Name _____ Date _____

Average Atomic Mass

Overview

The **average atomic mass** of an element can be determined from the relative amounts of each isotope. This is the mass used in most chemical calculations.

In a naturally occurring element, the **fractional abundance** is the percentage of the abundance of a particular isotope in the total sample of atoms, written as a decimal.

To calculate average atomic mass of an element:

Average atomic mass = (fractional abundance of isotope 1)(atomic mass of isotope 1) + (fractional abundance of isotope 2)(atomic mass of isotope 2) + ...

Practice Problems

1. Chlorine has two isotopes. Chlorine-35 has an actual mass of 34.9689 u and chlorine-37 has a mass of 36.9659 u. In any sample of chlorine atoms, 75.771% will be chlorine-35 and 24.229% will be chlorine 37. Calculate the average atomic mass of chlorine.

2. Copper has two isotopes. Copper-63, which has an atomic mass of 62.93 u and copper-65, which has an atomic mass of 64.93 u. In any sample of copper atoms, 69.1% will be copper-63 and 30.9% will be copper-65. Calculate the average atomic mass of naturally occurring copper.

3. One atom has 20 protons and a mass of 44. Another atom has 20 protons and a mass number of 40. What is the identity of these atoms? How do you account for the difference in mass numbers?

4. The pie graph shows the abundance of the two kinds of silver atoms found in nature. The more abundant isotope has an atomic mass of a little less than 107, but the average atomic mass of silver on the periodic table is about 107.9. Explain why it is higher.

Calculate the average atomic masses using the following data for #5-14.

5. | Isotope | mass (u) | fractional abundance |
|---|---|---|
| Mg-24 | 23.985 | 78.7% |
| Mg-25 | 24.986 | 10.13% |
| Mg-26 | 25.983 | 11.17% |

Average atomic mass of magnesium = _____

6. | Isotope | mass (u) | fractional abundance |
|---|---|---|
| Ir-191 | 191.0 | 37.58% |
| Ir-193 | 193.0 | 62.42% |

Average atomic mass for iridium = _____

7. | Isotope | mass (u) | fractional abundance |
|---|---|---|
| Li-6 | 6.015 | 7.59% |
| Li-7 | 7.016 | 92.41% |

Average atomic mass of lithium = _____

8. | Isotope | mass (u) | fractional abundance |
|---|---|---|
| Cr-50 | 49.946 | 4.35% |
| Cr-52 | 51.941 | 83.8% |
| Cr-53 | 52.941 | 9.5% |
| Cr-54 | 53.939 | 2.35% |

Average atomic mass of chromium = _____

9.

Isotope	mass (u)	fractional abundance
I-127	127.0	80%
I-126	126.0	17%
I-128	128.0	3%

Average atomic mass of iodine = _____

10.

Isotope	mass (u)	fractional abundance
Au-197	196.56	50%
Au-198	197.96	50%

Average atomic mass of gold = _____

11.

Isotope	mass (u)	fractional abundance
Fe-55	54.876	14.5%
Fe-56	55. 998	85.5%

Average atomic mass of iron = _____

12.

Isotope	mass (u)	fractional abundance
H-1	0.98	99%
H-2	1.97	0.8%
H-3	2.98	0.2%

Average atomic mass of hydrogen = _____

13.

Isotope	mass (u)	fractional abundance
N-14	14.0	95%
N-15	15.0	3%
N-16	16.0	2%

Average atomic mass of nitrogen = _____

14.

Isotope	mass (u)	fractional abundance
C-12	12.0	98%
C-13	13.0	0.5%
C-14	14.0	1.5%

Average atomic mass of carbon = _____