NAME Key

CHEM1301/Homework 4 5

Atomic Mass Practice

Example: Find the average atomic mass for B if 19.9% of B atoms are 10B with a mass of 10.0129371 amu and 80.1% are 11B with a mass of 11.0093055 amu.

$.199(10.0129371\text{amu}) + .801(11.0093055\text{amu})$

$= 10.811\text{amu}$

1. There are two isotopes of lithium, Li-6 and Li-7. If 7.5% of Li atoms are Li-6 with a mass of 6.0151223 amu and 92.5% are Li-7 with a mass of 7.0160041 amu, what is the atomic mass of lithium?

$.075(6.0151225\text{amu}) + .925(7.0160041\text{amu})$

$= 6.941\text{amu}$

2. Find the average atomic mass for Mg if 78.99% of Mg atoms are $^{24}_{12}Mg$ with a mass of 23.9850419 amu, 10.00% are $^{25}_{12}Mg$ with a mass of 24.9858370 amu, and 11.01% are $^{26}_{12}Mg$ with a mass of 25.9825930 amu.

$.7899(23.9850419\text{amu}) + .100(24.9858370\text{amu}) + .1101(25.9825930\text{amu})$

$= 24.3051\text{amu}$

3. The element copper has naturally occurring isotopes with mass numbers of 63 and 65. The relative abundance and atomic masses are 69.2% for a mass of 62.93amu and 30.8% for a mass of 64.93amu. Calculate the average atomic mass of copper.

$.692(62.93amu) + .308(64.93amu)$

$= 63.5466amu$

4. Calculate the average atomic mass of sulfur if 95.00% of all sulfur atoms have a mass of 31.972 amu, 0.76% has a mass of 32.971amu and 4.22% have a mass of 33.967amu.

$.9500(31.972) + .0076(32.971amu)$
$+ .0422(33.967amu)$

$= 32.0574amu$

5. An unknown element is discovered that has 4 isotopes. Isotope 1 has a mass of 291.54 amu and an abundance of 43.52%. Isotope 2 has a mass of 294.65 amu and an abundance of 12.65%. Isotope 3 has a mass of 298.73 amu and an abundance of 32.01%. Isotope 4 has a mass of 304.45amu and an abundance of 11.82%. What is the unknown element's atomic mass?

$.4352(291.54amu) + .1265(294.69amu) +$
$.3201(298.73amu) + .1182(304.45amu)$

$= \boxed{295.766amu}$

5. There are three isotopes of silicon. They have mass numbers of 28, 29 and 30. The average atomic mass of silicon is 28.086amu. What does this say about the relative abundances of the three isotopes? (No math here. Just explain briefly.)

The abundance of Si-28 is much larger than the abundances of Si-29 or Si-30.

1. Write the chemical formula for compounds containing:

1 Nitrogen for every 3 oxygen atoms	NO_3
5 Phosphorus atoms for every 2 Nitrogen atoms	P_5N_2
1 Calcium and 2 nitrates (polyatomic)	$Ca(NO_3)_2$
One Chromium and 2 Sulfur atoms	CrS_2
2 ammonium ions and 1 carbonate	$(NH_4)_2CO_3$
2 nickel atoms and 2 sulfite ions	$Ni_2(SO_3)_2$
2 Hydrogen atoms and one sulfur atom	H_2S
2 Sodium atoms and one sulfate ion	Na_2SO_4

**Make sure you use parenthesis and subscripts where needed. Order Counts!*

2. Complete the table:

Formula	Number of CO_3^{-2} units	Number of carbon atoms	Number of oxygen atoms	Number of metal atoms
$CaCO_3$	1	1	3	1
$Al_2(CO_3)_3$	3	3	9	2
Ag_2CO_3	1	1	3	2

Formula	Number of PO_4^{-3} units	Number of P atoms	Number of oxygen atoms	Number of metal atoms
$Ca_3(PO_4)_2$	2	2	8	3
K_3PO_4	1	1	4	3
$Sn_3(PO_4)_4$	4	4	16	3

Ionic Compound Practice

Using the cations and anions in the table below, make as many unique ionic compounds as possible. Write the formulas of the ionic compounds in the space provided. Then tell if it is Type 1 or 2.

Cations	Anions
Li^+	Cl^-
Ca^{2+}	CN^-
Ba^{2+}	Br^-
NH_4^+	O^{2-}
Al^{3+}	S^{2-}
Fe^{2+}	SO_3^{2-}
Fe^{3+}	N^{3-}

Just some examples of Ionics you can make

CATION	ANION	TYPE?	CHEMICAL FORMULA	TYPE
Li^+	Cl^-	1	$LiCl$	
	CN^-	1	$LiCN$	
	Br^-	1	$LiBr$	
	O^{2-}	1	Li_2O	
	S^{2-}	1	Li_2S	
	SO_3^{2-}	1	Li_2SO_3	
	N^{3-}	1	Li_3N	
Ca^{2+}	Cl^-	1	$CaCl_2$	
	O^{2-}	1	CaO	
	SO_3^{2-}	1	$CaSO_3$	
NH_4^+	Cl^-	1	NH_4Cl	
	O^{2-}	1	$(NH_4)_2O$	
	N^{3-}	1	$(NH_4)_3N$	
	SO_3^{2-}	1	$(NH_4)_2SO_3$	
Al^{3+}	Cl^-	1	$AlCl_3$	
	CN^-	1	$Al(CN)_3$	
	S^{2-}	1	Al_2S_3	

CATION	ANION	TYPE?	CHEMICAL FORMULA	TYPE
Fe^{2+}	Cl^-	2	$FeCl_2$	
	O^{2-}		FeO	
	SO_3^{2-}		$FeSO_3$	
	N^{3-}		~~Fe_3N_2~~ Fe_3N_2	
Fe^{3+}	Cl^-		$FeCl_3$	
	O^{2-}		Fe_2O_3	
	SO_3^{2-}		$Fe_2(SO_3)_3$	
	N^{3-}		FeN	