

Natural Abundance Worksheet

Isotope- each of two or more forms of the same element that contain equal numbers of *protons* but different numbers of *neutrons* in their nucleus, and hence differ in relative atomic mass but not in chemical properties; in particular, a radioactive form of an element

$$\sum (\% \text{ abundance} \cdot \text{mass})$$

1. Determine the mass of Chromium from the isotopes and their natural abundances listed below.

Cr-50 4.345% 49.9460 amu

Cr-52 83.79% 51.9405 amu

Cr-53 9.50% 52.9407 amu

Cr-54 2.365% 53.9389 amu

$$04.345\% \rightarrow 0.04345$$

$$83.79\% \rightarrow 0.8379$$

$$09.50\% \rightarrow 0.0950$$

$$02.365\% \rightarrow 0.02365$$

$$(.04345 \times 49.9460) + (.8379 \times 51.9405) + (.0950 \times 52.9407) + (.02365 \times 53.9389)$$

$$= 51.99612014$$

$$= \boxed{51.9961 \text{ amu}}$$

2. Determine the mass of Strontium given the following isotopes and their natural abundances

Sr-84 0.56% 83.9134 amu

Sr-86 9.86% 85.9093 amu

Sr-87 7.00% 86.9089 amu

Sr-88 82.85% 87.9056 amu

$$00.56\% \rightarrow .0056$$

$$09.86\% \rightarrow .0986$$

$$07.00\% \rightarrow .0700$$

$$82.85\% \rightarrow .8285$$

$$(.0056 \times 83.9134) + (.0986 \times 85.9093) + (.0700 \times 86.9089) + (.8285 \times 87.9056)$$

$$= 87.85398462$$

$$= \boxed{87.8540 \text{ amu}}$$

3. Rhenium has two naturally occurring isotopes: Re-185 with a natural abundance of 37.40% and Re-187 with a natural abundance of 62.20%. The sum of the masses of the two isotopes is 371.9087 amu. Find the masses of the individual isotopes.

$$\text{Re-185} \rightarrow 37.80\% \rightarrow 371.9087 \text{ amu}$$

$$\text{Re-187} \rightarrow 62.20\%$$

$$\begin{array}{r} 371.9087 \\ \times .3780 \\ \hline \end{array}$$

$$\begin{array}{r} 371.9087 \\ \times .6220 \\ \hline \end{array}$$

$$140.5814886 + 231.3272114 = \boxed{371.9087 \text{ amu}}$$

Symbol	Atomic Number	$p + n$ Mass Number	(+) # of Protons	(-) # of Electrons	# of Neutrons	Charge
<i>technetium</i>	43	87	43	40	44	+3
<i>argon</i>	18	32	18	18	14	0 no charge
Calcium	20	31	20	19	11	+1
<i>vanadium</i>	23	49	23	25	26	-2
<i>silicon</i>	14	35	14	15	21	-1
Lithium	3	8	3	3	5	No Charge
<i>Fluorine</i>	9	18	9	7	9	+2