

## Conversion of Radiological units

Much of the world uses units from the *Système International* (SI) to measure radiation. The SI is based on the metric system. These units include the:

becquerel  
gray  
sievert  
coulomb/kg

From the early 1900s, through to the 30s, until the 1960s, another set of units were used. They were called the:

curie  
rad  
rem  
Roentgen

The United States still uses these units. You may also find them in older documents.

This table shows a simple comparison between the words used in the SI and the old system.

<b>Old system to Système International</b>	<b>Système International to Old system</b>
<b>The becquerel (Bq) replaces the curie (Ci). *</b>	<b>The becquerel (Bq)* replaces the curie (Ci).</b>
1 kilocurie (kCi) = 37 terabecquerel (TBq) 1 curie (Ci) = 37 gigabecquerel (GBq) 1 millicurie (mCi) = 37 megabecquerel (MBq) 1 microcurie (μCi) = 37 kilobecquerel (kBq) 1 nanocurie (nCi) = 37 becquerel (Bq) 1 picocurie (pCi) = 37 millibecquerel (mBq)	1 terabecquerel (TBq) ~ 27 curie (Ci) 1 gigabecquerel (GBq) ~ 27 millicurie (mCi) 1 megabecquerel (MBq) ~ 27 microcurie (μCi) 1 kilobecquerel (kBq) ~ 27 nanocurie (nCi) 1 becquerel (Bq) ~ 27 picocurie (pCi)  * 1 Bq = 1s <sup>-1</sup>
<b>The gray (Gy) replaces the rad (rad).</b>	<b>The gray (Gy) replaces the rad (rad).</b>
1 kilorad (krad) = 10 gray (Gy) 1 rad (rad) = 10 milligray (mGy) 1 millirad (mrad) = 10 microgray (μGy) 1 microrad (μrad) = 10 nanogray (nGy)	1 gray (Gy) = 100 rad (rad) 1 milligray (mGy) = 100 millirad (mrad) 1 microgray (μGy) = 100 microrad (μrad) 1 nanogray (nGy) = 100 nanorad (nrad)
<b>The coulomb/kg (C/kg) replaces the roentgen (R).</b>	<b>The coulomb/kg (C/kg) replaces the roentgen (R).</b>
1 kiloroentgen (kR) ~ 258 millicoulomb/kg (mC/kg) 1 roentgen (R) ~ 258 microcoulomb/kg (μC/kg) 1 milliroentgen (mR) ~ 258 nanocoulomb/kg (nC/kg) 1 microroentgen (μR) ~ 258 picocoulomb/kg (pC/kg)	1 coulomb/kg (C/kg) ~ 3876 roentgen (R) 1 millicoulomb/kg (mC/kg) ~ 3876 milliroentgen (mR) 1 microcoulomb/kg (μC/kg) ~ 3876 microroentgen (μR) 1 nanocoulomb/kg (nC/kg) ~ 3876 nanoroentgen (nR)
<b>The sievert (Sv) replaces the rem (rem).</b>	<b>The sievert (Sv) replaces the rem (rem).</b>
1 kilorem (krem) = 10 sievert (Sv) 1 rem (rem) = 10 millisievert (mSv) 1 millirem (mrem) = 10 microsievert (μSv) 1 microrem (μrem) = 10 nanosievert (nSv)	1 sievert (Sv) = 100 rem (rem) 1 millisievert (mSv) = 100 millirem (mrem) 1 microsievert (μSv) = 100 microrem (μrem) 1 nanosievert (nSv) = 100 nanorem (nrem)

## **About the becquerel**

The becquerel (Bq) is named after the French physicist A.H. Becquerel. This unit measures radioactivity in a substance. It doesn't consider the type of radiation emitted or what its effects may be. One becquerel equals one nuclear disintegration per second. This is a very small unit, so multiples are often used. These include the:

kilobecquerel (kBq: thousand Bq);  
megabecquerel (MBq: million Bq); and  
gigabecquerel (GBq: thousand million or billion Bq).

## **About the gray**

The gray (Gy) was defined in 1975 in honor of English radiobiologist Louis H. Gray (1905-1965). This unit describes how much energy is absorbed by a substance from the radiation passing through it, or the absorbed dose. One gray corresponds to one joule of radiation energy absorbed by one kilogram of matter. Measuring how many grays a substance receives in one hour tells us what the rate is. The gray is a very large dose of radiation. A more useful unit is the milligray (mGv). This is one-thousandth of a gray.

## **About the sievert**

The sievert (Sv) is named after the Swedish physicist Rolf M. Sievert. The unit reflects the biological effects of the ionizing radiation absorbed. It is used to express both the equivalent dose and the effective dose. The sievert is a very large dose of radiation. A more useful unit is the millisievert (mSv). This is one-thousandth of a sievert.

**1milliSievert per year  $\approx$ 0.11 microSievert per hour**

From Health Canada web site:

<http://www.hc-sc.gc.ca/ewh-semt/occup-travail/radiation/dosim/res-centre/conversion/index-eng.php>