CHE 105 Fall 16 - Exam 2

Your Name: _____ **Your ID:** _____

Question #: 1

Calculate the number of **atoms** in a 4.54 g sample of CH_4.

A. 1.25
B. 8.52×10^{23}
C. 2.27×10^{23}
D. 0.295

Question #: 2

What is the name of $BaCl_2$? __1__

1. _____

Question #: 3

Which of the following is the formula for vanadium(IV) oxide?

A. VO_2
B. V_2O_3
C. VO
D. V_2O_5

Question #: 4

What is the chemical name for XeF_4?

A. xenon(IV) fluoride
B. monoxenon difluoride
C. xenic fluorine
D. xenon tetrafluoride

Question #: 5

A 33.33 g sample of a compound containing only phosphorus and sulfur was found to contain 9.29 g of phosphorus.
What is the empirical formula of the compound? .
Fill in the blank with the appropriate subscripts. Enter a 1 (one), if needed, so there is a number in both blanks.
P__1__ S__2__

1. _____
2. _____

Question #: 6

Balance the following chemical equation with the smallest possible whole numbers by filling in each blank with the proper coefficient. If the coefficient is 1, fill in 1.
__1__ NO_2 + __2__ H_2O → __3__ HNO_3 + __4__ NO

1. _____
2. _____
3. _____
4. _____

Question #: 7

What is the mass in grams for 150.1 moles of potassium nitrate?

A. 1.518×10^4 g
B. 1.485 g
C. 0.6736 g
D. 1.938×10^4 g

Question #: 8

What is the mass of 7.21×10^{21} molecules of carbon dioxide (CO_2, 44.01 g/mol)?

A. 368 g
B. 2.72 g
C. 1.90 g
D. 0.527 g

Question #: 9

How many grams of CO(*g*) will be formed when 17.0 g of SiO_2 completely reacts with excess carbon as described by the equation below?
(molar mass of SiO_2 = 60.09 g/mol, molar mass of CO = 28.01 g/mol)
$SiO_2(s) + 3C(s) \rightarrow SiC(s) + 2CO(g)$

A. 11.3 g
B. 15.8 g
C. 31.2 g
D. 7.33 g

Question #: 10

What is the percent yield of $CO_2(g)$ when 28.16 g of $CO_2(g)$ (molar mass of CO_2 is 44.01 g/mol) are produced
from the combustion of 0.1000 moles of $C_8H_{18}(l)$ in the presence of excess $O_2(g)$?
$2\ C_8H_{18}(l) + 25\ O_2(g) \rightarrow 16\ CO_2(g) + 18\ H_2O(g)$

A. 79.98%
B. 0.7813%
C. 125.0%
D. 15.63%

Question #: 11

What is the mass of the **excess** reactant after 3.27 grams of Zn react with 3.30 grams of HCl?
$Zn + 2HCl \rightarrow ZnCl_2 + H_2$

A. 0.03 g
B. 0.35 g
C. 0.38 g
D. 0.31 g

Question #: 12

A maximum of __1__ grams of CO_2 can be produced from the reaction of 105 grams of CH_3OH with 61 grams of O_2.
$2\ CH_3OH(l) + 3\ O_2(g) \rightarrow 2\ CO_2(g) + 4\ H_2O(l)$
Report your answer with **two** significant figures. Do **NOT** include units in your answer.

1. _____

Question #: 13

What volume, in mL, of a 0.135 M KNO_3 solution contains 0.285 g of KNO_3?
Report your answer with **three** significant figures. Do **NOT** include units in your answer.
__1__ mL

1. _____

Question #: 14

195 mL of a 1.81 M HCl solution is diluted with H2O to make a 1.30 M solution. What is the volume of the final solution?
Report your answer with **three** significant figures. Do **NOT** include units in your answer.
__1__ mL

1. _____

Question #: 15

Select **two** electrolytes.

A. HI(aq)
B. K_2SO_4
C. C_6H_6 (benzene)
D. $C_4H_{10}O$ (diethyl ether)

Question #: 16

What is the precipitate, if any, when aqueous solutions of potassium iodide and silver nitrate are mixed?

A. potassium iodide
B. silver nitrate
C. silver iodide
D. potassium nitrate
E. No precipitate will form.

Question #: 17

The net ionic equation for the reaction, if any, of aqueous solutions of copper (II) sulfate ($CuSO_4$) and sodium carbonate (Na_2CO_3) is:

A. $Cu^{2+}(aq) + CO_3^{2-}(aq) \rightarrow CuCO_3(s)$
B. $CuSO_4(aq) + Na_2CO_3(aq) \rightarrow CuCO_3(aq) + Na_2SO_4(aq)$
C. $CuSO_4(aq) + CO_3^{2-}(aq) \rightarrow CuCO_3(s) + SO_4^{2-}(aq)$
D. No reaction occurs.

Question #: 18

Which one of the following compounds is **insoluble** in water?

A. $PbSO_4$
B. $Pb(NO_3)_2$
C. CaS
D. KOH

Question #: 19

A 10.0 mL sample of an unknown H_2SO4 solution requires titration with 15.0 mL of 0.350 M NaOH to reach the equivalence point.
What is the concentration of the unknown H_2SO_4 solution? (Remember to write a balanced equation for the reaction.)
Report your answer with **three** significant figures. Do **NOT** include units in your answer.
1 M

1. _____

Question #: 20

In this reaction proceeding to the right, H_2SO_4 is the __1__ agent and Al is the __2__ agent.
$2\ Al(s) + 3\ H_2SO_4(aq) \rightarrow Al_2(SO_4)_3\ (aq) + 3\ H_2(g)$
Fill in each blank with one of these words: **precipitating**, **reducing**, **oxidizing**, **dehydrating**

1. _____
2. _____

Question #: 21

The oxidation number of manganese in Mn_2O_7 is __1__. Include a number **and** a sign (+ or -) in your answer.

1. _____

Question #: 22

Which **two** of the following substances would react with an acid to evolve a gas?

A. NaOH
B. NaI
C. Na_2CO_3
D. $NaHCO_3$

Question #: 23

The pressure of a gas is 750.0 torr when its volume is 400.0 mL. What is the pressure if the gas is allowed to expand to 600.0 mL at constant temperature?

A. 500.0 torr
B. 1125 torr
C. 320.0 torr
D. 1800. torr

Question #: 24

The volume of a gas is increased from 150.0 mL to 350.0 mL by heating it at constant pressure. If the original temperature of the gas was 25.0°C, what is the final temperature?

A. 146°C
B. 10.7°C
C. 423°C
D. 600°C

Question #: 25

How many moles of air are in a bicycle tire with a volume of 2.26 L and an internal pressure of 6.90 atm at 17 °C?
Report your answer with **three** significant figures in scientific notation with the format 2.22E2 or 2.22E-2. Do **NOT** include units in your answer.
__1__ moles

1. _____

Question #: 26

A tank has a volume of 12.4 liters of carbon dioxide gas at 722 torr and 298 K.
If the $CO_2(g)$ is compressed to a volume of 10.5 L at a temperature of 293 K, what is the new pressure of the gas?

A. 682 torr
B. 838 torr
C. 5.08×10^4 torr
D. 931 torr

Question #: 27

A 3.635 g sample of gas in a 0.326 L vessel exerts a pressure of 1.20 atm at 338 K. What is the molar mass of the gas?

A. 56.6 g/mol
B. 91.7 g/mol
C. 164 g/mol
D. 258 g/mol

Question #: 28

A sample of natural gas contains 9.89 moles of CH_4, 0.841 moles of C_2H_6, and 0.253 moles of C_3H_8.
If the total pressure of the gases is 2.57 atm, the partial pressure of C_2H_6 is __1__ atm.
Report your answer with **two** significant figures, and **not** in scientific notation. Do **NOT** include units in your answer.

1. _____

Question #: 29

Quicklime (CaO) is produced by the thermal decomposition of calcium carbonate ($CaCO_3$).
What is the volume of CO_2 produced **at STP** from the decomposition of 152 g $CaCO_3$?
$CaCO_3$ (s) → CaO (s) + CO_2 (g)

A. 44.5 L
B. 55.1 L
C. 34.0 L
D. 25.3 L

Question #: 30

A gaseous compound is decomposed and found to contain 85.63 % carbon and 14.37 % hydrogen by mass.
The mass of 258 mL of the gas, measured at STP, was 0.646 g. What is the **molecular** formula of the compound?
Fill in the blanks below with the appropriate subscripts. Enter a number for each blank, even if the number is 1 (one).
$C_{\_1\_}H_{\_2\_}$

1. _____
2. _____

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1. barium chloride

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1. 3
2. 1
3. 2
4. 1

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Report your answer with **two** significant figures. Do **NOT** include units in your answer.

1. 55|56|57|

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What volume, in mL, of a 0.135 M KNO_3 solution contains 0.285 g of KNO_3?
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__1__ mL

1. 20.9

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__1__ mL

1. 272|271|

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Select **two** electrolytes.

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1. 0.262|2.62E-1|0.263|2.63E-1|

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1. oxidizing|oxdizing|oxidant|oxidize|
2. reducing|reducting|reductant|reduce|

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1. +7|7+|seven plus|plus seven|

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Report your answer with **two** significant figures, and **not** in scientific notation. Do **NOT** include units in your answer.

1. 0.20|.20|0.19|.19|0.21|.21|

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Fill in the blanks below with the appropriate subscripts. Enter a number for each blank, even if the number is 1 (one).
C_1_ H_2_

1. 4
2. 8