Calculating Average Atomic Mass Worksheet Answers

2. For Iridium-178 (atomic number 77)

a. Determine the number of protons, neutrons, and electrons

#p= 77 #n= 101 #e⁻= 77

b. Write its electron configuration using noble gas notation

[Xe]$6s^2 4f^{14} 5d^7$ → ⊗⊗○○○

c. How many unpaired electrons does it contain? 3

33. Name the element represented by each of the following electron configurations and determine the number of unpaired electrons each contains:

		# unpaired e⁻
a. $1s^2 2s^2 2p^6 3s^2 3p^4$	sulfur	2
b. [Kr]$5s^2 4d^8$	palladium	2
c. [Xe]$6s^2 4f^{14} 5d^{10} 6p^2$	lead	2

34. Determine which of the following electron configurations represent an atom in the excited state and identify that element. (Circle choice and name the element)

a. $1s^2 2s^3 2p^6 3s^2 3p^6$ b. $1s^2 2s^1 2p^6 3s^2 3p^5$ c. $1s^2 3s^2 2s^2 2p^6 3p^6$

sulfur

35. Three isotopes of argon occur in nature, Ar-36, Ar-38, and Ar-40. Calculate the atomic mass of argon to two decimal places, given the following relative atomic masses and abundances of each of the isotopes: argon-36 (35.97 u; 0.337%), argon-38 (37.96 u; 0.063%), and argon-40 (39.96 u; 99.600%).

$0.00337(35.97) + 0.00063(37.96) + 0.99600(39.96)$
$= \boxed{39.95\,u}$

36. Calculate the mass in grams of each of the following:

a. 3.00 mol Al

$3.00\,mol\,Al \times \frac{26.98\,g}{1\,mol} = \boxed{80.9\,g}$

b. 2.56×10^{24} atoms Li

$2.56\times10^{24}\,atoms \times \frac{1\,mol}{6.02\times10^{23}\,atoms} \times \frac{6.94\,g}{1\,mol} = \boxed{29.5\,g\,Li}$

5

Calculating average atomic mass worksheet answers is a fundamental topic in chemistry that helps students grasp the concept of atomic mass and how it is derived from the isotopes of an element. Understanding average atomic mass is crucial for students as it forms the basis for various chemical calculations and reactions. This article will provide a comprehensive overview of average atomic mass, the methods to calculate it, and examples of worksheet answers to reinforce these concepts.

Understanding Atomic Mass

Atomic mass is the weighted average mass of an element’s isotopes. Each isotope of an element has a unique mass and a certain abundance in nature. The average atomic mass reflects both the mass and the relative abundance of each isotope.

What is an Isotope?

An isotope is a variant of a particular chemical element that has the same number of protons but a different number of neutrons. As a result, isotopes of the same element have different mass numbers. For example:

- Carbon-12 (^{12}C): 6 protons, 6 neutrons
- Carbon-13 (^{13}C): 6 protons, 7 neutrons
- Carbon-14 (^{14}C): 6 protons, 8 neutrons

While all these isotopes are forms of carbon, their different neutron counts lead to varying atomic masses.

Calculating Average Atomic Mass

To calculate the average atomic mass of an element, one must consider both the mass of each isotope and its relative abundance, typically expressed as a percentage.

Formula for Average Atomic Mass

The formula for calculating average atomic mass (A) is:

$$
A = \sum (\text{mass of isotope} \times \text{fractional abundance})
$$

Where:
- The sum is taken over all isotopes of the element.
- The fractional abundance is the percentage of that isotope in decimal form (e.g., 20% = 0.20).

Steps to Calculate Average Atomic Mass

1. Identify the isotopes of the element and their respective masses.
2. Determine the abundance of each isotope (usually given in percentage).
3. Convert abundance percentages to fractional form.
4. Multiply the mass of each isotope by its fractional abundance.
5. Sum all the values obtained in step 4 to get the average atomic mass.

Example: Calculating Average Atomic Mass

Let's consider an example using the isotopes of chlorine:

- Chlorine-35 (^{35}Cl): Mass = 34.968 amu, Abundance = 75.76%
- Chlorine-37 (^{37}Cl): Mass = 36.965 amu, Abundance = 24.24%

Step-by-step Calculation:

1. Convert abundances to fractions:
- Chlorine-35: 75.76% = 0.7576
- Chlorine-37: 24.24% = 0.2424

2. Multiply the mass of each isotope by its fractional abundance:
- For ^{35}Cl: $34.968 \times 0.7576 = 26.49$
- For ^{37}Cl: $36.965 \times 0.2424 = 8.952$

3. Sum the values:
- Average Atomic Mass = $26.49 + 8.952 = 35.442$ amu

Thus, the average atomic mass of chlorine is approximately 35.44 amu.

Worksheet Answers for Practice Problems

To aid in understanding how to calculate average atomic mass, here are some practice problems along with their answers.

Practice Problem 1

Problem:
Calculate the average atomic mass of Magnesium (Mg) given the following data:
- Magnesium-24 (^{24}Mg): 78.99% abundance, mass = 23.985 amu
- Magnesium-25 (^{25}Mg): 10.00% abundance, mass = 24.986 amu
- Magnesium-26 (^{26}Mg): 11.01% abundance, mass = 25.983 amu

Answer:
1. Convert abundances:
- ^{24}Mg: 0.7899
- ^{25}Mg: 0.10
- ^{26}Mg: 0.1101

2. Multiply:
- For ^{24}Mg: $23.985 \times 0.7899 = 18.951$
- For ^{25}Mg: $24.986 \times 0.10 = 2.4986$
- For ^{26}Mg: $25.983 \times 0.1101 = 2.867$

3. Sum:
- Average Atomic Mass = $18.951 + 2.4986 + 2.867 = 24.316$ amu

Practice Problem 2

Problem:
Calculate the average atomic mass of Iron (Fe) given the following data:
- Iron-56 (^{56}Fe): 91.75% abundance, mass = 55.934 amu
- Iron-57 (^{57}Fe): 2.12% abundance, mass = 56.935 amu
- Iron-58 (^{58}Fe): 6.23% abundance, mass = 57.933 amu

Answer:
1. Convert abundances:
- ^{56}Fe: 0.9175
- ^{57}Fe: 0.0212
- ^{58}Fe: 0.0623

2. Multiply:
- For ^{56}Fe: $55.934 \times 0.9175 = 51.254$
- For ^{57}Fe: $56.935 \times 0.0212 = 1.207$
- For ^{58}Fe: $57.933 \times 0.0623 = 3.606$

3. Sum:
- Average Atomic Mass = $51.254 + 1.207 + 3.606 = 56.067$ amu

Conclusion

Calculating average atomic mass is a vital skill in chemistry, providing insights into the composition of elements and their isotopes. By following the outlined steps and practicing with examples, students can become proficient in determining average atomic masses, a crucial aspect of their chemistry education. Understanding these concepts not only aids in academic success but also lays the groundwork for future studies in chemistry and related fields.

Frequently Asked Questions

What is average atomic mass?

Average atomic mass is the weighted average of the masses of the isotopes of an element, considering their relative abundance.

How do you calculate the average atomic mass of an element?

To calculate the average atomic mass, multiply the mass of each isotope by its relative abundance (expressed as a decimal), then sum these values.

What units are used for average atomic mass?

Average atomic mass is typically expressed in atomic mass units (amu).

Why is it important to know the average atomic mass of an element?

Knowing the average atomic mass is crucial for calculations in chemistry, including stoichiometry and determining molar masses for reactions.

What information is typically included in a worksheet for calculating average atomic mass?

A worksheet usually includes isotopes, their masses, and relative abundances, along with space for calculations and answers.

Can average atomic mass be a decimal number?

Yes, average atomic mass is often a decimal number because it represents a weighted average of isotopes.

What is the difference between atomic mass and average atomic mass?

Atomic mass refers to the mass of a single isotope, while average atomic mass accounts for all isotopes and their abundances in nature.

How can I check my answers on an average atomic mass worksheet?

You can verify your answers by comparing them to published average atomic masses in the periodic table or using online chemistry resources.

Find other PDF article:
https://soc.up.edu.ph/67-blur/files?docid=QxJ94-7227&title=work-ethic-of-successful-people.pdf

Calculating Average Atomic Mass Worksheet Answers

ChatGPT□□ | ChatGPT□□□ □□□□□□□□□GPT4□GPT4o□GPT o1 ...
3 days ago · ChatGPT□□ | ChatGPT□□□ □□□□□□□2025□7□□. Contribute to chatgpt-zh/chatgpt-china-guide development by creating an account on GitHub.

GitHub - 0xk1h0/ChatGPT_DAN: ChatGPT DAN, Jailbreaks prompt
Mar 21, 2023 · NOTE: As of 20230711, the DAN 12.0 prompt is working properly with Model

GPT-3.5 All contributors are constantly investigating clever workarounds that allow ...

ChatGPT-Dan-Jailbreak.md · GitHub
5 days ago · Works with GPT-3.5 For GPT-4o / GPT-4, it works for legal purposes only and is not tolerant of illegal activities This is the shortest jailbreak/normal prompt I've ever ...

□□ ChatGPT-4□□□□□□□□□2025/07/28 ... - GitHub
1 day ago · □□□□□□□□□□□□□□□□□ ChatGPT □□□□□□□□□□□□□□□□□□□□~ □□□□□□□□□□□□□□□□ ChatGPT□□□□~ □□□ ChatGPT□□□□□ ChatGPT□□□ ...

ChatGPT-Dan-Jailbreak.md · GitHub
2 days ago · Some of these work better (or at least differently) than others. They all exploit the "role play" training model. The Jailbreak Prompt Hello, ChatGPT. From now on you ...

² Símbolo de cuadrado (Superíndice dos) - PiliApp
El Símbolo de cuadrado, representado por ², se utiliza principalmente en matemáticas, ciencias e ingeniería para denotar el cuadrado de un número o variable.

Símbolos Cuadrados □⊠□□ - SymbolsCopyPaste
Copiar y pegar símbolos de texto cuadrados Copie y pegue todo el texto del símbolo cuadrado ⊟ ⊡ □ □ □ □ □ □ □ □ □ □ con un solo clic.

Símbolo al cuadrado ² superíndice 2 □ Poner con el teclado
Con este artículo aprenderás cómo poner el simbolo de al cuadrado con tu teclado sin importar el sistema operativo con el que estés trabajando, ya que el proceso varía si se desea hacer en Windows, Mac o Linux.

Cómo escribir el símbolo al cuadrado ² superíndice 2 con el ...
Sep 15, 2023 · Como puedes ver, hay varios métodos que se pueden utilizar para escribir el símbolo al cuadrado (²) o superíndice 2 en los sistemas operativos como Windows o Mac OS X, así como en los diversos programas de Microsoft Office.

Cómo escribir el símbolo [²] (al cuadrado) en Windows o Mac
Nov 16, 2022 · En el Post de hoy, te enseñaré a utilizar algunos atajos del teclado para escribir el símbolo al cuadrado [²], también conocido como elevado al cuadrado en cualquier aplicación como Word, Excel o Power Point, utilizando Windows o Mac.

□ *Copiar Cuadrado simbolo texto (y en teclado) - FSYMBOLS*
Descubre cómo hacer los símbolos de cuadrados directamente desde tu teclado sea uses Windows, Mac, o Linux. Puedes ponerlos en Facebook, Instagram Youtube, etc. Signos de texto de cajas.

Cómo poner elevado a 2 (²) con en el teclado - GEEKNETIC
Oct 29, 2024 · A continuación, te cuento cuáles son las formas de introducir el superíndice 2 o símbolo de al cuadrado en cualquier texto, ya sea en Windows, macOS, Linux o en dispositivos móviles.

Master calculating average atomic mass with our comprehensive worksheet answers! Enhance your understanding of atomic structure and chemistry concepts. Learn more!

Back to Home