

Guide to SI Unit for Radiation Protection

Introduction to SI Units

SI (System International) units comprise the primary measurement system for most countries. The system is also finding increasing use in the United States. State and federal regulatory agencies, including the Agency and the U.S. Nuclear Regulatory Commission, have adopted SI units for radiation measurements; other agencies (e.g., the U.S. Department of Transportation) require their use.

Common Radiological Unit Prefixes

Submultiples				Multiples			
m	milli	10^{-3}	thousandth	k	kilo	10^3	thousand
μ	micro	10^{-6}	millionth	M	mega	10^6	million
n	nano	10^{-9}	thousand millionth	G	giga	10^9	thousand million
p	Pico	10^{-12}	million millionth	T	tera	10^{12}	million million

Length

1 centimeter (cm)	=	0.3937 in	=	.03287 ft
1 meter (m)	=	100 cm	=	39.37 in = 3.281 ft
1 inch (in)	=	2.54 cm	=	0.254 m
1 foot (ft)	=	30.48 cm	=	0.3048 m

Activity

The traditional unit is the Curie (Ci); the SI unit is the Becquerel (Bq)

$1 \text{ Ci} = 3.7 \times 10^{10} \text{ Bq} = 37 \text{ GBq}$ $1 \text{ Bq} = 1 \text{ disintegration per second} = 2.7027 \times 10^{-11} \text{ Ci}$ or $\approx 27 \text{ pCi}$

To convert Bq to Ci, divide the Bq figure by 37×10^9 (or multiply the Bq figure by 2.7027×10^{-11}) To convert Ci to Bq, multiply the Ci figure by 37×10^9



Examples: $9 \text{ mCi} = 333 \text{ MBq} = 0.333 \text{ GBq}$
 $44 \text{ mCi} = 1628 \text{ MBq} = 1.63 \text{ GBq}$

$10 \text{ mCi} = 370 \text{ MBq} = 0.37 \text{ GBq}$
 $50 \text{ mCi} = 1850 \text{ MBq} = 1.85 \text{ GBq}$

Activity (continued)

Table A

Curie Units	Becquerel Units
μCi	kBq
mCi	MBq
Ci	GBq
0.1	3.7
0.25	9.25
0.5	18.5
0.75	27.75
1	37
2	74
3	111
5	185
7	259
10	370
20	740
25	925

From Table A: 0.1 mCi = 3.7 MBq
0.1 Ci = 3.7 GBq

Table B

Curie Units	Becquerel Units
μCi	MBq
mCi	GBq
Ci	TBq
50	1.85
60	2.22
100	3.7
200	7.4
250	9.25
500	18.5
800	29.6
1000	37

From Table B: 50 mCi = 1.85 GBq
3.7 MBq = 100 μCi

To convert from one unit to another, read across from one column to the other, ensuring the units are in the same line of the column headings.

Radiation Dose Equivalent

The traditional unit is the rem; the SI unit is the sievert (Sv).

1 rem = 0.01 sievert (Sv) = 10 mSv

100 rem = 1 Sv = 0.01 Sv

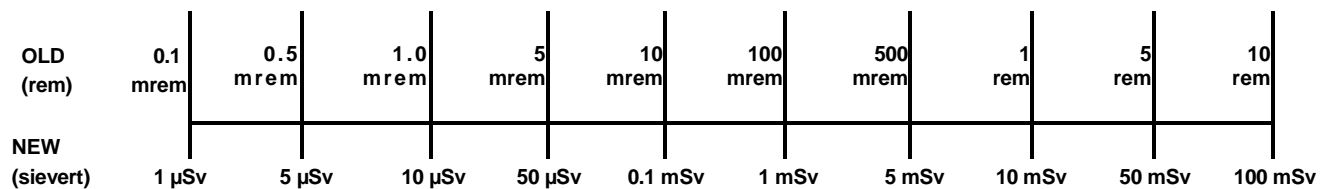
500 rem = 5 Sv = 0.5 mSv

1 rad = 0.01 gray (Gy) = 10 mGy

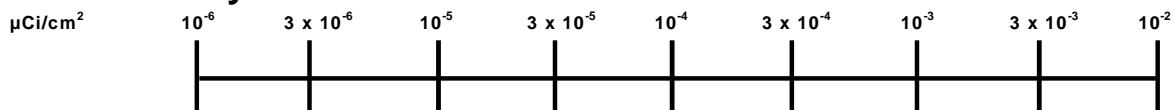
100 rads = 1 Gy = 0.01 Gy

500 rads = 5 Gy = 0.5 mGy

The working SI unit is the sievert (Sv)



Surface Activity



Bq/cm ²	0.037	0.1	0.37	1	3.7	10	37	100	370
(kBq/cm ²)	0.37	0.1	3.7	10	37	100	370	1000	3700