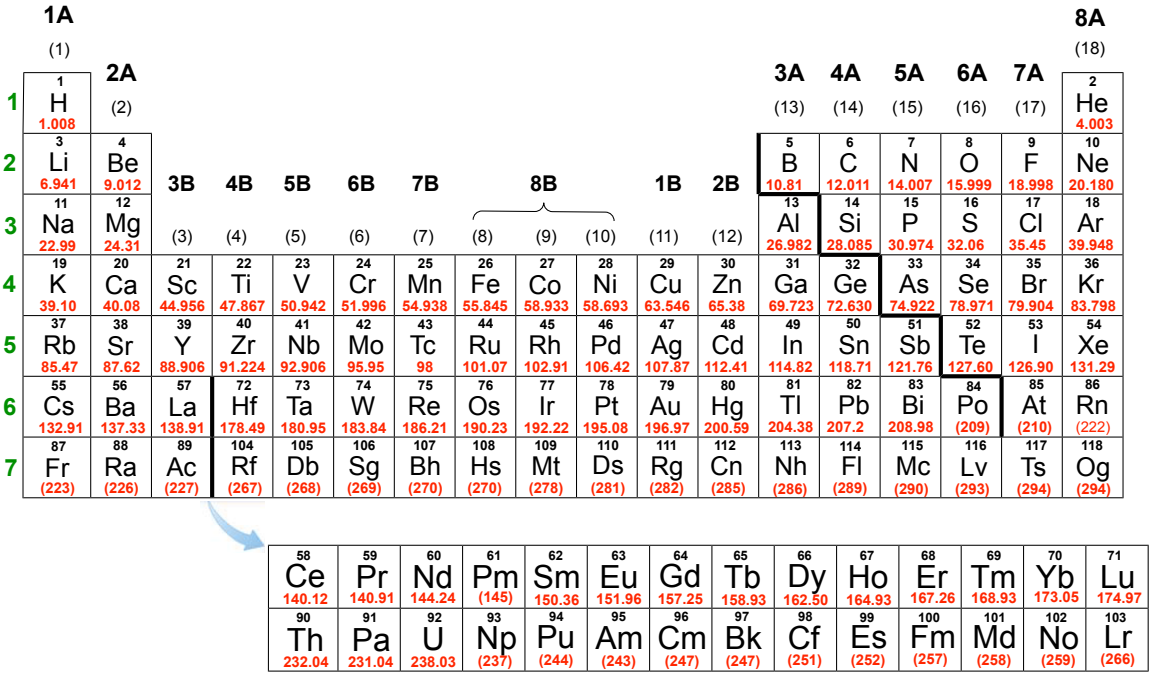
CONCEPT: ATOMIC MASS

- **Atomic Mass** is the mass of an element that includes the masses of all 3 subatomic particles.
  - □ Atomic masses of elements can be found by simply looking at the Periodic Table.
  - □ The atomic mass of an element is an average of all its isotopes that uses the units of _____, _____ or _____.
  - □ Recall that 1 amu = _____ kg.



EXAMPLE: Which of the following represents an element from the first column with the greatest atomic mass?

a) Ba b) Al c) Cs d) Li e) Na

PRACTICE: Which of the following choices has the greatest atomic mass?

a) Element A (0.283 kg)

b) Element B (3.20×10^{24} amu)

c) Element C (0.350 kg)

d) Element D (4.14×10^{26} Da)

CONCEPT: ATOMIC MASS

Calculating Atomic Mass

- The **Atomic Mass** of an element can be calculated if you know the **Isotopic Masses** and **Percent Abundances**.
  - **Isotopic Masses:** The masses for all the isotopes of a given element.
  - **Percent Abundances**: The percentages available for each of the isotopes of a given element.
    - Sometimes referred to as _____ abundances.
  - **Fractional Abundance:** Represents the **percent abundance** of an isotope divided by _____.

Atomic Mass Formula

Atomic Mass = [(Isotope Mass __)•(Fractional Abudance)] + [(Isotope Mass __)•(Fractional Abudance)]

EXAMPLE: Calculate the atomic mass of lithium if the isotopic masses and percent abundances are given for its 2 naturally occurring isotopes.

Li-6	6.015122 amu	7.59%
Li-7	7.016004 amu	92.41%

a) 6.091 amu b) 6.941 amu c) 100.00 amu d) 5.993 amu e) 7.529 amu

STEP 1: If you are given **percent abundances** then divide them by 100 in order to isolate the **fractional abundances**.

STEP 2: Plug your given variables into the atomic mass formula in order to isolate the missing variable.

CONCEPT: ATOMIC MASS

Calculating Atomic Mass (No Fractional Abundances)

- Adding up the **fractional abundances** of all isotopes for an element gives you a total of _____.
    - □ Important for atomic mass questions where there are _____ isotopes with unknown fractional abundances.

EXAMPLE: Iron possesses two naturally occurring isotopic forms. Iron-54 has an isotopic mass of 53.939615 amu and Iron-56 has an isotopic mass of 55.934942 amu. Wat is the percent abundance of Iron-56?

STEP 1: Make the first isotope's fractional abundance _____ and the second isotope's _____.

STEP 2: Plug your given variables into the atomic mass formula in order to isolate the missing variable.

CONCEPT: ATOMIC MASS

PRACTICE: Neon possesses three naturally occurring isotopes. ^{20}Ne has a percent abundance of 90.48% and an isotopic mass of 19.99244 amu, ^{21}Ne has a percent abundance of 0.27% and an isotopic mass of 20.99384 amu, and ^{22}Ne has a percent abundance of 9.25%. What is the isotopic mass of the ^{22}Ne isotope?

a) 20.9182 amu b) 15.119 amu c) 23.001 amu d) 21.98768 amu

PRACTICE: Three isotopic forms of potassium exist: ^{39}K, ^{40}K and ^{41}K. Potassium has an atomic mass of 39.0983 amu. Potassium-40 has an isotopic mass of 39.9640 amu and natural abundance of 0.0117%. Potassium-41 has an isotopic mass of 40.9618 amu and natural abundance of 6.7302%. What is the isotopic mass of Potassium-39?

a) 106.905 amu b) 38.9637 amu c) 106.903 amu d) 106.911 amu