

# Muons in sodium carbonate (Na<sub>2</sub>CO<sub>3</sub>)

$\langle Z/A \rangle$	$\rho$ [g/cm <sup>3</sup> ]	$I$ [eV]	$a$	$k = m_s$	$x_0$	$x_1$	$\overline{C}$	$\delta_0$
0.49062	2.532	125.0	0.08715	3.5638	0.1287	2.8591	3.7178	0.00
$T$	$p$ [MeV/c]	Ionization	Brems	Pair prod [MeV cm <sup>2</sup> /g]	Photonucl	Total	CSDA range [g/cm <sup>2</sup> ]	
10.0 MeV	$4.704 \times 10^1$	6.575				6.575	$8.449 \times 10^{-1}$	
14.0 MeV	$5.616 \times 10^1$	5.142				5.142	$1.540 \times 10^0$	
20.0 MeV	$6.802 \times 10^1$	4.026				4.026	$2.874 \times 10^0$	
30.0 MeV	$8.509 \times 10^1$	3.131				3.131	$5.729 \times 10^0$	
40.0 MeV	$1.003 \times 10^2$	2.679				2.679	$9.204 \times 10^0$	
80.0 MeV	$1.527 \times 10^2$	2.017				2.017	$2.695 \times 10^1$	
100. MeV	$1.764 \times 10^2$	1.895				1.895	$3.721 \times 10^1$	
140. MeV	$2.218 \times 10^2$	1.771				1.772	$5.914 \times 10^1$	
200. MeV	$2.868 \times 10^2$	1.703				1.703	$9.381 \times 10^1$	
298. MeV	$3.894 \times 10^2$	1.681			0.000	1.681	<i>Minimum ionization</i>	
300. MeV	$3.917 \times 10^2$	1.681			0.000	1.681	$1.531 \times 10^2$	
400. MeV	$4.945 \times 10^2$	1.690			0.000	1.691	$2.125 \times 10^2$	
800. MeV	$8.995 \times 10^2$	1.764	0.000		0.000	1.764	$4.440 \times 10^2$	
1.00 GeV	$1.101 \times 10^3$	1.796	0.000		0.000	1.797	$5.563 \times 10^2$	
1.40 GeV	$1.502 \times 10^3$	1.847	0.000	0.000	0.001	1.848	$7.757 \times 10^2$	
2.00 GeV	$2.103 \times 10^3$	1.903	0.001	0.000	0.001	1.905	$1.095 \times 10^3$	
3.00 GeV	$3.104 \times 10^3$	1.967	0.001	0.001	0.001	1.971	$1.611 \times 10^3$	
4.00 GeV	$4.104 \times 10^3$	2.011	0.002	0.001	0.002	2.016	$2.112 \times 10^3$	
8.00 GeV	$8.105 \times 10^3$	2.111	0.004	0.004	0.004	2.124	$4.039 \times 10^3$	
10.0 GeV	$1.011 \times 10^4$	2.142	0.006	0.006	0.005	2.158	$4.973 \times 10^3$	
14.0 GeV	$1.411 \times 10^4$	2.185	0.009	0.009	0.006	2.210	$6.804 \times 10^3$	
20.0 GeV	$2.011 \times 10^4$	2.230	0.013	0.015	0.009	2.268	$9.482 \times 10^3$	
30.0 GeV	$3.011 \times 10^4$	2.277	0.022	0.027	0.013	2.339	$1.382 \times 10^4$	
40.0 GeV	$4.011 \times 10^4$	2.310	0.031	0.039	0.017	2.397	$1.804 \times 10^4$	
80.0 GeV	$8.011 \times 10^4$	2.384	0.070	0.095	0.033	2.582	$3.409 \times 10^4$	
100. GeV	$1.001 \times 10^5$	2.407	0.091	0.125	0.041	2.664	$4.172 \times 10^4$	
140. GeV	$1.401 \times 10^5$	2.441	0.134	0.187	0.058	2.820	$5.631 \times 10^4$	
200. GeV	$2.001 \times 10^5$	2.477	0.201	0.286	0.082	3.046	$7.677 \times 10^4$	
300. GeV	$3.001 \times 10^5$	2.518	0.317	0.453	0.123	3.411	$1.078 \times 10^5$	
400. GeV	$4.001 \times 10^5$	2.547	0.438	0.627	0.163	3.775	$1.356 \times 10^5$	
800. GeV	$7.999 \times 10^5$	2.617	0.936	1.350	0.330	5.234	<i>Muon critical energy</i>	
800. GeV	$8.001 \times 10^5$	2.617	0.937	1.351	0.330	5.235	$2.252 \times 10^5$	
1.00 TeV	$1.000 \times 10^6$	2.640	1.194	1.724	0.415	5.974	$2.610 \times 10^5$	
1.40 TeV	$1.400 \times 10^6$	2.675	1.713	2.467	0.588	7.442	$3.208 \times 10^5$	
2.00 TeV	$2.000 \times 10^6$	2.712	2.508	3.603	0.852	9.675	$3.914 \times 10^5$	
3.00 TeV	$3.000 \times 10^6$	2.755	3.840	5.494	1.305	13.395	$4.789 \times 10^5$	
4.00 TeV	$4.000 \times 10^6$	2.786	5.194	7.411	1.765	17.157	$5.447 \times 10^5$	
8.00 TeV	$8.000 \times 10^6$	2.862	10.671	15.127	3.682	32.342	$7.117 \times 10^5$	
10.0 TeV	$1.000 \times 10^7$	2.887	13.438	19.011	4.669	40.006	$7.672 \times 10^5$	
14.0 TeV	$1.400 \times 10^7$	2.925	18.961	26.753	6.700	55.340	$8.519 \times 10^5$	
20.0 TeV	$2.000 \times 10^7$	2.966	27.311	38.427	9.820	78.525	$9.425 \times 10^5$	
30.0 TeV	$3.000 \times 10^7$	3.014	41.204	57.855	15.231	117.305	$1.046 \times 10^6$	
40.0 TeV	$4.000 \times 10^7$	3.048	55.163	77.343	20.783	156.337	$1.120 \times 10^6$	
80.0 TeV	$8.000 \times 10^7$	3.133	111.138	155.356	44.055	313.681	$1.297 \times 10^6$	
100. TeV	$1.000 \times 10^8$	3.161	139.197	194.406	56.109	392.873	$1.354 \times 10^6$	