

SI Worksheet

2/17/22

Agenda:

Worksheet

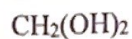
1. Calculate the Formula Weight of each compound



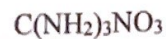
250.22
amu



246.35
amu
347.13



48.05
amu



122.11
amu

2.

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

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

Number of Si atoms?

$$0.53 \text{ mol} \times \frac{6.022 \times 10^{23}}{1 \text{ mol}} = 3.1 \times 10^{23} \text{ atoms}$$

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

$$4.28 \text{ mol} \times \frac{6.022 \times 10^{23}}{1 \text{ mol}} = 2.58 \times 10^{24} \text{ atoms}$$

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

$$3.58g B \times \frac{1 \text{ mol}}{10.81g} \times \frac{6.022 \times 10^{23} \text{ atoms}}{1 \text{ mol}} = 1.99 \times 10^{23} \text{ atoms}$$

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!

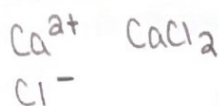
$$17.980 \text{ g} \times \frac{1 \text{ mol}}{122.11 \text{ g}} \times \frac{6.022 \times 10^{23} \text{ atoms } C(NH_2)_3NO_3}{1 \text{ mol}} \times \frac{4 \text{ N atoms}}{1 C(NH_2)_3NO_3 \text{ molecule}} = 3.55 \times 10^{23} \text{ N atoms}$$

~~How many total atoms are there?~~

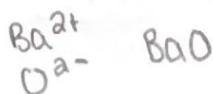
*This can be confusing
I added a step by
step on last page
and explanation

3. Write the formula of each ionic compounds

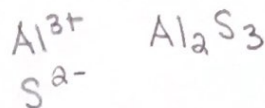
Calcium & Chlorine



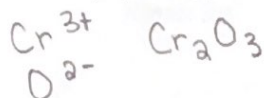
Barium (Ba) & Oxygen



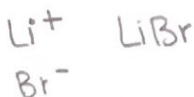
Aluminum & Sulfur



Chromium (III) & Oxygen



Lithium & Bromine



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^{3-} ?

phosphate ion

SO_3^{2-} ?

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

$\text{C}(\text{NH}_4)_3\text{NO}_3$ has a mass of 142.11 g/mol

Step 2. Calculate the moles of $\text{C}(\text{NH}_4)_3\text{NO}_3$

$$17.980 \text{ g} \times \frac{1 \text{ mol}}{142.11 \text{ g}} = 0.1472 \text{ mol } \text{C}(\text{NH}_4)_3\text{NO}_3$$

Step 3. Calculate moles of N atoms

$$1 \text{ mole } \text{C}(\text{NH}_4)_3\text{NO}_3 = 4 \text{ mol N atoms}$$

$$0.1472 \text{ mol } \text{C}(\text{NH}_4)_3\text{NO}_3 \times \frac{4 \text{ mol N atoms}}{1 \text{ mol } \text{C}(\text{NH}_4)_3\text{NO}_3} = 0.58898 \text{ mol N atoms}$$

Step 4. Calculate number of N atoms

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

Therefore, 17.980 g of $\text{C}(\text{NH}_4)_3\text{NO}_3$ contains 3.55×10^{23} N atoms

* Why multiplying by 4?

- When doing this conversion you are finding number of molecules of $\text{C}(\text{NH}_4)_3\text{NO}_3$, NOT total # of atoms.
- So, think about how each molecule of $\text{C}(\text{NH}_4)_3\text{NO}_3$ there are 4 nitrogen atoms, meaning this will result in four times the number of N atoms as there are $\text{C}(\text{NH}_4)_3\text{NO}_3$ molecules.
- I think looking at the above alternative way might help it make more sense!