The periodic table shows the atomic number, symbol, and atomic mass for each element.

6
Atomic number

C

12.01
Atomic mass

Carbon atom

Carbon atom nucleus
Atomic Notation

• Each element has a characteristic number of protons in the nucleus. This is the atomic number, \( Z \).

• The total number of protons and neutrons in the nucleus of an atom is the mass number, \( A \).

• We use atomic notation to display the number of protons and neutrons in the nucleus of an atom:

\[
\begin{array}{c}
\text{mass number (p}^+\text{ and n}^0\text{)} \\
A \\
\text{Sy} — \text{symbol of the element} \\
\text{atomic number (p}^+) \\
\end{array}
\]
Using Atomic Notation

• An example: $^{23}_{11}\text{Na}$

• How many protons does sodium have?

• How many total protons and neutrons are there?

• How many neutrons are there?
Using Atomic Notation Cont’d

- Therefore an atom of uranium looks like this…
Using Atomic Notation

State the number of neutrons in an atom of each of the following isotopes:

a) $^{15}\text{N}$
b) $^{58}\text{Ni}$
c) Iodine-131
d) Hydrogen-3
e) $^{52}\text{Cr}$
Simple & Weighted Averages

• A simple average assumes the same number of each object.

• A weighted average takes into account the fact that we do not have equal numbers of all the objects.

• A weighted average is calculated by multiplying the percentage of the object (as a decimal number) by its mass for each object and adding the numbers together.
Average Atomic Mass

• Since not all isotopes of an atom are present in equal proportions, we must use the weighted average.
• Copper has two isotopes:
  – $^{63}\text{Cu}$ with a mass of 62.930 amu and 69.09% abundance
  – $^{65}\text{Cu}$ with a mass of 64.928 amu and 30.91% abundance
• The average atomic mass of copper is:
  \[
  \begin{align*}
  62.930 \text{ amu} \times 0.6909 &= 43.48 \text{ amu} \\
  64.928 \text{ amu} \times 0.3091 &= 20.07 \text{ amu}
  \end{align*}
  \]
  \[
  63.55 \text{ amu}
  \]
  Exact number shown on the periodic table
Periods on the Periodic Table

- The 7 periods are labeled 1 through 7.
- The first period has only 2 elements, H and He.
- The second and third periods have 8 elements each:
  - Li through Ne and Na through Ar
- The fourth and fifth periods each have 18 elements:
  - K through Kr and Rb through Xe
Groupings of Elements

- The inner transition elements are divided into the **lanthanide series** and the **actinide series**.
Assigned Readings and Homework

• Read pages 95–115 (skip page 110) in textbook.

• End of Chapter 4 Problems:
  (Answers at back of textbook)

• Practice Quiz link http://education.jlab.org/elementflashcards/index.html