light material, such as a paper, or even the dead cells in the outer layer of human skin provides adequate shielding because alpha particles cant penetrate it. However living tissue inside body, offers no protection against inhaled or ingested alpha emitters.

β βeta additional covering for example heavy clothing, is necessary to protect against beta emitters. S ome beta particles can penetrate and burn the skin.

γ thick, dense shielding such as lead, is necessary to protect a gainst gamma rays. The higher the energy of the gamma ray, the thicker the lead must be. X-ray pose a similar challenge, so x-ray technician often give patients receiving medical or dental x-ray a lead apron to cover parts of their body.

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N neutron radiation is not as readily absorbed as charged particle radiation. Neutron are absorbed by nuclei in a nuclear reaction

C osmic radiation is not common concern, as the earths atmosphere absorbs it and the magnetosphere act as a shield. Cosmic radiation is extremely high energy, and is very penetrating.

UV ltraviolet (UV) radiation is ionizing but it is not penetrating so it can be shielded by thin opaque layers such as sunscreen, clothing and protective eyewear. Protection from UV is simpler than for the other forms of radiation above, so it oven considered separately.

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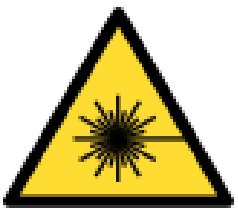
Types of hazard symbols

Radioactivity decay sign (trefoil)

Ionizing radiation sign

Non ionizing radiation sign



Laser hazard sign

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