

**Muons in sodium (Na)**

Z	A [g/mol]	$\rho$ [g/cm <sup>3</sup> ]	I [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\bar{C}$	$\delta_0$
11 (Na)	22.98976928(2)	0.971	149.0	0.07772	3.6452	0.2880	3.1962	5.0526	0.08

  

$T$	$p$ [MeV/c]	Ionization	Brems	Pair prod [MeV cm <sup>2</sup> /g]	Photonucl	Total	CSDA range [g/cm <sup>2</sup> ]
10.0 MeV	$4.704 \times 10^1$	6.245				6.245	$8.929 \times 10^{-1}$
14.0 MeV	$5.616 \times 10^1$	4.891				4.891	$1.624 \times 10^0$
20.0 MeV	$6.802 \times 10^1$	3.833				3.833	$3.026 \times 10^0$
30.0 MeV	$8.509 \times 10^1$	2.985				2.985	$6.023 \times 10^0$
40.0 MeV	$1.003 \times 10^2$	2.554				2.554	$9.668 \times 10^0$
80.0 MeV	$1.527 \times 10^2$	1.926				1.926	$2.827 \times 10^1$
100. MeV	$1.764 \times 10^2$	1.813				1.813	$3.900 \times 10^1$
140. MeV	$2.218 \times 10^2$	1.704				1.704	$6.186 \times 10^1$
200. MeV	$2.868 \times 10^2$	1.650				1.650	$9.776 \times 10^1$
263. MeV	$3.527 \times 10^2$	1.639			0.000	1.639	<i>Minimum ionization</i>
300. MeV	$3.917 \times 10^2$	1.641			0.000	1.641	$1.587 \times 10^2$
400. MeV	$4.945 \times 10^2$	1.658			0.000	1.659	$2.193 \times 10^2$
800. MeV	$8.995 \times 10^2$	1.747	0.000		0.000	1.747	$4.541 \times 10^2$
1.00 GeV	$1.101 \times 10^3$	1.783	0.000		0.000	1.784	$5.674 \times 10^2$
1.40 GeV	$1.502 \times 10^3$	1.840	0.000	0.000	0.001	1.841	$7.879 \times 10^2$
2.00 GeV	$2.103 \times 10^3$	1.901	0.001	0.000	0.001	1.903	$1.108 \times 10^3$
3.00 GeV	$3.104 \times 10^3$	1.969	0.001	0.001	0.001	1.973	$1.623 \times 10^3$
4.00 GeV	$4.104 \times 10^3$	2.016	0.002	0.002	0.002	2.022	$2.124 \times 10^3$
8.00 GeV	$8.105 \times 10^3$	2.122	0.005	0.005	0.004	2.135	$4.042 \times 10^3$
10.0 GeV	$1.011 \times 10^4$	2.153	0.007	0.007	0.005	2.171	$4.971 \times 10^3$
14.0 GeV	$1.411 \times 10^4$	2.198	0.010	0.011	0.006	2.226	$6.789 \times 10^3$
20.0 GeV	$2.011 \times 10^4$	2.244	0.015	0.018	0.009	2.286	$9.447 \times 10^3$
30.0 GeV	$3.011 \times 10^4$	2.292	0.025	0.031	0.013	2.361	$1.375 \times 10^4$
40.0 GeV	$4.011 \times 10^4$	2.324	0.036	0.046	0.017	2.422	$1.793 \times 10^4$
80.0 GeV	$8.011 \times 10^4$	2.397	0.081	0.110	0.033	2.621	$3.377 \times 10^4$
100. GeV	$1.001 \times 10^5$	2.419	0.105	0.145	0.041	2.711	$4.128 \times 10^4$
140. GeV	$1.401 \times 10^5$	2.453	0.155	0.217	0.057	2.882	$5.558 \times 10^4$
200. GeV	$2.001 \times 10^5$	2.488	0.233	0.331	0.081	3.133	$7.554 \times 10^4$
300. GeV	$3.001 \times 10^5$	2.528	0.367	0.524	0.121	3.540	$1.055 \times 10^5$
400. GeV	$4.001 \times 10^5$	2.556	0.505	0.725	0.161	3.948	$1.323 \times 10^5$
712. GeV	$7.119 \times 10^5$	2.613	0.951	1.372	0.289	5.226	<i>Muon critical energy</i>
800. GeV	$8.001 \times 10^5$	2.624	1.080	1.559	0.326	5.590	$2.170 \times 10^5$
1.00 TeV	$1.000 \times 10^6$	2.647	1.377	1.990	0.409	6.423	$2.504 \times 10^5$
1.40 TeV	$1.400 \times 10^6$	2.681	1.973	2.844	0.580	8.078	$3.058 \times 10^5$
2.00 TeV	$2.000 \times 10^6$	2.717	2.888	4.151	0.840	10.597	$3.705 \times 10^5$
3.00 TeV	$3.000 \times 10^6$	2.759	4.420	6.326	1.286	14.792	$4.500 \times 10^5$
4.00 TeV	$4.000 \times 10^6$	2.789	5.976	8.530	1.740	19.035	$5.095 \times 10^5$
8.00 TeV	$8.000 \times 10^6$	2.863	12.267	17.398	3.628	36.157	$6.594 \times 10^5$
10.0 TeV	$1.000 \times 10^7$	2.888	15.445	21.861	4.600	44.794	$7.090 \times 10^5$
14.0 TeV	$1.400 \times 10^7$	2.925	21.790	30.758	6.599	62.072	$7.845 \times 10^5$
20.0 TeV	$2.000 \times 10^7$	2.965	31.380	44.172	9.668	88.186	$8.652 \times 10^5$
30.0 TeV	$3.000 \times 10^7$	3.011	47.326	66.497	14.989	131.824	$9.574 \times 10^5$
40.0 TeV	$4.000 \times 10^7$	3.045	63.344	88.889	20.447	175.725	$1.023 \times 10^6$
80.0 TeV	$8.000 \times 10^7$	3.127	127.579	178.524	43.311	352.543	$1.180 \times 10^6$
100. TeV	$1.000 \times 10^8$	3.155	159.780	223.390	55.150	441.475	$1.231 \times 10^6$