

Appendix E. Rules of Thumb and Conversions.

E-1. Rules of Thumb.

Alpha particle cannot penetrate a piece of paper or the dead layer of skin.

Beta particle can not penetrate a book.

Beta particle Average Energy $E = 1/3 E_{\max}$.

Beta particle dose rate is about 300 R/hr per mCi.

Gamma exposure at 1 foot is about $6 \cdot \text{Ci} \cdot E$, where E is in MeV.

Gamma exposure is reduced to 1/4 by doubling the distance from the source.

The activity of a nuclide is reduced to less than 1% after 7 Half lives.

The activity of a nuclide is reduced to less than 0.1% after 10 Half lives.

1 gram of Radium-226 emits 1 Ci ($3.7E10$ dps) of radiation.

The half value layer for Lead

for 1 MeV photons is about 1 cm.

The half value layer for Lead for 1 MeV photons is about 1 cm.

E-2. Conversions.

$$1 \text{ in}^2 = 6.4516 \text{ cm}^2$$

$$1 \text{ ft}^2 = 0.0929 \text{ m}^2$$

$$1 \text{ eV} = 1.6021 \times 10^{-19} \text{ joules (absolute)}$$

$$1 \text{ erg} = 10^{-7} \text{ joules (absolute)}$$

$$1 \text{ ft} = 0.3048 \text{ m}$$

$$1 \text{ lb} = 453.952 \text{ gm}$$

$$1 \text{ Ci} = 3.7 \times 10^{10} \text{ becquerel}$$

$$1 \text{ Ci} = 3.7 \times 10^{10} \text{ disintegration/sec}$$

$$1 \text{ R} = 2.58 \times 10^{-4} \text{ C/kg of air}$$

$$1 \text{ rad} = 0.01 \text{ J/kg}$$

$$1 \text{ dpm} = 4.505 \times 10^{-10} \text{ mCi.}$$

$$1 \text{ ft}^3 = 2.832 \times 10^{-2} \text{ m}^3$$

$$1 \text{ ft}^3 = 7.481 \text{ gal}$$

$$55 \text{ gal} = 7.35 \text{ ft}^3$$