

(Source: National Council on Radiation Protection and Measurements)

- 3) What are some sources of radiation found in living tissues? What percentage of radiation in the typical yearly exposure is from artificial sources?

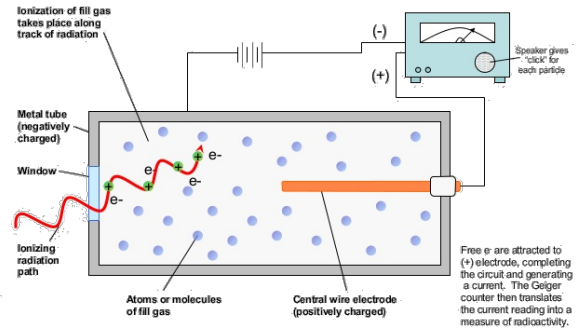
See chart above. Typically only about 18% of radiation exposure is from artificial sources.

- 4) Why is radiation harmful to humans?

Because it can ionize (remove electrons from) atoms, it can cause cell damage and death: somatic damage such as cancer in non-reproductive cells or genetic damage such as birth defects or mutations in reproductive cells.

- 5) How does a Geiger counter work? Draw a diagram. Indicate two additional methods of detecting radiation and describe how they work. (see larger diagram on website)

Alpha, beta or gamma radiation enters the chamber through the front window and ionizes the gas (typically Ar) in the chamber. Electrons are collected at the central anode and create current that is detected at the meter, causing a “beep” for each ionization.



Other methods: (1) Photographic film is exposed by interaction to ionizing radiation (including also X-rays and some high-energy UV light). Film badges worn by professionals working with radiation act as a passive measurement of exposure. (2) Scintillation counters (Rutherford’s Gold Foil experiment): a fluorescent material emits light when struck with a charged particle, and the flashes can be counted.

- 6) What are some beneficial uses of radioactive isotopes?

- Radiation treatments for cancer
- Radiotracer experiments in medical diagnostics or chemical reactions
- Radioisotopic dating of geologic and anthropologic artifacts
- Nuclear energy