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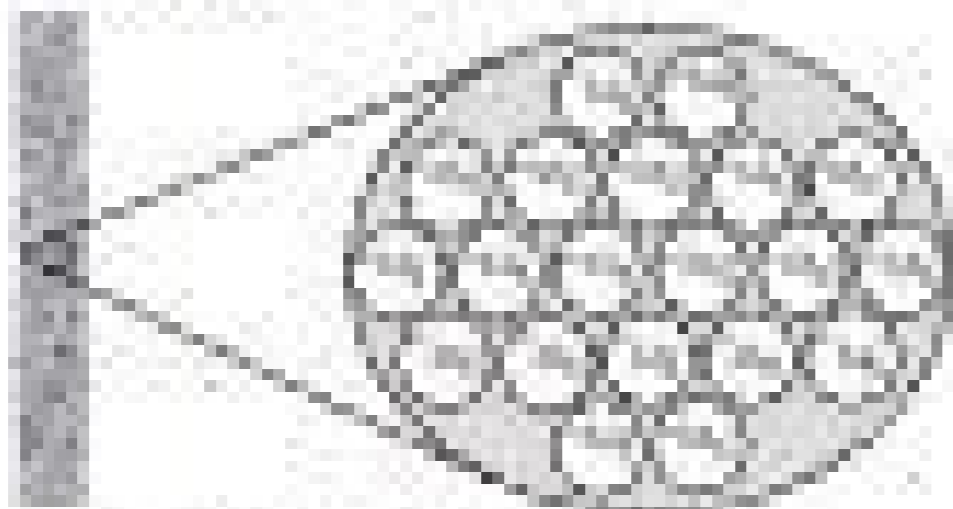
Average Atomic Mass

(How are the masses of isotopes added together?)

Why?

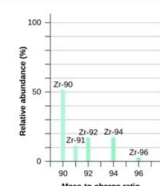
Elements have different isotopes. At the time of discovery, the masses of these isotopes have the same atomic number (number of protons) but they differ in the mass. It means that they have different mass number (sum of protons and neutrons) though the number of protons is the same. So, the average atomic mass is calculated by taking into account the relative abundance of each isotope. The formula for calculating average atomic mass is given below.

Model 1 – A Strip of Magnesium Metal



1. What is the atomic number for each magnesium atom?
2. What is the mass number of the naturally occurring isotopes of magnesium shown in Model 1?
3. For all of the atoms of magnesium in Model 1 from the same metal strip, explain the relative abundance of these isotopes in the metal.
4. For the purpose of this model, the magnesium shown in Model 1, draw a scale representing the mass numbers of the three isotopes and the relative abundance of each isotope (percent).
5. Which isotope is the most abundant in the metal shown in Model 1? (The one with the greatest mass.)
6. How does Model 1 and the scale you constructed compare to the value of the atomic mass of magnesium, approximately 24.305 amu, which is the average atomic mass?

Average Atomic Mass



Name _____ Period _____ Score: _____ /35

*Round to 3 decimal places AND show your work!

Atomic Mass Worksheet

1. How do isotopes of an element differ? How are they similar?
2. How many electrons, protons, and neutrons are in each of the following?
Electrons Protons Neutrons

a. Gallium-64			
b. Fluorine-23			
c. ⁴⁹ Ti			
d. ⁴ He			

3. Boron has two naturally occurring isotopes: boron-10 (abundance = 19.8%, mass = 10.013), and boron-11 (abundance = 80.2%, mass = 11.009 amu). Calculate the atomic mass of boron.
4. An isotope of mercury has 80 protons and 120 neutrons. What is the mass number of this isotope?
5. How many protons and electrons are contained in an atom of the element Antimony?
Protons: _____ Electrons: _____
6. What is the mass number of potassium-39?
7. Is the charge of a nucleus positive, negative, or zero?
8. The volume of an atom is made up of mostly _____.
9. The mass of an atom is located in the _____.

Home Learning
Isotopes and Relative Atomic Mass

Use the table below to calculate the relative atomic masses for each element.

Element	Isotope	Percentage Abundance
Lithium	⁶ Li	7.5%
	⁷ Li	92.5%
Magnesium	²⁴ Mg	78%
	²⁵ Mg	10%
	²⁶ Mg	12%
Copper	⁶³ Cu	69%
	⁶⁵ Cu	31%

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Key 3

Model 3 – Proposed Average Atomic Mass Calculations

Mary's Method

$$\frac{(78.99)(23.9850 \text{ amu}) + (10.00)(24.9858 \text{ amu}) + (11.01)(25.9826 \text{ amu})}{100} = 24.305$$

Jack's Method

$$(0.7899)(23.9850 \text{ amu}) + (0.1000)(24.9858 \text{ amu}) + (0.1101)(25.9826 \text{ amu}) = 24.305$$

Alan's Method

$$\frac{23.9850 \text{ amu} + 24.9858 \text{ amu} + 25.9826 \text{ amu}}{3} = 24.9845$$

13. Complete the three proposed calculations for the average atomic mass of magnesium in Model 3.

14. Consider the calculations in Model 3.

a. Which methods shown in Model 3 give an answer for average atomic mass that matches the mass of magnesium on the periodic table? *Mary and Jack's methods*

b. Explain why the mathematical reasoning was incorrect for any method(s) in Model 3 that did not give the correct answer for average atomic mass (the one on the periodic table). *The equation did not take percent abundance into account.*

c. For the methods in Model 3 that gave the correct answer for average atomic mass, show that they are mathematically equivalent methods. *The percentages of each isotope divided by 100 (Mary's method) equals the decimal values of Jack's method.*

15. Use one of the methods in Model 3 that gave the correct answer for average atomic mass to calculate the average atomic mass for oxygen. Isotope information is provided below. Show all of your work and check your answer against the mass listed on the periodic table.

Isotope	Natural Abundance on Earth (%)	Atomic Mass (amu)
¹⁶ O	99.76	15.9949
¹⁷ O	0.04	16.9991
¹⁸ O	0.20	17.9992

$$(0.9976 \times 15.9949) + (0.0004 \times 16.9991) + (0.0020 \times 17.9992) = 15.9993 \text{ amu}$$

How to calculate relative abundance of an isotope. Formula for relative abundance of isotopes. How to calculate relative abundance of 3 isotopes.

Jon Feingersh Photography Inc/Getty Images Related Pages Mole Molecular Calculation Mass More Lessons on Chemistry The following diagrams show the chlorine isotopes and how to calculate the relative atomic mass. Scroll through the page below for examples and solutions. Isotopes Isotopes are those of the same element as they have a different number of neutrons. (In that they are acts of the same element, their number of tones would be the same) Examples: ³⁵Cl a chlorine isotope that has 17 protons and 18 neutrons. It ³⁷Cl a chlorine isotope that has 17 protons and 20 neutrons. Generally, isotopes behave the same way during quantum reactions. The extra neutrons alter only the mass of the tone and its density. Some of the substances of certain isotopes are useless due to the extra number of neutrons, and are said to be radioactive. What are isotopes? In this game, we will learn about what isis and how to write atomic number and mass number in isotopes note. We speak of a simple analogy with the automobiles to explain this tutorial. The isotopes are versions of an element or an element that have the same number of protons, but different number of number ones. The isotopes and the rating of isotopes are particularly important in nuclear physics. Isotópica Note Learn how to write forums in isotopic note! In the isotópica note, you can quickly show how many tones, neutrons and electrons there are in one tone. The anathemic number, mass number and the water load are placed around the symbol of the chemical element. The isotopic rating is ³⁵ particularly important in nuclear physics, because if you are doing fission, fission, alpha decay, beta decay, emission of particles, or capture of electrons, either be able to tell how many neutrons and substances are in the number. Standard Unit - Unit of evenomic mass Since the mass of an átomo would be extremely small when measured in grams, it would be more convenient to measure the masses of átomos in relationship to a tone The chosen standard is ¹²C (carbon-12) (carbon-12) A carbon-12-amium ¹²C to have a mass of 12 unit of atomic mass (amu). Since a carbon-12 tone has 6 protons and 6 neutrons, mass of a proton (neutron) = mass of a carbon-12 átomo = 1 amu (unit of atomic mass) Units of atomic mass MA dia Amic Mass and definition of unit of atomic mass Show level ing water mass relative to the relative atomic mass (Air) of an element is ¹²C the mass of ¹²C of the naturally occurring element somanys. This quantity takes into account the percentage abundance of all isotopes of an element that exists. The formula for the amic mass relative to A ¹²C = mass of iso topes of the element Example: Given that the percentage abundance of A ¹²C of 75% and that ¹³C of 25%, calculate the Chlorine Air. SoluŠA Example: Bromine has two isotopes, Br-79 and Br-81. Both exist in equal amounts. Calculate the relative atomic mass of bromine. SoluŠA Example: The noon element has three isotopes. Are 90.92% of ¹²C, 0.26% and 8.82% of the Release. Athemic Mass: Introduction What is ¹²C mass? It is a ¹²C day of the different isotopes of an element. Sometimes it is ¹²C referred to as atomic weight, relative atomic mass or atomic mass ¹²C dia. We look at how to calculate and determine the heavy ¹²C of elements using atomic mass units. Show the word ing of the atomic Mass: How to calculate the isotope abuse How do you determine and calculate the abundance of isotope when you know the relative atomic mass ¹²C (also known as atomic weight), measured in amu or atomic mass number? Here we will go through the lgebra and reasoning to find out the amount of abundance of the isOtopes, in percentages and in decimals. Example: There are two sterile chlorine isotopes: chlorine-35 (which weighs 34.97 am) and chlorine-37 (which weighs 36.97 am). If the relative atomic mass of chlorine is ^{35.45}, what is ³⁵C the abundance of each isotope? Show video story Try the free Mathway calculator and troubleshooter below to practice various time series Experience the given data or write your own problem and check your answer with step-by-step explanations. We appreciate your feedback, comments and questions about this computer or page. Please send your feedback or questions ¹²C your Feedback page.

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