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Radiation Conversion Chart

Sieverts and rem, gray and rad, becquerels and curies, roentgen

For: Radiographers, health physicists, nuclear and medical staff, students

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EXACT DEFINITION	FORMULA	REVERSE	WORKED EXAMPLE
1 Sv = 100 rem; 1 Gy = 100 rad; 1 Ci = 3.7×10^{10} Bq; 1 R = 2.58×10^{-4} C/kg	mrem = mSv × 100	mSv = mrem ÷ 100	2.4 mSv (world average yearly background) = 240 mrem

Values use 4 significant figures. Equivalent dose (Sv) = absorbed dose (Gy) × radiation weighting factor.

Dose equivalent: millisieverts to millirem and microsieverts

Millisieverts (mSv)	Millirem (mrem)	Microsieverts (µSv)
0.001	0.1	1
0.01	1	10
0.05	5	50
0.1	10	100
0.5	50	500
1	100	1,000
2	200	2,000
2.4	240	2,400

Millisieverts (mSv)	Millirem (mrem)	Microsieverts (µSv)
5	500	5,000
10	1,000	10,000
20	2,000	20,000
50	5,000	50,000
100	10,000	100,000
250	25,000	250,000
500	50,000	500,000
1,000	100,000	1×10^{6}

Absorbed dose: gray to rad

Gray (Gy)	Rad (rad)	Milligray (mGy)
0.001	0.1	1
0.01	1	10
0.1	10	100
0.5	50	500
1	100	1,000

Gray (Gy)	Rad (rad)	Milligray (mGy)
2	200	2,000
5	500	5,000
10	1,000	10,000
50	5,000	50,000
100	10,000	100,000

Activity: millicuries to becquerels

Millicuries (mCi)	Becquerels (Bq)
0.001	37,000
0.01	370,000
0.1	3.7×10^{6}
0.5	1.85×10^{7}
1	3.7×10^{7}
5	1.85×10^{8}

Millicuries (mCi)	Becquerels (Bq)
10	3.7×10^{8}
20	7.4×10^{8}
25	9.25×10^{8}
30	1.11×10^{9}
50	1.85×10^{9}
100	3.7×10^{9}

Activity and exposure factors

From	To	Multiply by
Curies (Ci)	Becquerels (Bq)	3.7×10^{10}
Microcuries (µCi)	Becquerels (Bq)	37,000
Becquerels (Bq)	Microcuries (µCi)	2.702703×10^{-5}
Roentgen (R)	Coulombs per kilogram (C/kg)	2.58×10^{-4}
Coulombs per kilogram (C/kg)	Roentgen (R)	3,875.969

Reference doses

Reference	Dose
World average natural background (UNSCEAR)	2.4 mSv per year (240 mrem)
Public dose limit, planned exposures (ICRP 103)	1 mSv per year (100 mrem)
Occupational limit (ICRP 103)	20 mSv per year averaged over 5 years; max 50 mSv in any year

Sources and method

- **BIPM SI Brochure, 9th edition** — Definitions of the SI units, including the kelvin (www.bipm.org/en/publications/si-brochure)
- **NIST Special Publication 811** — Guide for the Use of the International System of Units (www.nist.gov/pml/special-publication-811)
- **ICRP Publication 103 (2007)** — Recommended dose limits; UNSCEAR 2008 for natural background

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