Name:
Score: 0 / 25 points (0%) [2 open-ended questions not graded]

Chapters3&4

True/False
Indicate whether the statement is true or false.

 ____ 1. The quantity of product that is calculated to form when all of the limiting reagent reacts is called the actual yield.

ANSWER: F
POINTS: 0 / 1

 ____ 2. The molecular weight is ALWAYS a whole-number multiple of the empirical formula weight.

ANSWER: T
POINTS: 0 / 1

Multiple Choice
Identify the choice that best completes the statement or answers the question.

 ____ 3. When the following equation is balanced, the coefficients are _____.

$NH_3\ (g) + O_2\ (g) \rightarrow NO_2\ (g) + H_2O\ (g)$

a. 1, 1, 1, 1
b. 4, 7, 4, 6
c. 2, 3, 2, 3
d. 1, 3, 1, 2
e. 4, 3, 4, 3

ANSWER: B
POINTS: 0 / 1

 ____ 4. Write the balanced equation for the reaction that occurs when methanol, CH_3OH (1), is burned in air. What is the coefficient of oxygen in the balanced equation?

a. 1
b. 2
c. 3
d. 4
e. 3/2

ANSWER: C

POINTS: 0 / 1

___ 5. Predict the product in the combination reaction below.

$Al\,(s) + N_2\,(g) \rightarrow$ _____

a. AlN
b. Al_3N
c. AlN_2
d. Al_3N_2
e. AlN_3

ANSWER: A
POINTS: 0 / 1

___ 6. There are _____ mol of carbon atoms in 4 mol of dimethylsulfoxide (C_2H_6SO).

a. 2
b. 6
c. 8
d. 4
e. 3

ANSWER: C
POINTS: 0 / 1

___ 7. There are _____ sulfur atoms in 25 molecules of $C_4H_4S_2$.

a. 1.5×10^{25}
b. 4.8×10^{25}
c. 3.0×10^{25}
d. 50
e. 6.02×10^{23}

ANSWER: D
POINTS: 0 / 1

___ 8. How many grams of hydrogen are in 46 g of CH_4O?

a. 5.8
b. 1.5
c. 2.8
d. 0.36
e. 184

ANSWER: A
POINTS: 0 / 1

___ 9. A 22.5-g sample of ammonium carbonate contains _____ mol of ammonium ions.

a. 0.468

b. 0.288
c. 0.234
d. 2.14
e. 3.47

ANSWER: A
POINTS: 0 / 1

___ 10. What is the empirical formula of a compound that contains 27.0% S, 13.4% O, and 59.6% Cl by mass?
a. SOCl
b. $SOCl_2$
c. S_2OCl
d. SO_2Cl
e. $ClSO_4$

ANSWER: B
POINTS: 0 / 1

___ 11. A compound contains 40.0% C, 6.71% H, and 53.29% O by mass. The molecular weight of the compound is 60.05 amu. The molecular formula of this compound is _____.
a. $C_2H_4O_2$
b. CH_2O
c. $C_2H_3O_4$
d. $C_2H_2O_4$
e. CHO_2

ANSWER: A
POINTS: 0 / 1

___ 12. Combustion of a 1.031-g sample of a compound containing only carbon, hydrogen, and oxygen produced 2.265 g of CO_2 and 1.236 g of H_2O. What is the empirical formula of the compound?
a. C_3H_8O
b. C_3H_5O
c. $C_6H_{16}O_2$
d. $C_3H_9O_3$
e. $C_3H_6O_3$

ANSWER: A
POINTS: 0 / 1

___ 13. Silver nitrate and aluminum chloride react with each other by exchanging anions:

$3AgNO_3\,(aq) + AlCl_3\,(aq) \rightarrow Al(NO_3)_3\,(aq) + 3AgCl\,(s)$

What mass in grams of AgCl is produced when 4.22 g of $AgNO_3$ react with 7.73 g of $A1C1_3$?

a. 17.6
b. 4.22
c. 24.9
d. 3.56
e. 11.9

ANSWER: D
POINTS: 0 / 1

___ 14. Sulfur and fluorine react in a combination reaction to produce sulfur hexafluoride:

$S(s) + 3F_2(g) \rightarrow SF_6(g)$

In a particular experiment, the percent yield is 79.0%. This means that in this experiment, a 7.90-g sample of fluorine yields _____ g of SF_6.

a. 30.3
b. 10.1
c. 7.99
d. 24.0
e. 0.110

ANSWER: C
POINTS: 0 / 1

___ 15. When a hydrocarbon burns in air, what component of air reacts?

a. oxygen
b. nitrogen
c. carbon dioxide
d. water
e. argon

ANSWER: A
POINTS: 0 / 1

___ 16. Of the reactions below, which one is a decomposition reaction?

a. $NH_4Cl \rightarrow NH_3 + HCl$
b. $2Mg + O_2 \rightarrow 2MgO$
c. $2N_2 + 3H_2 \rightarrow 2NH_3$
d. $2CH_4 + 4O_2 \rightarrow 2CO_2 + 4H_2O$
e. $Cd(NO_3)_2 + Na_2S \rightarrow CdS + 2NaNO_3$

ANSWER: A
POINTS: 0 / 1

17.

___ 17. Which one of the following is <u>not</u> true concerning automotive air bags?
a. They are inflated as a result of a decomposition reaction
b. They are loaded with sodium azide initially
c. The gas used for inflating them is oxygen
d. The two products of the decomposition reaction are sodium and nitrogen
e. A gas is produced when the air bag activates.

ANSWER: C
POINTS: 0 / 1

___ 18. The formula of nitrobenzene is $C_6H_5NO_2$. The molecular weight of this compound is _____ amu.
a. 107.11
b. 43.03
c. 109.10
d. 123.11
e. 3.06

ANSWER: D
POINTS: 0 / 1

___ 19. One mole of _____ contains the largest number of atoms.
a. S_8
b. $C_{10}H_8$
c. $Al_2(SO_4)_3$
d. Na_3PO_4
e. Cl_2

ANSWER: B
POINTS: 0 / 1

___ 20. One million argon atoms is _____ mol (rounded to two significant figures) of argon atoms.
a. 3.0
b. 1.7×10^{-18}
c. 6.0×10^{23}
d. 1.0×10^{-6}
e. $1.0 \times 10^{+6}$

ANSWER: B
POINTS: 0 / 1

___ 21. Gaseous argon has a density of 1.40 g/L at standard conditions. How many argon atoms are in 1.00 L of argon gas at standard conditions?
a. 4.76×10^{22}
b. 3.43×10^{25}

c. 2.11×10^{22}
d. 1.59×10^{25}
e. 6.02×10^{23}

ANSWER: C
POINTS: 0 / 1

___ 22. A nitrogen oxide is 63.65% by mass nitrogen. The molecular formula could be _____.
a. NO
b. NO_2
c. N_2O
d. N_2O_4
e. either NO_2 or N_2O_4

ANSWER: C
POINTS: 0 / 1

___ 23. Which hydrocarbon pair below have identical mass percentage of C?
a. C_3H_4 and C_3H_6
b. C_2H_4 and C_3H_4
c. C_2H_4 and C_4H_2
d. C_2H_4 and C_3H_6
e. none of the above

ANSWER: D
POINTS: 0 / 1

___ 24. Propane (C_3H_8) reacts with oxygen in the air to produce carbon dioxide and water. In a particular experiment, 38.0 grams of carbon dioxide are produced from the reaction of 22.05 grams of propane with excess oxygen. What is the % yield in this reaction?
a. 38.0
b. 57.6
c. 66.0
d. 86.4
e. 94.5

ANSWER: B
POINTS: 0 / 1

___ 25. Automotive air bags inflate when sodium azide decomposes explosively to its constituent elements:

$2NaN_3\ (s) \rightarrow 2Na\ (s) + 3N_2\ (g)$

How many moles of N_2 are produced by the decomposition of 2.88 mol of sodium azide?

a. 1.92
b. 8.64
c. 4.32
d. 0.960
e. 1.44

ANSWER: C
POINTS: 0 / 1

Problem

26. Show all work on the following problem: 6.8360g of aqueous calcium hydroxide are combined in a beaker with 5.0999g of aqueous sodium sulfate. (29 pts.)
    a. Write the balanced molecular equation.
    b. Determine the limiting reagent.
    c. Determine which product is the precipitate.
    d. Calculate the theoretical mass of the precipitate produced.
    e. Calculate the percent yield if 3.0575g of the precipitate are actually produced.

RESPONSE:
ANSWER:

a. $Ca(OH)_2(aq) + Na_2SO_4(aq) \rightarrow CaSO_4(s) + 2NaOH(aq)$
b. Na_2SO_4
c. $CaSO_4$
d. 4.89g of $CaSO_4$
e. 62.6% yield

POINTS: -- / 29

27. Show all work on the following problem: Potassium dichromate is used to titrate a sample containing an unknown percentage of iron. The sample is dissolved in H_3PO_4/H_2SO_4 mixture to reduce all of the iron to Fe^{2+} ions. The solution is then titrated with 0.01625M $K_2Cr_2O_7$, producing Fe^{3+} and Cr^{3+} ions in acidic solution. The titration requires 32.26mL of $K_2Cr_2O_7$ for 1.2765g of the sample. (46 pts.)
    a. Balance the net ionic equation using the half-reaction method.
    b. Determine the percent iron in the sample.
    c. Is the sample ferrous iodate, ferrous phosphate, or ferrous acetate?

RESPONSE:
ANSWER:

a. $6\ Fe^{2+} + Cr_2O_7^{2-} + 14H^{1+} \rightarrow .\ 6\ Fe^{3+} + 2Cr^{3+} + 7H_2O$
b. 13.8% Fe
c. ferrous iodate

POINTS: -- / 46

Retake Test