SI Worksheet

2/17/22

Agenda:

Worksheet

1. Calculate the Formula Weight of each compound

$C_{12}H_{10}O_6$	$PbHAsO_4$	$CH_2(OH)_2$	$C(NH_2)_3NO_3$
250.22 amu	246.35 amu	48.05 amu	122.11 amu
	347.13		

2.

a. How many moles are in 15 grams of silicon?

$$15\,g\,Si \times \frac{1\ mol}{28.09\,g} = 0.53\,mol$$

Number of Si atoms?

$$0.53\,mol \times \frac{6.022\times10^{23}}{1\,mol} = 3.1\times10^{23}\ atoms$$

b. How many Neon atoms are in 4.28 moles of Neon?

$$4.28\,mol \times \frac{6.022\times10^{23}}{1\,mol} = 2.58\times10^{24}\ atoms$$

c. How many atoms are in 3.58 grams of Boron?

$$3.58\,g\,B \times \frac{1\ mol}{10.81\,g} \times \frac{6.022\times10^{23}\ atoms}{1\ mol} = 1.99\times10^{23}\ atoms$$

d. How many nitrogen atoms are in a sample of 17.980 grams of $C(NH_2)_3NO_3$?
*Hint: you calculated the formula weight above!

$$17.980\ g \times \frac{1\ mol}{122.11\ g} \times \frac{6.022\times10^{23}\ atoms\ C(NH_2)_3NO_3}{1\ mol} \times \frac{4\ N\ atoms}{1\ C(NH_2)_3NO_3\ molecule}$$

$= 3.55 \times 10^{23}$ N atoms

[redacted]?

*This can be confusing I added a step by step on last page and explanation

3. Write the formula of each ionic compounds

Calcium & Chlorine
Ca^{2+} Cl^- $CaCl_2$

Barium (Ba) & Oxygen
Ba^{2+} O^{2-} BaO

Aluminum &Sulfur
Al^{3+} S^{2-} Al_2S_3

Chromuim (III)& Oxygen
Cr^{3+} O^{2-} Cr_2O_3

Lithium & Bromine
Li^+ Br^- $LiBr$

4. Name or write formula of each compound

dichlorine heptoxide Cl_2O_7	S_2Cl_2 disulfur dichloride	dinitrogen tetroxide N_2O_4
$CuSO_4$ Copper(II) Sulfate	NH_4Cl Ammonium Chloride	$Fe_3(PO_4)_2$ Iron(II) phosphate
CF_4 Carbon tetrafluoride	Lithium Acetate $LiCH_3COO^-$	$Al(CN)_3$ Aluminum cyanide

5.

a. What is the name of ClO_2?

chlorite ion

PO_4?

phosphate ion

SO_3?

sulfite ion

b. What is the formula of carbonate ion?

CO_3^{2-}

Nitrate ion?

NO_3^-

Chlorate ion?

ClO_3^-

Step 1. Calculate molar mass

$C(NH_2)_3NO_3$ has a mass of 122.11 g/mol

Step 2. Calculate the moles of $C(NH_2)_3NO_3$

$$17.980\ g \times \frac{1\ mol}{122.11\ g} = 0.1472\ mol\ C(NH_2)_3NO_3$$

Step 3. Calculate moles of N atoms

1 mole $C(NH_2)_3NO_3$ = 4 mol N atoms

$$0.1472\ mol\ C(NH_2)_3NO_3 \times \frac{4\ mol\ N\ atoms}{1\ mol\ C(NH_2)_3NO_3} = 0.58898\ mol\ N\ atoms$$

Step 4. Calculate number of N atoms

$$0.58898\ mol\ N\ atoms \times \frac{6.022 \times 10^{23}\ N\ atoms}{1\ mol\ N\ atoms} = 3.55 \times 10^{23}\ N\ atoms$$

Therefore, 17.980g of $C(NH_2)_3NO_3$ contains 3.55×10^{23} N atoms

* Why multiplying by 4?

- When doing this conversion you are finding number of molecules of $C(NH_2)_3NO_3$, NOT total # of atoms.
- So, think about how each molecule of $C(NH_2)_3NO_3$ there are 4 nitrogen atoms, meaning this will result in four times the number of N atoms as there are $C(NH_2)_3NO_3$ molecules

·I think looking at the above alternative way might help it make more sense!