

Worksheet No. 3

Worksheet - Isotopes and Average Atomic Mass

1. Naturally occurring neon contains the following ratio of isotopes

^{20}Ne (19.992 a.m.u.) - 90.92%

^{21}Ne (20.994 a.m.u.) - 0.257%

^{22}Ne (21.991 a.m.u.) - 8.82%

What is the average atomic mass of naturally occurring neon ?

$$\begin{array}{r}
 19.992 \times 0.9092 = 18.1767 \\
 20.994 \times 0.00257 = 0.05395 \\
 21.991 \times 0.0882 = 1.9396 \\
 \hline
 20.17025
 \end{array}$$

Average atomic mass of neon = 20.17 amu.

2. Calculate the average atomic mass of magnesium in its naturally occurring form given the following percentage abundances and masses

^{24}Mg (23.98504 a.m.u.) - 78.70%

^{25}Mg (24.98584 a.m.u.) - 10.13%

^{26}Mg (25.98259 a.m.u.) - 11.17%

$$\begin{array}{r}
 23.98504 \times 0.7870 = 18.876 \\
 24.98584 \times 0.1013 = 2.5311 \\
 25.98259 \times 0.1117 = 2.9023 \\
 \hline
 24.3094
 \end{array}$$

Average atomic mass of magnesium = 24.31 amu

3. Zinc is an element used in galvanizing steel (preventing rust). The natural abundance of the stable isotopes of zinc are 48.89% ^{64}Zn (63.9291 a.m.u.), 27.81% ^{66}Zn (65.9260 a.m.u.), 4.11% ^{67}Zn (66.9721 a.m.u.), 18.57% ^{68}Zn (67.9249 a.m.u.) and 0.62% ^{70}Zn (69.9253 a.m.u.). Calculate the average atomic mass of zinc.

$$\begin{array}{r}
 63.9291 \times 0.4889 = 31.255 \\
 65.9260 \times 0.2781 = 18.334 \\
 66.9721 \times 0.0411 = 2.753 \\
 67.9249 \times 0.1857 = 12.614 \\
 69.9253 \times 0.0062 = 0.4335 \\
 \hline
 65.3895
 \end{array}$$

Average atomic mass of zinc = 65.39 amu