Radiation: Units

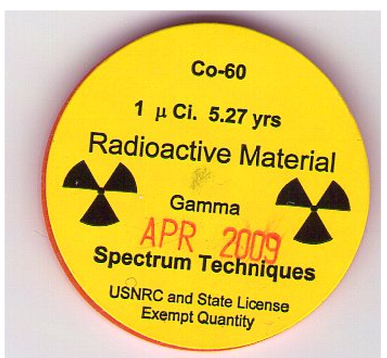
	Activity of a source	**Absorbed dose**	Biologically **effective dose**
your book calls it	"Activity"	"Dose"	"Dose equivalent"
SI unit	becquerel (Bq)	gray (Gy)	sievert (Sv)
old unit	curie (Ci)	rad	rem
dimensions	counts/time	energy/mass	energy/mass

Radiation: Biology

Radiation type	**Relative biological effectiveness (RBE)**	
gamma rays	1	less damaging
X rays	1	
beta particles (e-, e+)	1	
protons	5	
neutrons (slow)	5	
neutrons (fast)	20	
alpha particles	20	more damaging

dose equivalent = dose x RBE

Activity



1 becquerel = 1 decay/second

The becquerel is a unit that describes the activity of a radioactive source.

(The CIPM* would like it to be the only unit you use to describe the activity of a source.)

Henri Becquerel (1852 - 1908)
Discovered radioactivity by combining a small jar of uranium with photographic paper.

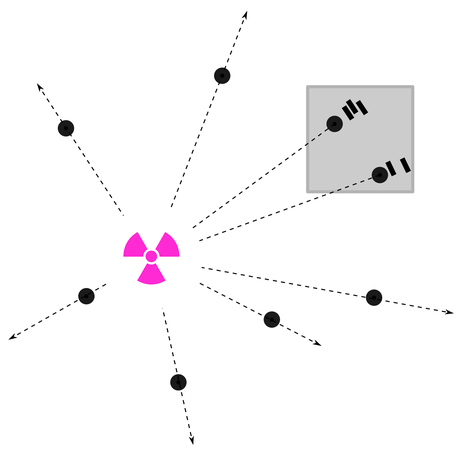
1 curie = 3.7x10^10 decays/second

The curie is another unit that describes the activity of a radioactive source.

One curie is defined to be the activity of one gram of radium.

Marie Curie (1864 - 1967)
Discovered radioactive elements radium (Ra) and polonium (Po).

Absorbed Dose ("Dose")



1 gray = 1 joule/kg

The gray is a unit that describes the absorbed dose.

Radiation that deposits energy densely in tissue is more damaging.

Harold Gray (1905 - 1965)
Built a neutron generator and studied how radiation affects different types of cells.

1 rad = 0.01 joule/kg

The rad, or "radiation absorbed dose", is another unit that describes an absorbed dose.

Dose Equivalent

Image from
hyperphysics.phy-astr.gsu.edu

1 sievert = 1 joule/kg

The sievert is a unit that measures the biological effect of an absorbed dose.

The absorbed dose, adjusted for biology, is called the "dose equivalent"

Note that the units for the dose equivalent are the same as for the absorbed dose.

Rolf Sievert (1986 - 1966)
Developed instruments to accurately measure absorbed doses.

1 rem = 0.01 joule/kg

The rem, or "Roentgen equivalent man", is another unit describing the biologically-adjusted absorbed dose.

Wilhelm Roentgen (1845 - 1923)
Discovered x-rays. Also one of the few early radioactivity researchers who used protective lead shielding.

* CIPM is the International Committee for Weights and Measures.
They help define standard international (SI) units.