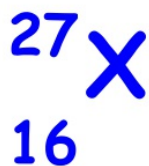


Warm Up

In an element, X, what does the number 16 represent? What does the number 27 represent? Write a possible isotope for X.



Objectives:

TSWBAT

*Determine the average atomic mass
for an element.*

.

Practice Answers:

p. 113 of textbook:
problems 19 & 20.

p. 122

34, 36, 39, 40, 41, 43, 47, 48

You do **NOT** have time to **COPY** all of these questions & the answers- only to check your answers and make quick corrections. More detailed corrections will have to be done at pre-dismissal.

p. 122

34. What is an atom



36. With which of these statements would John Dalton have agreed in the early 1800's?



39. Would you expect 2 electrons to attract or repel each other?

40. How do the charge and mass of a neutron compare to the charge and mass of a proton?

41. Why does it make sense that if an atom loses electrons, it is left with a positive charge?

43. How did the results of Rutherford's gold-foil experiment differ from his expectations?



47. What does the atomic number of each atom represent?



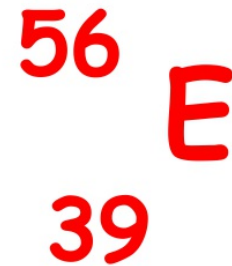
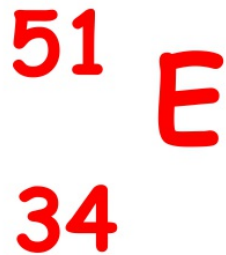
How many protons are in the nuclei of the following atoms?

- a. phosphorus (P)
- b. molybdenum (Mo)
- c. aluminum (Al)
- d. cadmium (Cd)
- e. chromium (Cr)
- f. lead (Pb)



Warm Up

Which of these fictional elements are isotopes? Circle them.



Objectives:

TSWBAT

*Determine the average atomic mass
for an element.*

.

Conventions for writing about atoms:

Sometimes you will see chemists refer to "Uranium-238" or "Carbon-14."

This is one way to express a specific isotope of an element. The **number** is the **mass number** for that isotope.

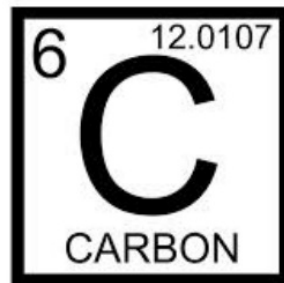
Atomic Mass:

Scientists have chosen **not** to talk about the weight of atoms in grams b/c they are too light weight. Instead, the whole scientific community got together and decided to pick a **standard** and use that as a weight.

The standard they chose was one particular atom,

Carbon-12, and defined this atom

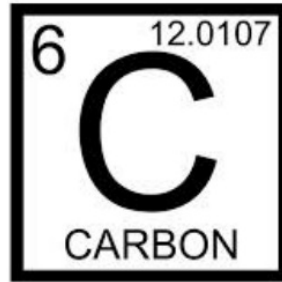
as weighing exactly 12 atomic mass units.



So,

DEF: Atomic mass unit (amu) =

1/12 of the mass of a Carbon-12 atom.



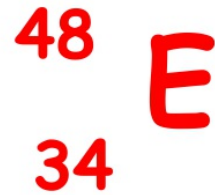
What is the atomic number for carbon?

**If we are looking at carbon-12,
how many protons and how many
neutrons are in this isotope?**

**If carbon-12 weighs 12 amu's,
what can we conclude about the
weight of a proton and a neutron in amu's?**

What is an isotope?

Are these atoms isotopes or not?



Weighted Averages:

the **atomic masses** on the periodic table are the **average atomic mass** of that element based on all of the naturally occurring **isotopes** of that element.

In order to calculate an average atomic mass for an element, you need to know 2 things.

You must be **told**:

1. Which isotopes of the element exist in nature.

2. The natural abundance of each isotope. That is, in what % will you find each isotope in nature?

This is not something you can figure out- you must be told this information.

Once you do know how many isotopes an element has and the natural abundance of each, calculating the atomic mass is straightforward:

You multiply the mass of each isotope by its natural abundance (in decimal form), then add up all the products. The result is the "weighted average" mass the element.

Example: A “fake” element, X, has atomic number 13, and two isotopes. One isotope has an atomic mass of 29. The other has an atomic mass of 30. In nature, the isotope 29 occurs 34% of the time and the isotope 30 occurs 66% of the time. What is the average atomic mass for this element?

Solution:

$$29 \text{ amu} \times 0.34 = 9.86$$

$$30 \text{ amu} \times 0.66 = \underline{19.8}$$

$$29.66 \text{ amu}$$

Another example:

An element, R, has two natural isotopes. The isotope with mass 10.0 amu (^{10}R) has a relative abundance of 19.91%. The isotope with a mass of 11.0 amu (^{11}R) has a relative abundance of 80.09%. Calculate the atomic mass of this element.

for ^{10}R : $10.0 \text{ amu} \times 0.1991 = 1.991 \text{ amu}$

for ^{11}R : $11.0 \text{ amu} \times 0.8009 = 8.8099$

for element R: atomic mass = 10.8 amu

Warm Up

13 Stallions = 4 Trojans

1 Trojan = 15 Bearcats

67 Bearcats = 1 Yellow Jacket

How many Yellow Jackets come from
8 Stallions?

Get a calculator NOW!!

Warm Up

What does the number mean in
sodium-23?

**Try the practice problem #23
on p. 117 of the text book.**

**Also, do problems 30, 32 (p.119),
65 (p.123), and 72 (p.123)**

Warm-Up:

Two naturally occurring isotopes of uranium are uranium-234 (natural abundance 97.50%) and uranium-237 (natural abundance 2.50%).

What is the average atomic mass of this element?

What do significant figures reflect about measurements, precision or accuracy

Objectives

TSWBAT

Determine average atomic mass for a given element based on isotopic abundances.

p. 117 #23

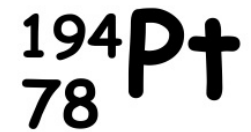
Copper-63 has 69.2% (0.692)

Copper-65 has 30.8% (0.308)

$$(63)(0.692) + (65)(0.308) = 63.6 \text{ amu}$$

p.119 #30

The number is the mass number for Pt



p. 119, #34

On the board... (a,b,c)

p. 123 #65

**(Hint: you have to add
the $p + n$ before you can
do this problem.)**

On the board...

p. 123 #72

What makes isotopes of the same element chemically alike?

