Name: **Period:**   **Seat#:**

Directions: Any worksheet that is labeled with an * means it is suggested extra practice. We do not always have time to assign every possible worksheet that would be good practice for you to do. You can do this worksheet when you have extra time, when you finish something early, or to help you study for a quiz or a test. If and when you choose to do this Extra Practice worksheet, please do the work on binder paper. You will include this paper stapled into your Rainbow Packet when you turn it in, even if you didn't do any of this. We want to make sure we keep it where it belongs so you can do it later if you want to (or need to). If you did the work on binder paper you can include that in your Rainbow Packet after this worksheet. If we end up with extra class time then portions of this may turn into required work. If that happens you will be told which problems are turned into required. Remember there is tons of other extra practice on the class website…and the entire internet! See me if you need help finding practice on a topic you are struggling with.

- **Show work for ANY math problem.**
- **Include ALL units.**
- **Some answers provided at the end of the question. The answers are underlined.**

1) Vitamin C, Molar mass = 176.12 g/mol, is a compound of composed of carbon, hydrogen, and oxygen. Vitamin C is found in many natural sources especially citrus fruits. When a 1.000-g sample of vitamin C is burned in a combustion apparatus 1.50 g of CO_2 and 0.410 g of H_2O are produced. What is the empirical formula of Vitamin C? What is the molecular formula of Vitamin C? $C_3H_4O_3; C_6H_8O_6$

2) Sometimes, athletes illegally use anabolic steroids to increase muscle strength. A forensic chemist analyzes some tablets suspected of being a popular steroid. He determined that the substance in the tablets contains only carbon, hydrogen, and oxygen in and has a molar mass of 300.14 g/mole. When a 1.200 g sample of this study by combustion analysis, 3.516 g of CO_2 and 1.007 g of H_2O are collected. What is the molecular formula for the substance? $C_{10}H_{14}O;$ $C_{20}H_{28}O_2$

3) 0.487 g sample of quinine 324g/mol is combusted and found to produce 1.321 g carbon dioxide 0.325 g water and 0.0421 g nitrogen. Determine in empirical and molecular formula (hint there is one element missing!)
$C_{10}H_{12}NO, C_{20}H_{24}N_2O_2$

4) After combustion with excess oxygen, a 12.501 g of a petroleum compound produced 38.130 g of carbon dioxide and 18.732 of water. A previous analysis determined that the compound does not contain oxygen. Establish the empirical formula of the compound C_5H_{12}

5) A hydrocarbon fuel is fully combusted with 22.000 g of oxygen to yield 23.118 g of carbon dioxide and 4.729 g of water. Find the empirical formula for the hydrocarbon. CH

6) 12.915 g of a biochemical substance was burned in an atmosphere of 50.123 g of oxygen. Subsequent analysis of the gaseous result yielded 18.942 g carbon dioxide, 7.749 g of water and 36.347 g of oxygen. Determine the empirical formula of the substance. CH_2O

7) A 12.00 gram sample of a smelly compound was tested by combustion analysis. The products were 21.41 grams of CO_2, 14.59 grams of H_2O, and 17.51 grams of N_2O_5. Further analysis showed that oxygen was NOT present in the molecule. What is the empirical formula of the compound? $C_3H_{10}N$

8) When a 10.0 g sample of an unknown organic acid is subjected to combustion analysis 21.2 grams of CO_2 and 3.25 g of H_2O are produced. What is the empirical formula of the acid? *$C_4H_3O_2$*

9) A carbohydrate is a compound composed solely of carbon, hydrogen and oxygen. When 10.7695 g of an unknown carbohydrate (MW = 128.2080 g/mol) was subjected to combustion analysis with excess oxygen, it produced 29.5747 g CO_2 and 12.1068 g H_2O. What is its molecular formula? *$C_8H_{16}O$, $C_8H_{16}O$*

10) Caproic acid, which is responsible for the foul odor of dirty socks, is composed of C, H, and O atoms. Combustion of a 0.225-g sample of this compound produces 0.512 g CO_2 and 0.209 g H_2O. What is the empirical formula of caproic acid? Caproic acid has a molar mass of 116 g/mol. What is its molecular formula?

11) A 0.1034 g sample of an unknown compound is subjected to combustion analysis, producing 0.2351g CO_2 and 0.0962 g H_2O. What is the empirical formula for the compound? *C_3H_6O*

12) Cyclopropane is a compound of carbon and hydrogen that is used as a general anesthetic. When 1.00 g of this substance was burned completely in oxygen, 3.14 g of CO_2 and 1.29 g of H_2O were produced. What is the empirical formula of the compound? The molar mass of cyclopropane is about 42 g/mole. *C_3H_6*

13) When 3.10 g of a compound containing only carbon, hydrogen, and oxygen was completely burned in oxygen, 4.40 g CO_2 and 2.70 g H_2O were produced. What is the empirical formula of the compound? What is the molecular formula if the molar mass is 62.1 g/mole? *CH_3O, $C_2H_6O_2$*