Hydrogen (H)

$$
\begin{aligned}
W_M^{00}(y) &= 0.0397887 & W_{\Sigma''}^{00}(y) &= 0.0397887 & W_{\Sigma'}^{00}(y) &= 0.0795775 \\
W_M^{11}(y) &= 0.0397887 & W_{\Sigma''}^{11}(y) &= 0.0397887 & W_{\Sigma'}^{11}(y) &= 0.0795775 \\
W_M^{10}(y) &= 0.0397887 & W_{\Sigma''}^{10}(y) &= 0.0397887 & W_{\Sigma'}^{10}(y) &= 0.0795775 \\
W_M^{01}(y) &= 0.0397887 & W_{\Sigma''}^{01}(y) &= 0.0397887 & W_{\Sigma'}^{01}(y) &= 0.0795775
\end{aligned}
\tag{1}
$$

Helium (^{3}He)

$$
\begin{aligned}
W_M^{00}(y) &= 0.358099e^{-2y} & W_{\Sigma''}^{00}(y) &= 0.0397887e^{-2y} & W_{\Sigma'}^{00}(y) &= 0.0795775e^{-2y} \\
W_M^{11}(y) &= 0.0397887e^{-2y} & W_{\Sigma''}^{11}(y) &= 0.0397887e^{-2y} & W_{\Sigma'}^{11}(y) &= 0.0795775e^{-2y} \\
W_M^{10}(y) &= 0.119366e^{-2y} & W_{\Sigma''}^{10}(y) &= -0.0397887e^{-2y} & W_{\Sigma'}^{10}(y) &= -0.0795775e^{-2y} \\
W_M^{01}(y) &= 0.119366e^{-2y} & W_{\Sigma''}^{01}(y) &= -0.0397887e^{-2y} & W_{\Sigma'}^{01}(y) &= -0.0795775e^{-2y}
\end{aligned}
\tag{2}
$$

Helium (^{4}He)

$$
W_M^{00}(y) = 0.31831e^{-2y}
\tag{3}
$$

Carbon (^{12}C)

$$
\begin{aligned}
W_M^{00}(y) &= 0.565882e^{-2y}(2.25 - y)^2 \\
W_{\Phi''}^{00}(y) &= 0.0480805e^{-2y} \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-0.371134 + 0.164948y)
\end{aligned}
\tag{4}
$$

Nitrogen (^{14}N)

$$
\begin{aligned}
W_{M}^{00}(y) &= e^{-2y}(11.6979 - 11.1409y + 2.67574y^2) \\
W_{\Sigma''}^{00}(y) &= 0.0230079e^{-2y}(1.20986 + y)^2 \\
W_{\Sigma'}^{00}(y) &= 0.134532e^{-2y}(0.707578 - y)^2 \\
W_{\Phi''}^{00}(y) &= 0.0905048e^{-2y} \\
W_{\tilde{\Phi}'}^{00}(y) &= 0.00126432e^{-2y} \\
W_{\Delta}^{00}(y) &= 0.0424075e^{-2y} \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-1.02414 + 0.483267y) \\
W_{\Sigma'\Delta}^{00}(y) &= e^{-2y}(0.0534451 - 0.0755325y)
\end{aligned}
\tag{5}
$$

Oxygen (^{16}O)

$$
\begin{aligned}
W_{M}^{00}(y) &= 0.000032628e^{-2y}(395.084 - 200.042y + y^2)^2 \\
W_{\Phi''}^{00}(y) &= 0.000032628e^{-2y}(3.66055 - y)^2 \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-0.0471874 + 0.0367831y - 0.00664641y^2 + 0.000032628y^3)
\end{aligned}
\tag{6}
$$

Neon (^{20}Ne)

$$
\begin{aligned}
W_{M}^{00}(y) &= 0.0431723e^{-2y}(13.5766 - 9.05108y + y^2)^2 \\
W_{\Phi''}^{00}(y) &= 0.00348077e^{-2y}(2.50001 - y)^2 \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-0.416077 + 0.443815y - 0.1416y^2 + 0.0122586y^3)
\end{aligned}
\tag{7}
$$

Magnesium (^{24}Mg)

$$
\begin{aligned}
W_{M}^{00}(y) &= 0.123467e^{-2y}(9.63385 - 7.49299y + y^2)^2 \\
W_{\Phi''}^{00}(y) &= 0.0260816e^{-2y}(2.5 - y)^2 \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-1.36673 + 1.6097y - 0.567072y^2 + 0.056747y^3)
\end{aligned}
\tag{8}
$$

Sodium (^{23}Na)

$$
\begin{aligned}
W_M^{00}(y) &= e^{-2y}(42.0965 - 63.4498y + 32.5913y^2 - 6.57878y^3 + 0.483166y^4)\\
W_M^{11}(y) &= e^{-2y}(0.0795776 - 0.212207y + 0.182941y^2 - 0.0543892y^3 + 0.00523012y^4)\\
W_M^{10}(y) &= e^{-2y}(-1.83028 + 3.81972y - 2.50445y^2 + 0.597822y^3 - 0.04545y^4)\\
W_M^{01}(y) &= e^{-2y}(-1.83028 + 3.81972y - 2.50445y^2 + 0.597822y^3 - 0.04545y^4)\\
W_{\Sigma''}^{00}(y) &= e^{-2y}(0.0126672 - 0.0262533y + 0.0401886y^2 - 0.010514y^3 + 0.00078605y^4)\\
W_{\Sigma''}^{11}(y) &= e^{-2y}(0.00917577 - 0.0167053y + 0.0332751y^2 - 0.00765719y^3 + 0.000597676y^4)\\
W_{\Sigma''}^{10}(y) &= e^{-2y}(0.0107811 - 0.020986y + 0.0360971y^2 - 0.00876213y^3 + 0.000626718y^4)\\
W_{\Sigma''}^{01}(y) &= e^{-2y}(0.0107811 - 0.020986y + 0.0360971y^2 - 0.00876213y^3 + 0.000626718y^4)\\
W_{\Sigma'}^{00}(y) &= e^{-2y}(0.0253345 - 0.0750847y + 0.100235y^2 - 0.0384261y^3 + 0.00466396y^4)\\
W_{\Sigma'}^{11}(y) &= e^{-2y}(0.0183515 - 0.0567009y + 0.0887794y^2 - 0.0374699y^3 + 0.00477955y^4)\\
W_{\Sigma'}^{10}(y) &= e^{-2y}(0.0215622 - 0.0652627y + 0.0941439y^2 - 0.0379511y^3 + 0.00472138y^4)\\
W_{\Sigma'}^{01}(y) &= e^{-2y}(0.0215622 - 0.0652627y + 0.0941439y^2 - 0.0379511y^3 + 0.00472138y^4)\\
W_{\Phi''}^{00}(y) &= e^{-2y}(0.612149 - 0.49308y + 0.107832y^2)\\
W_{\Phi''}^{11}(y) &= e^{-2y}(0.00940911 - 0.00747826y + 0.00163204y^2)\\
W_{\Phi''}^{10}(y) &= e^{-2y}(-0.075893 + 0.060682y - 0.0110124y^2)\\
W_{\Phi''}^{01}(y) &= e^{-2y}(-0.075893 + 0.060682y - 0.0110124y^2)\\
W_{\tilde{\Phi}'}^{00}(y) &= e^{-2y}(0.000495589 - 0.00010394y + 0.00000544981y^2)\\
W_{\tilde{\Phi}'}^{11}(y) &= e^{-2y}(0.00000616583 + 0.00008381y + 0.0002848y^2)\\
W_{\tilde{\Phi}'}^{10}(y) &= e^{-2y}(-0.0000552785 - 0.000369894y + 0.0000393968y^2)\\
W_{\tilde{\Phi}'}^{01}(y) &= e^{-2y}(-0.0000552785 - 0.000369894y + 0.0000393968y^2)\\
W_{\Delta}^{00}(y) &= e^{-2y}(0.0335711 - 0.0268568y + 0.00656896y^2)\\
W_{\Delta}^{11}(y) &= e^{-2y}(0.00772326 - 0.00617861y + 0.0021619y^2)\\
W_{\Delta}^{10}(y) &= e^{-2y}(0.0161021 - 0.0128817y + 0.00362952y^2)\\
W_{\Delta}^{01}(y) &= e^{-2y}(0.0161021 - 0.0128817y + 0.00362952y^2)\\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-5.07498 + 5.86765y - 2.09908y^2 + 0.226345y^3)\\
W_{M\Phi''}^{11}(y) &= e^{-2y}(-0.0273574 + 0.0474719y - 0.0213121y^2 + 0.00280825y^3)\\
W_{M\Phi''}^{10}(y) &= e^{-2y}(0.220651 - 0.382932y + 0.17682y^2 - 0.0226015y^3)\\
W_{M\Phi''}^{01}(y) &= e^{-2y}(0.62922 - 0.727336y + 0.243236y^2 - 0.0210943y^3)\\
W_{\Sigma'\Delta}^{00}(y) &= e^{-2y}(-0.0291634 + 0.0548817y - 0.0305345y^2 + 0.00476387y^3)\\
W_{\Sigma'\Delta}^{11}(y) &= e^{-2y}(-0.0119052 + 0.0231539y - 0.0164035y^2 + 0.00310235y^3)\\
W_{\Sigma'\Delta}^{10}(y) &= e^{-2y}(-0.024821 + 0.0482732y - 0.02884y^2 + 0.00481368y^3)\\
W_{\Sigma'\Delta}^{01}(y) &= e^{-2y}(-0.013988 + 0.0263236y - 0.0171362y^2 + 0.00306717y^3)
\end{aligned}
\tag{9}
$$

Aluminium (^{27}Al)

$$
\begin{aligned}
W_M^{00}(y) &= e^{-2y}(87.0146 - 146.097y + 83.5367y^2 - 18.5981y^3 + 1.43446y^4)\\
W_M^{11}(y) &= e^{-2y}(0.119366 - 0.31831y + 0.337291y^2 - 0.132526y^3 + 0.018155y^4)\\
W_M^{10}(y) &= e^{-2y}(-3.22283 + 7.00266y - 4.92756y^2 + 1.33587y^3 - 0.11524y^4)\\
W_M^{01}(y) &= e^{-2y}(-3.22283 + 7.00266y - 4.92756y^2 + 1.33587y^3 - 0.11524y^4)\\
W_{\Sigma''}^{00}(y) &= e^{-2y}(0.0309465 - 0.0367242y + 0.0265347y^2 - 0.00241606y^3 + 0.0110011y^4)\\
W_{\Sigma''}^{11}(y) &= e^{-2y}(0.0218834 - 0.00944476y + 0.011506y^2 + 0.000953537y^3 + 0.0104813y^4)\\
W_{\Sigma''}^{10}(y) &= e^{-2y}(0.0260233 - 0.0210567y + 0.0158643y^2 + 0.000606077y^3 + 0.0105713y^4)\\
W_{\Sigma''}^{01}(y) &= e^{-2y}(0.0260233 - 0.0210567y + 0.0158643y^2 + 0.000606077y^3 + 0.0105713y^4)\\
W_{\Sigma'}^{00}(y) &= e^{-2y}(0.0618929 - 0.210848y + 0.244466y^2 - 0.0942682y^3 + 0.0243737y^4)\\
W_{\Sigma'}^{11}(y) &= e^{-2y}(0.0437667 - 0.165622y + 0.221193y^2 - 0.101991y^3 + 0.0277477y^4)\\
W_{\Sigma'}^{10}(y) &= e^{-2y}(0.0520466 - 0.18713y + 0.233007y^2 - 0.0985082y^3 + 0.0259327y^4)\\
W_{\Sigma'}^{01}(y) &= e^{-2y}(0.0520466 - 0.18713y + 0.233007y^2 - 0.0985082y^3 + 0.0259327y^4)\\
W_{\Phi''}^{00}(y) &= e^{-2y}(2.80498 - 2.24306y + 0.455491y^2)\\
W_{\Phi''}^{11}(y) &= e^{-2y}(0.021493 - 0.0156159y + 0.00596886y^2)\\
W_{\Phi''}^{10}(y) &= e^{-2y}(-0.180417 + 0.137389y - 0.0239615y^2)\\
W_{\Phi''}^{01}(y) &= e^{-2y}(-0.180417 + 0.137389y - 0.0239615y^2)\\
W_{\tilde{\Phi}'}^{00}(y) &= e^{-2y}(0.0000680703 - 0.000376682y + 0.00340251y^2)\\
W_{\tilde{\Phi}'}^{11}(y) &= e^{-2y}(0.0149622 - 0.00563307y + 0.00440385y^2)\\
W_{\tilde{\Phi}'}^{10}(y) &= e^{-2y}(-0.0010092 + 0.00298228y + 0.00281525y^2)\\
W_{\tilde{\Phi}'}^{01}(y) &= e^{-2y}(-0.0010092 + 0.00298228y + 0.00281525y^2)\\
W_{\Delta}^{00}(y) &= e^{-2y}(0.126043 - 0.100835y + 0.0237577y^2)\\
W_{\Delta}^{11}(y) &= e^{-2y}(0.05736 - 0.045888y + 0.012102y^2)\\
W_{\Delta}^{10}(y) &= e^{-2y}(0.0850285 - 0.0680228y + 0.016845y^2)\\
W_{\Delta}^{01}(y) &= e^{-2y}(0.0850285 - 0.0680228y + 0.016845y^2)\\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-15.6228 + 19.3589y - 7.23234y^2 + 0.79705y^3)\\
W_{M\Phi''}^{11}(y) &= e^{-2y}(-0.0370794 + 0.0852545y - 0.0449284y^2 + 0.00866992y^3)\\
W_{M\Phi''}^{10}(y) &= e^{-2y}(0.578632 - 1.00438y + 0.491252y^2 - 0.0730693y^3)\\
W_{M\Phi''}^{01}(y) &= e^{-2y}(1.00112 - 1.15934y + 0.40275y^2 - 0.0364952y^3)\\
W_{\Sigma'\Delta}^{00}(y) &= e^{-2y}(-0.0883243 + 0.185775y - 0.104001y^2 + 0.0163635y^3)\\
W_{\Sigma'\Delta}^{11}(y) &= e^{-2y}(-0.0501045 + 0.114845y - 0.0729898y^2 + 0.0131315y^3)\\
W_{\Sigma'\Delta}^{10}(y) &= e^{-2y}(-0.0742731 + 0.170242y - 0.105744y^2 + 0.0188197y^3)\\
W_{\Sigma'\Delta}^{01}(y) &= e^{-2y}(-0.0595834 + 0.125323y - 0.0717204y^2 + 0.011398y^3)
\end{aligned}
\tag{10}
$$

Silicon (^{28}Si)

$$\begin{aligned} W_M^{00}(y) &= 0.281695e^{-2y}(7.44089 - 6.37784y + y^2)^2 \\ W_{\Phi''}^{00}(y) &= 0.0739103e^{-2y}(2.5 - y)^2 \\ W_{M\Phi''}^{00}(y) &= e^{-2y}(-2.68415 + 3.37434y - 1.281y^2 + 0.144292y^3) \end{aligned} \tag{11}$$

Sulfur (^{32}S)

$$\begin{aligned} W_M^{00}(y) &= 0.580305e^{-2y}(5.92494 - 5.43118y + y^2)^2 \\ W_{\Phi''}^{00}(y) &= 0.0765941e^{-2y}(2.5 - y)^2 \\ W_{M\Phi''}^{00}(y) &= e^{-2y}(-3.12284 + 4.11173y - 1.6721y^2 + 0.210827y^3) \end{aligned} \tag{12}$$

Argon (^{40}Ar)

$$
\begin{aligned}
W_M^{00}(y) &= e^{-2y}(31.8294 - 65.9618y + 48.5834y^2 - 15.194y^3 + 1.9036y^4 - 0.0595886y^5 \\
&\quad + 0.000544329y^6) \\
W_M^{11}(y) &= e^{-2y}(0.318304 - 1.06524y + 1.24846y^2 - 0.62249y^3 + 0.141618y^4 - 0.0138797y^5 \\
&\quad + 0.000480513y^6) \\
W_M^{10}(y) &= e^{-2y}(-3.18299 + 8.62425y - 8.02539y^2 + 3.19316y^3 - 0.554467y^4 + 0.0353797y^5 \\
&\quad - 0.000511426y^6) \\
W_M^{01}(y) &= e^{-2y}(-3.18299 + 8.62425y - 8.02539y^2 + 3.19316y^3 - 0.554467y^4 + 0.0353797y^5 \\
&\quad - 0.000511426y^6) \\
W_{\Phi''}^{00}(y) &= e^{-2y}(0.299629 - 0.373798y + 0.154895y^2 - 0.0238983y^3 + 0.00122474y^4) \\
W_{\Phi''}^{11}(y) &= e^{-2y}(0.00414999 - 0.0181474y + 0.0240755y^2 - 0.00926264y^3 + 0.00108115y^4) \\
W_{\Phi''}^{10}(y) &= e^{-2y}(-0.0352627 + 0.0990955y - 0.0683453y^2 + 0.0161561y^3 - 0.00115071y^4) \\
W_{\Phi''}^{01}(y) &= e^{-2y}(-0.0352627 + 0.0990955y - 0.0683453y^2 + 0.0161561y^3 - 0.00115071y^4) \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-3.08821 + 5.12625y - 2.89248y^2 + 0.653386y^3 - 0.0526576y^4 \\
&\quad + 0.000816493y^5) \\
W_{M\Phi''}^{11}(y) &= e^{-2y}(-0.036345 + 0.140282y - 0.171917y^2 + 0.0770456y^3 - 0.0134973y^4 \\
&\quad + 0.000720769y^5) \\
W_{M\Phi''}^{10}(y) &= e^{-2y}(0.308826 - 0.709394y + 0.515378y^2 - 0.153134y^3 + 0.0185641y^4 \\
&\quad - 0.000767139y^5) \\
W_{M\Phi''}^{01}(y) &= e^{-2y}(0.363444 - 1.17124y + 1.09117y^2 - 0.373592y^3 + 0.0452762y^4 \\
&\quad - 0.000767139y^5)
\end{aligned}
\tag{13}
$$

Calcium (^{40}Ca)

$$
\begin{aligned}
W_M^{00}(y) &= 0.000016743e^{-2y}(1378.8 - 1387.54y + 281.953y^2 - y^3)^2 \\
W_{\Phi''}^{00}(y) &= 0.0000376718e^{-2y}(13.117 - 8.74678y + y^2)^2 \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-0.454214 + 0.759976y - 0.432314y^2 + 0.0971138y^3 - 0.00730079y^4 \\
&\quad + 0.0000251146y^5)
\end{aligned}
\tag{14}
$$

Iron (^{56}Fe)

$$
\begin{aligned}
W_M^{00}(y) &= e^{-2y}(62.3888 - 160.428y + 152.644y^2 - 67.2779y^3 + 14.478y^4 - 1.43665y^5 \\
&\quad + 0.0525291y^6) \\
W_M^{11}(y) &= e^{-2y}(0.318309 - 1.27323y + 1.99188y^2 - 1.54562y^3 + 0.622264y^4 - 0.122277y^5 \\
&\quad + 0.00921525y^6) \\
W_M^{10}(y) &= e^{-2y}(-4.45633 + 14.6422y - 18.2579y^2 + 10.8919y^3 - 3.2296y^4 + 0.446836y^5 \\
&\quad - 0.0220016y^6) \\
W_M^{01}(y) &= e^{-2y}(-4.45633 + 14.6422y - 18.2579y^2 + 10.8919y^3 - 3.2296y^4 + 0.446836y^5 \\
&\quad - 0.0220016y^6) \\
W_{\Phi''}^{00}(y) &= e^{-2y}(4.22872 - 6.76595y + 3.79067y^2 - 0.867433y^3 + 0.069506y^4) \\
W_{\Phi''}^{11}(y) &= e^{-2y}(0.143378 - 0.229404y + 0.144606y^2 - 0.0422756y^3 + 0.00486921y^4) \\
W_{\Phi''}^{10}(y) &= e^{-2y}(-0.778655 + 1.24585y - 0.741661y^2 + 0.194658y^3 - 0.0183967y^4) \\
W_{\Phi''}^{01}(y) &= e^{-2y}(-0.778655 + 1.24585y - 0.741661y^2 + 0.194658y^3 - 0.0183967y^4) \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-16.2427 + 33.8776y - 25.2342y^2 + 8.30471y^3 - 1.20334y^4 + 0.0604243y^5) \\
W_{M\Phi''}^{11}(y) &= e^{-2y}(-0.213631 + 0.598168y - 0.622338y^2 + 0.308014y^3 - 0.0735211y^4 \\
&\quad + 0.00669858y^5) \\
W_{M\Phi''}^{10}(y) &= e^{-2y}(1.16019 - 3.24853y + 3.31473y^2 - 1.54264y^3 + 0.325833y^4 - 0.0253084y^5) \\
W_{M\Phi''}^{01}(y) &= e^{-2y}(2.99085 - 6.23805y + 4.81422y^2 - 1.74483y^3 + 0.288128y^4 - 0.015993y^5)
\end{aligned}
\tag{15}
$$

Nickel (^{58}Ni)

$$
\begin{aligned}
W_M^{00}(y) &= e^{-2y}(66.9246 - 175.389y + 169.877y^2 - 76.127y^3 + 16.6597y^4 - 1.6839y^5 \\
&\quad + 0.0628067y^6) \\
W_M^{11}(y) &= e^{-2y}(0.0795762 - 0.318305y + 0.548985y^2 - 0.503018y^3 + 0.250492y^4 \\
&\quad - 0.0603789y^5 + 0.00545169y^6) \\
W_M^{10}(y) &= e^{-2y}(-2.30773 + 7.63937y - 10.3404y^2 + 6.95311y^3 - 2.30652y^4 + 0.350525y^5 \\
&\quad - 0.0185041y^6) \\
W_M^{01}(y) &= e^{-2y}(-2.30773 + 7.63937y - 10.3404y^2 + 6.95311y^3 - 2.30652y^4 + 0.350525y^5 \\
&\quad - 0.0185041y^6) \\
W_{\Phi''}^{00}(y) &= e^{-2y}(5.4697 - 8.75152y + 4.88454y^2 - 1.10715y^3 + 0.0875404y^4) \\
W_{\Phi''}^{11}(y) &= e^{-2y}(0.00977975 - 0.0156476y + 0.0136707y^2 - 0.00592935y^3 + 0.00140426y^4) \\
W_{\Phi''}^{10}(y) &= e^{-2y}(-0.231284 + 0.370054y - 0.264922y^2 + 0.0935201y^3 - 0.0110873y^4) \\
W_{\Phi''}^{01}(y) &= e^{-2y}(-0.231284 + 0.370054y - 0.264922y^2 + 0.0935201y^3 - 0.0110873y^4) \\
W_{M\Phi''}^{00}(y) &= e^{-2y}(-19.1326 + 40.3764y - 30.3339y^2 + 10.0435y^3 - 1.4629y^4 + 0.0741493y^5) \\
W_{M\Phi''}^{11}(y) &= e^{-2y}(-0.0278969 + 0.0781112y - 0.0956406y^2 + 0.0607914y^3 - 0.0211633y^4 \\
&\quad + 0.00276687y^5) \\
W_{M\Phi''}^{10}(y) &= e^{-2y}(0.659741 - 1.84727y + 2.0953y^2 - 1.10461y^3 + 0.25912y^4 - 0.0218459y^5) \\
W_{M\Phi''}^{01}(y) &= e^{-2y}(0.809015 - 1.7073y + 1.48687y^2 - 0.692274y^3 + 0.145722y^4 \\
&\quad - 0.00939131y^5)
\end{aligned}
\tag{16}
$$