Houston Community College System HCCS

Summer Semester 2018

CHEM 1305

Exam II Time: 2 Hours

Student Name: _____ Student ID #_____

Instructor: Dr. Emad Akeer 100 Points

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

1) Which of the following is a general trend from left to right in the periodic table of elements? 1) _____
A) atomic radius decreases; metallic character decreases
B) atomic radius increases; metallic character increases
C) atomic radius increases; metallic character decreases
D) atomic radius decreases; metallic character increases
E) none of the above

2) Which of the following is a halogen? 2) _____
A) Cl
B) I
C) F
D) all of the above
E) none of the above

3) Which of the following has chemical properties most similar to sodium? 3) _____
A) K B) Fe C) B D) He E) Mg

4) Given the chemical formulas CH_4, NH_3, and H_2O, predict the formula for silane, Si?H?. 4) _____
A) SiH_3 B) H_2Si C) SiH D) SiH_4 E) SiH_2

5) Which energy sublevel is being filled by the elements K to Ca? 5) _____
A) 3*d* B) 4*s* C) 4*f* D) 4*p* E) 4*d*

6) Predict the number of valence electrons for a Group VA/15 element. 6) _____
A) 8 B) 5 C) 15 D) 3 E) 2

7) Which element has the following electron configuration: [Ar] $4s^2\ 3d^5$? 7) _____
A) Br B) Mn C) Tc D) Cl E) Kr

8) Which of the following is the electron dot formula for an atom of fluorine? 8) _____

(a) F· (b) ·F· (c) ·F· (d) :F: (e) :F:

A) (a) B) (b) C) (c) D) (d) E) (e)

9) What is the predicted ionic charge for a Cl ion? 9) _____

A) 7+
B) 7–
C) 1+
D) 1–
E) none of the above

10) The compound Ag_2S is classified as which of the following? 10) _____

A) binary molecular
B) ternary ionic
C) ternary oxyacid
D) binary ionic
E) binary acid

11) The H_3O^+ ion is classified as which of the following? 11) _____

A) monoatomic anion
B) monoatomic cation
C) polyatomic cation
D) polyatomic anion
E) none of the above

12) What is the chemical formula for the binary compound composed of Al^{3+} and O^{2-} ions? 12) _____

A) Al_3O_2
B) AlO
C) Al_2O_3
D) Al_6O_6
E) none of the above

13) What is the ionic charge for the copper ion in Cu_2S? 13) _____

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

14) What is the Stock system name for Mn_3N_2? 14) _____

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

15) What is the Stock system name for $Fe_2(SO_4)_3$? 15) _____

A) iron(II) sulfate
B) ferrous sulfate
C) ferric sulfite
D) iron(III) sulfate
E) none of the above

16) What is the ionic charge for the cobalt ion in $Co_2(CO_3)_3$? 16) _____

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

17) What is the chemical formula for laughing gas, dinitrogen oxide? 17) _____

A) NO
B) N_2O_2
C) NO_2
D) N_2O
E) none of the above

18) What is the chemical formula for hydrochloric acid? 18) _____

A) HClO(*aq*)
B) HCl(*aq*)
C) $HClO_3$(*aq*)
D) $HClO_2$(*aq*)
E) none of the above

19) Which of the following is evidence for a chemical reaction? 19) _____

A) change in color
B) change in physical state
C) change in mass
D) all of the above
E) none of the above

20) Which of the following formulas represents an element in its natural state? 20) _____

A) P_2
B) N_2
C) C_2
D) B_2
E) none of the above

21) What is the coefficient of hydrogen gas after balancing the following equation? 21) _____

$$\_\_N_2(g) + \_\_H_2(g) \rightarrow \_\_NH_3(g)$$

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

22) What is the coefficient of silver metal after balancing the following equation? 22) _____

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

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

23) What type of chemical reaction is illustrated in the following example? 23) _____

$$H_2SO_4(aq) + NaOH(aq) \rightarrow Na_2SO_4(aq) + H_2O(l)$$

A) decomposition reaction
B) single–replacement reaction
C) double–replacement reaction
D) combination reaction
E) neutralization reaction

24) Which of the following metals reacts with aqueous $Al(NO_3)_3$? 24) _____

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

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

25) What are the products from the following single–replacement reaction? 25) _____

$$Zn(s) + CuSO_4(aq) \rightarrow$$

A) Cu and $ZnSO_3$
B) Cu and $ZnSO_4$
C) CuO and $ZnSO_4$
D) no reaction
E) CuO and $ZnSO_3$

26) Which of the following solid compounds is *insoluble* in water? 26) _____

A) $BaSO_4$
B) $(NH_4)_2CO_3$
C) K_2CrO_4
D) $Sr(OH)_2$
E) Na_2S

27) How many atoms of cobalt equal a mass of 58.93 g? (Refer to the Periodic Table.) 27) _____

A) 58.93
B) 6.02×10^{23}
C) 1
D) 59
E) 27

28) Which of the following is equal to 1.00 mole of substance? 28) _____

A) 6.02×10^{23} sodium iodide formula units, NaI
B) 6.02×10^{23} sodium atoms, Na
C) 6.02×10^{23} iodine molecules, I_2
D) all of the above
E) none of the above

29) What is the molar mass of aspirin, $C_9H_8O_4$? 29) _____

A) 29.02 g/mol
B) 252.25 g/mol
C) 180.17 g/mol
D) 244.17 g/mol
E) 116.08 g/mol

30) Which of the following gases occupies 22.4 L at STP? 30) _____

A) 1 mol of oxygen, O_2
B) 1 mol nitrogen, N_2
C) 1 mol hydrogen, H_2
D) all of the above
E) none of the above

31) How many propane molecules are in 22.4 liters of C_3H_8 gas at STP? 31) _____

A) 1.35×10^{25}
B) 2.69×10^{22}
C) 1.81×10^{24}
D) 6.02×10^{23}
E) 1.20×10^{24}

32) How many moles of carbon monoxide react with 1 mol of oxygen gas according to the balanced chemical equation? 32) _____

$$2\ CO(g) + O_2(g) \xrightarrow{\Delta} 2\ CO_2(g)$$

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

33) How many moles of water are produced from 1.00 mol of hydrogen peroxide? 33) _____

$$\_\_H_2O_2(l) \xrightarrow{\Delta} \_\_H_2O(l) + \_\_O_2(g)$$

A) 2.00 mol
B) 4.00 mol
C) 0.500 mol
D) 1.00 mol
E) none of the above

34) How many moles of oxygen gas react to yield 1.00 mol NO_2? 34) _____

$$\_\_NO(g) + \_\_O_2(g) \xrightarrow{UV} \_\_NO_2(g)$$

A) 1.00 mol
B) 0.500 mol
C) 2.00 mol
D) 0.250 mol
E) none of the above

35) How many moles of calcium metal react to yield 0.500 mol of hydrogen gas? 35) _____

$$\_\_Ca(s) + \_\_H_2O(l) \rightarrow \_\_Ca(OH)_2(aq) + \_\_H_2(g)$$

A) 0.500 mol
B) 1.00 mol
C) 2.00 mol
D) 0.250 mol
E) none of the above

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

36) How many hydrogen molecules are in 2.75 L of H_2 gas at STP? 36) _____

37) 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? 37) _____

38) 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? 38) _____

39) What is the mass of iron produced from 225 g of iron(III) oxide (159.70 g/mol)? 39) _____

$$\_\_Fe_2O_3(l) + \_\_CO(g) \xrightarrow{1500\ ^\circ C} \_\_Fe(l) + \_\_CO_2(g)$$

40) How many moles of water are produced from 0.100 mol pentane, C_5H_{12}? 40) _____

$$\_\_C_5H_{12}\,(g) + \_\_O_2(g) \xrightarrow{\text{spark}} \_\_CO_2(g) + \_\_H_2O(g)$$

41) 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? 41) _____

Answer Key
Testname: CHEM1305 EXAM II

1) A
2) D
3) A
4) D
5) B
6) B
7) B
8) D
9) D
10) D
11) C
12) C
13) C
14) A
15) D
16) D
17) D
18) B
19) A
20) B
21) D
22) D
23) E
24) A
25) B
26) A
27) B
28) D
29) C
30) D
31) D
32) C
33) D
34) B
35) A
36)
37)
38)
39)
40)
41)