**Exam 2: Chem 1114 Sprin g 2018**

**Version A 100 points**

**Your name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 1 pt**

1) **The molecular mass of crystal meth (C10H13N) is 149 g/mol.**

a) How many grams of crystal meth are formed from 0.9395 g N? The atomic mass of N=14 g/mol SHOW WORK

\_\_\_\_\_\_ g meth 7 pts

2a) A suspicious, probably illegal white powder contains 8.054 g C, 1.007 g H and 0.9396 g N.

What is the powder’s empiric formula ?

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Element** | **Mass (g)** | **Atomic mass (g/mol)** |  |  |
| **C** |  | **12** |  |  |
| **H** |  | **1** |  |  |
| **N** |  | **14** |  |  |

Empiric formula = C H N 7 pts

2b) A sugar with the molecular weight 180 g/mol has the following masses of C, H and O in a 10 gram

sample. What is the molecular formula for the sugar ?

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Element** | **Mass (g)** | **Atomic mass (g/mol)** |  |  |  |
| **C** | **2.000** | **12** |  |  |  |
| **H** | **0.3335** | **1** |  |  |  |
| **O** | **2.6665** | **16** |  |  |  |

Molecular formula = C H O 7 pts

3a) A 16.3475 gram sample of Zn metal is burned in oxygen to produce a 20.3475 gram sample of a zinc oxide compound. Given that the atomic masses of Zn and O are 65.39 and 16 g/mol respectively, what is the empiric formula of the zinc oxide compound? 7 pts

\_\_\_\_\_\_\_\_\_zinc oxide formula

\_\_/29 includes name

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3a)A hydrocarbon with the formula CxHy is burned to form 22 grams CO2 and 9.0 grams of H2O.

Given the molecular weights : CO2 = 44 g/mol, H2O=18 g/mol, provide a whole-numbered

formula for CxHy. SHOW WORK

CxHy= 7 pts

4. Balance the reactions below: (1 pt each/11 pts total)

a) \_\_\_\_ Cu + \_\_\_\_O2 🡪 \_\_\_\_CuO

b) \_\_MgSO4 + \_\_LiF -🡪 \_\_MgF2 +\_\_\_ Li2SO4

c) \_\_C8H18 +\_\_\_\_O2🡪 \_\_\_\_CO2 + \_\_\_H2O

5)Butane (C4H10) has a molecular weight of 58 g/mol and burns according to the stoichiometrically balanced reaction below:

2C4H10 +13 O2 🡪 8CO2 + 10H2O

How many moles of butane are consumed if we have formed 880 g of CO2 (MW=44 g/mol) ? SHOW WORK

\_\_\_\_\_\_\_\_ mol butane 7 pts

6) Propane (C3H8) burns according to the stoichiometrically balanced reaction below:

C3H8 +5 O2 🡪 3CO2 + 4H2O

MW (g/mol) 44 32 44 18

a) How many grams of H2O form when we burn 26.6666 grams of O2 ? (SHOW WORK !)

\_\_\_\_\_\_\_ g H2O 7 pts

7) Octane burns according to the balanced equation:

2C8H18 + 25O2 🡪 16CO2 +18H2O

MW 114 32 44 18

a) If we combine 11.4 g C8H18 and 22.727 g O2 how many grams of CO2 can you form ? SHOW WORK

\_\_\_\_\_\_ g CO2 7 pts \_\_\_\_/39

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8. Pentane, C5H12, burns according to the balanced equation:

C5H12 + 8 O2  🡪 5CO2  + 6H2O

A 54 g sample of pentane (MW= 72 g/mol) is experimentally burned in excess O2 to experimentally produce 2.25 moles of H20. What is the % yield of the reaction?

\_\_\_\_=% yield 7 pts

9. In the Arrhenius acid-base theory:

a) An acid is a(n)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) A base is a(n)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) acids + bases 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

10. In the Bronsted acid-base theory

a) An acid is a(n)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

b) A base is a(n)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

c) acids + bases 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

d) the conjugate acid of NH3 is: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

e) Write out the hydrolysis reaction for CO32- in water:

11. Identify the acid (A) , base (B) conjugate acid (CA) and conjugate base (CB) in the reaction below:

HPO32- + HCO3- 🡪 H2 PO3- + CO32- 2 pts

\_\_\_ \_\_\_\_ \_\_\_\_ \_\_\_\_\_

12. What is the net ionic equation for: Ag+ + NO3- + Na+ +Cl- 🡪 AgCl(s) + Na+ + NO3-

13. What are the oxidation numbers of all the elements in the compounds below: (1 pt each/ 7 pts total)

a) SO2 S oxidation #=\_\_\_\_ O oxidation # = \_\_\_\_\_\_

b) CuCl2 Cu oxidation #=\_\_\_ Cl oxidation #=\_\_\_\_\_\_

c) H2SO4 H oxidation #=\_\_\_ O oxidation # =\_\_\_\_ S oxidation #=\_\_\_\_

14. Oxidation = \_\_\_\_\_\_\_\_\_\_\_electrons

15. Reduction= \_\_\_\_\_\_\_\_\_\_\_ electrons

16. What are elements oxidized and reduced in the reactions below:

CH4 + 2O2 🡪 CO2 + 2H2O

\_\_\_\_\_oxidized \_\_\_\_\_\_ reduced

Co2O + Zno 🡪 ZnO + 2Coo

\_\_\_\_ oxidized \_\_\_\_\_ reduced

17. Any day doing Chemistry is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ day.

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