Houston Community College System HCCS Time: 2 Hours
CHEM 1305 Exam II, Chapters 6-10
Summer Semester 2017

Student Name: _____ Student ID # _____
Instructor: Dr. Emad Akeer

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

2 Points each

1) What is the general term for a substance dissolved in water? 1) _____
A) aqueous solution
B) salt solution
C) acid salt
D) aqueous salt
E) none of the above

2) What is the term for a single atom that has a negative or a positive charge as the result of gaining or losing valence electrons? 2) _____
A) cation
B) anion
C) polyatomic ion
D) monoatomic ion
E) none of the above

3) The NH_4^+ ion is classified as which of the following? 3) _____
A) monoatomic anion
B) polyatomic cation
C) monoatomic cation
D) polyatomic anion
E) none of the above

4) What is the chemical formula for the binary compound composed of Li^+ and O^{2-} ions? 4) _____
A) LiO
B) Li_2O_2
C) LiO_2
D) Li_2O
E) none of the above

5) What is the chemical formula for the ternary compound composed of Ca^{2+} and PO_4^{3-} ions? 5) _____
A) $CaPO_4$
B) $Ca_2(PO_4)_3$
C) $Ca_6(PO_4)_6$
D) $Ca_3(PO_4)_2$
E) none of the above

Student Name: _____ Student ID # _____

6) What is the Stock system name for Mn_3N_2? 6) _____

A) manganous nitride
B) manganese nitride
C) manganese(III) nitride
D) manganese(II) nitride
E) none of the above

7) What is the ionic charge for the chromium ion in $Cr_2(SO_4)_3$? 7) _____

A) zero
B) 1+
C) 2+
D) 3+
E) none of the above

8) What is the systematic name for aqueous HI? 8) _____

A) hydrogen iodide
B) hydroiodic acid
C) iodic acid
D) iodous acid
E) none of the above

9) Which of the following is evidence for a chemical reaction? 9) _____

A) An insoluble solid is produced in solution.
B) An energy change is observed.
C) A gas is produced.
D) A permanent color change is observed.
E) all of the above

10) Which of the following formulas represents an element in its natural state? 10) _____

A) O_2
B) N_2
C) H_2
D) all of the above
E) none of the above

11) What is the coefficient of silver metal after balancing the following equation? 11) _____

$$\_\_Cu(s) + \_\_AgNO_3(aq) \rightarrow \_\_Cu(NO_3)_2(aq) + \_\_Ag(s)$$

A) 2
B) 1
C) 4
D) 3
E) none of the above

Student Name: _____ Student ID # _____

12) Which of the following metals reacts with aqueous $Al(NO_3)_3$? 12) _____

Partial Activity Series: Mg > Al > Zn > (H) > Cu

A) Zn
B) Cu
C) Mg
D) all of the above
E) none of the above

13) What are the products from the following single–replacement reaction? 13) _____

$Mg(s) + H_2SO_4(aq) \rightarrow$

A) $MgSO_4$ and H_2
B) $MgSO_4$ and H_2O
C) MgO and H_2SO_3
D) no reaction
E) MgO and H_2S

14) Which of the following gases occupies 22.4 L at STP? 14) _____

A) 1 mol ammonia, NH_3
B) 1 mol carbon monoxide, CO
C) 1 mol ozone, O_3
D) all of the above
E) none of the above

15) How many moles of chlorine gas react with 1 mol of hydrogen gas according to the balanced chemical equation? 15) _____

$H_2(g) + Cl_2(g) \rightarrow 2\ HCl(g)$

A) 3 mol
B) 1 mol
C) 4 mol
D) 2 mol
E) none of the above

16) What is the term for the value corresponding to the number of atoms in 12.01g of carbon? 16) _____

A) mole number
B) mass number
C) Avogadro's number
D) atomic number
E) none of the above

17) What is the term for a temperature of 0 °C and a pressure of 1 atm? 17) _____

A) ideal gas temperature and pressure
B) standard temperature and pressure
C) atmospheric temperature and pressure
D) experimental temperature and pressure
E) none of the above

Student Name: _____ Student ID # _____

18) What principle states that mass is neither gained or lost during a chemical reaction? 18) _____
A) Avogadro's theory
B) law of conservation of mass
C) law of constant composition
D) law of combining volumes
E) none of the above

19) Which of the following steps is necessary to solve a mass–mass stoichiometry problem? 19) _____
A) Write a balanced equation for the reaction.
B) Calculate the mass of unknown substance.
C) Calculate the moles of known substance.
D) Convert moles of known to moles of unknown.
E) all of the above

20) How many moles of carbon dioxide are produced from 1.00 mol butane, C_4H_{10}? 20) _____

$$\_\_C_4H_{10}(g) + \_\_O_2(g) \xrightarrow{\text{spark}} \_\_CO_2(g) + \_\_H_2O(g)$$

A) 8.00 mol
B) 4.00 mol
C) 16.0 mol
D) 1.00 mol
E) none of the above

21) Which of the following is an observed property of gases? 21) _____
A) gases mix uniformly
B) gases have a variable shape
C) gases expand uniformly
D) gases compress uniformly
E) all of the above

22) Which of the following does *not* express standard atmospheric pressure? 22) _____
A) 760 torr
B) 14.7 psi
C) 101 kPa
D) 29.9 in. Hg
E) 760 cm Hg

23) Which of the following increases the pressure of a gas? 23) _____
A) decreasing the number of gas molecules
B) decreasing the temperature
C) decreasing the volume
D) all of the above
E) none of the above

24) A beaker of ether at 20 °C placed in a closed container and a vacuum pump is used to evacuate the air in the container. Why does the ether begin to boil? 24) _____
A) The vapor pressure decreases.
B) The vapor pressure increases.
C) Air is released from the ether.
D) The atmospheric pressure is reduced.
E) none of the above

Student Name: _____ Student ID # _____

25) Which of the following explains why the pressure of a gas decreases when the temperature decreases, and the volume remains constant? 25) _____

A) The kinetic energy increases.
B) The collision frequency decreases.
C) The velocity of molecules increases.
D) all of the above
E) none of the above

MULTIPLE CHOICE. Choose the one alternative that best completes the answers the problem.

In this part You must show your calculations and units clearly for credit or partial credit.

26) How many hydrogen molecules are in 2.75 L of H_2 gas at STP? **5 Points** 26) _____

A) 9.77×10^{21} molecules
B) 4.90×10^{24} molecules
C) 1.66×10^{24} molecules
D) 2.19×10^{23} molecules
E) 7.39×10^{22} molecules

27) The formula for the illegal drug cocaine is $C_{17}H_{21}NO_4$ (303.39 g/mol). What is the percentage of carbon in the compound? 27) _____ **6 Points**

A) 21.09% B) 3.959% C) 6.991% D) 4.618% E) 67.30%

Student Name: _____ Student ID # _____

28) The taste of sour milk is lactic acid. What is the molecular formula for lactic acid if the percent composition is 40.00% C, 6.71% H, 53.29% O, and the approximate molar mass is 90 g/mol? 28) _____

6 Points

A) CHO_2 B) CH_2O C) $C_3H_6O_3$ D) CHO E) C_6HO_8

29) What is the mass of hydrogen gas released from 2.70 g of aluminum metal and hydrochloric acid? 29) _____

__Al(*s*) + __HCl(*aq*) → __$AlCl_3$(*aq*) + __H_2(*g*) **6 Points**

A) 0.202 g B) 0.303 g C) 0.101 g D) 0.606 g E) 0.135 g

30) Starting with 1.56 g of salicylic acid, a student prepares 1.75 g of aspirin. If the calculated mass of aspirin is 1.88 g, what is the percent yield? 30) _____

4 Points

A) 121% B) 107% C) 83.0% D) 89.1% E) 93.1%

Student Name: _____ Student ID # _____

31) What volume of oxygen gas reacts to produce 20.0 mL of chlorine gas? **6 Points** 31) _____
(Assume temperature and pressure remain constant.)

$$\_\_\ HCl(g) + \_\_O_2(g) \xrightarrow{\Delta} \_\_Cl_2(g) + \_\_H_2O(g)$$

A) 40.0 mL
B) 10.0 mL
C) 5.00 mL
D) 20.0 mL
E) none of the above

32) Considering the limiting reactant concept, how many moles of copper(I) sulfide are produced from the reaction of 0.500 mol of copper and 0.750 mol of sulfur? **6 Points** 32) _____

$$2\ Cu(s) + S(s) \xrightarrow{\Delta} Cu_2S(s)$$

A) 0.750 mol
B) 0.500 mol
C) 0.250 mol
D) 0.375 mol
E) none of the above

Student Name: _____ Student ID # _____

33) A sample of argon gas at 520 mm Hg expands from 0.150 L to 0.300 L. If the temperature remains constant, what is the final pressure in mm Hg? **5 Points** 33) _____

A) 760 mm Hg
B) 520 mm Hg
C) 260 mm Hg
D) 1040 mm Hg
E) none of the above

34) An unknown gas occupies a volume of 1.50 L at 21 °C and 0.950 atm. If the mass is 2.01 g, what is the molar mass of the gas? (R = 0.0821 atm•L/mol•K) **6 Points** 34) _____

A) 69.1 g/mol B) 30.7 g/mol C) 34.0 g/mol D) 76.6 g/mol E) 19.0 g/mol

Answer Key
Testname: CHEM 1305_SUMMER2017 TEST II

1) A
2) D
3) B
4) D
5) D
6) D
7) D
8) B
9) E
10) D
11) A
12) C
13) A
14) D
15) B
16) C
17) B
18) B
19) E
20) B
21) E
22) E
23) C
24) D
25) B
26) E
27) E
28) C
29) B
30) E
31) B
32) C
33) C
34) C