Appendix C Useful Quantities in Nuclear Science

atomic mass unit (u)	$\frac{1}{12}$ mass ^{12}C	$1.6605402 \times 10^{-27}$ kg
electric charge (coulomb)	e	$1.60217733 \times 10^{-19}$ C
speed of light (vacuum)	c	299792458 m/s (exact)

Particle	**Mass** (in *u*)	**Charge** (in electron charge, *e*)	**Half-life** (in seconds)
proton, p	1.007276	+1	stable
neutron, n	1.008665	0	624
electron, e or e^-	0.000549	-1	stable
neutrino, ν	> 0	0	stable
antiproton, $\bar{p}$	1.007276	-1	stable†
antineutron, $\bar{n}$	1.008665	0	624†
positron, e^+	0.000549	+1	stable
antineutrino, $\bar{\nu}$	> 0	0	stable†
muon, $\mu^\pm$	0.10565	+1, -1	3.17×10^{-6}
pion, $\pi^\pm$	0.14	+1, -1	3.76×10^{-8}
pion, π^0	0.14	0	6.63×10^{-17}
photon, γ	0	0	stable
gluon, g	0	0	
up quark, u	approximately 0.005	+2/3	
down quark, d	approximately 0.01	-1/3	
strange quark, s	0.1 to 0.3	-1/3	
charm quark, c	1.0 to 1.6	+2/3	
bottom quark, b	4.1 to 4.5	-1/3	
top quark, t	180 ± 12	+2/3	
^1H atom	1.007825	0	stable
^2H nucleus	2.013553	+1	stable
^2H atom	2.014102	0	stable
^3H nucleus	3.015500	+1	3.88×10^8
^3H atom	3.016049	0	3.88×10^8
^3He nucleus	3.014932	+2	stable
^3He atom	3.016029	0	stable
^4He nucleus	4.001506	+2	stable
^4He atom	4.002603	0	stable
^{12}C atom	12.000000	0	stable
^{238}U atom	238.050785	0	1.41×10^{17}

† Antiparticles are assumed to have same half-life as particles.
From the Review of Particle Properties, R. M. Barnett *et al*., Physical Review **D54**, 1 (1996).

International System of Units (SI)—SI prefixes

value	name	symbol
10^{-24}	yocto	y
10^{-21}	zepto	z
10^{-18}	atto	a
10^{-15}	femto	f
10^{-12}	pico	p
10^{-9}	nano	n
10^{-6}	micro	μ
10^{-3}	milli	m
10^{-2}	centi	c
10^{-1}	deci	d
10	deca	da
10^{2}	hecto	h
10^{3}	kilo	k
10^{6}	mega	M
10^{9}	giga	G
10^{12}	tera	T
10^{15}	peta	P
10^{18}	exa	E
10^{21}	zetta	Z
10^{24}	yotta	Y

Example of a Branching Ratio

Examples of three ways that ^{226}Ac decays. The quantity to the right is the fraction of times that a particular decay occurs. The sum is not 100% because the numbers are rounded.

^{226}Ac	→	$^{226}Th + e^{-} + \bar{\nu}$	83%
$^{226}Ac + e^{-}$	→	$^{226}Fr + \nu$	17%
^{226}Ac	→	$^{222}Fr + {}^{4}He$	0.006%