

Chemistry Lesson: Steemit Edition Problem Set 3

- 1.) How many neutrons are present in ${}^{54}_{24}\text{Cr}$? (refer to Chemistry Lesson: Part 3 if you do not remember how to determine that)

There are 30 neutrons in that Chromium atom. Remember molecular mass is that of protons + neutrons, and the atomic number is the number of protons. To calculate number of neutrons we subtract the atomic number from the atomic mass ($54 - 24 = 30$).

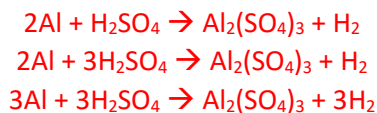
- 2.) What is the empirical formula for a compound with the following composition: 54.5 % C, 13.7 % H, and 31.8 % N? (Bonus: the molecular mass of this compound is ~88 g/mol, the first person to post the correct molecular formula and name of the compound in the comments of Chemistry Lesson: Part 4 will get 5 SBD as a reward).

$$54.5 \% C * 100g = 54.5 g C * \frac{1 \text{ mol}}{12.01 g C} = 4.54 \text{ Mol C}$$
$$13.7 \% H * 100g = 13.7 g H * \frac{1 \text{ mol}}{1.008 g C} = 13.59 \text{ mol H}$$
$$31.8 \% N * 100g = 31.8 g N * \frac{1 \text{ mol}}{14.01 g C} = 2.26 \text{ mol N}$$

Nitrogen is the smallest # of moles so we divide each number by 2.26. $4.54/2.26 = 2C$.
 $13.59/2.26 = 6 H$, $2.26/2.26 = 1 N$. So our empirical formula is C_2H_6N .

If you want the bonus... you've got to figure that one out on your own.

- 3.) Balance the following chemical reaction: $\text{Al} + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2$
This is the reaction of aluminum with concentrated sulfuric acid, if you are curious what this reaction looks like see the following YouTube video (it's NOT a crazy one):
(<https://www.youtube.com/watch?v=vR2ivraWTyU>)



Balanced Aluminum because it was the easiest first. Then balanced SO_4 , there were 3 on the product side (Compound)_{number of units} so added 3 to the H_2SO_4 to make that equal. Finally balanced the hydrogens. We had 6 on the reactants side, so added the coefficient of 3 to the H_2 to put 6 on the product side.