

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<sub>4</sub>, NH<sub>3</sub>, and H<sub>2</sub>O, predict the formula for silane, Si?H?. 4) \_\_\_\_\_  
A) SiH<sub>3</sub>                      B) H<sub>2</sub>Si                      C) SiH                      D) SiH<sub>4</sub>                      E) SiH<sub>2</sub>
- 5) Which energy sublevel is being filled by the elements K to Ca? 5) \_\_\_\_\_  
A) 3d                      B) 4s                      C) 4f                      D) 4p                      E) 4d
- 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<sup>2</sup> 3d<sup>5</sup>? 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) •F̣ •                      (d) :F̣:                      (e) :F̣:  
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  $\text{Ag}_2\text{S}$  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  $\text{H}_3\text{O}^+$  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  $\text{Al}^{3+}$  and  $\text{O}^{2-}$  ions? 12) \_\_\_\_\_  
A)  $\text{Al}_3\text{O}_2$   
B)  $\text{AlO}$   
C)  $\text{Al}_2\text{O}_3$   
D)  $\text{Al}_6\text{O}_6$   
E) none of the above
- 13) What is the ionic charge for the copper ion in  $\text{Cu}_2\text{S}$ ? 13) \_\_\_\_\_  
A) 3+  
B) 2+  
C) 1+  
D) zero  
E) none of the above
- 14) What is the Stock system name for  $\text{Mn}_3\text{N}_2$ ? 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  $\text{Fe}_2(\text{SO}_4)_3$ ? 15) \_\_\_\_\_  
A) iron(II) sulfate  
B) ferrous sulfate  
C) ferric sulfite  
D) iron(III) sulfate  
E) none of the above

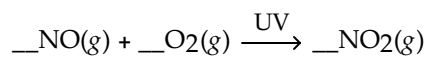
- 16) What is the ionic charge for the cobalt ion in  $\text{Co}_2(\text{CO}_3)_3$ ? 16) \_\_\_\_\_
- A) zero
  - B) 1+
  - C) 2+
  - D) 3+
  - E) none of the above
- 17) What is the chemical formula for laughing gas, dinitrogen oxide? 17) \_\_\_\_\_
- A) NO
  - B)  $\text{N}_2\text{O}_2$
  - C)  $\text{NO}_2$
  - D)  $\text{N}_2\text{O}$
  - E) none of the above
- 18) What is the chemical formula for hydrochloric acid? 18) \_\_\_\_\_
- A)  $\text{HClO}(aq)$
  - B)  $\text{HCl}(aq)$
  - C)  $\text{HClO}_3(aq)$
  - D)  $\text{HClO}_2(aq)$
  - 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)  $\text{P}_2$
  - B)  $\text{N}_2$
  - C)  $\text{C}_2$
  - D)  $\text{B}_2$
  - E) none of the above
- 21) What is the coefficient of hydrogen gas after balancing the following equation? 21) \_\_\_\_\_
- $\_\_\text{N}_2(g) + \_\_\text{H}_2(g) \rightarrow \_\_\text{NH}_3(g)$
- 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) \_\_\_\_\_
- $\_\_\text{Cu(s)} + \_\_\text{AgNO}_3(\text{aq}) \rightarrow \_\_\text{Cu(NO}_3)_2(\text{aq}) + \_\_\text{Ag(s)}$
- 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) \_\_\_\_\_
- $\text{H}_2\text{SO}_4(\text{aq}) + \text{NaOH}(\text{aq}) \rightarrow \text{Na}_2\text{SO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$
- 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  $\text{Al(NO}_3)_3$ ? 24) \_\_\_\_\_
- Partial Activity Series:  $\text{Mg} > \text{Al} > \text{Zn} > (\text{H}) > \text{Cu}$
- 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) \_\_\_\_\_
- $\text{Zn(s)} + \text{CuSO}_4(\text{aq}) \rightarrow$
- A) Cu and  $\text{ZnSO}_3$   
B) Cu and  $\text{ZnSO}_4$   
C) CuO and  $\text{ZnSO}_4$   
D) no reaction  
E) CuO and  $\text{ZnSO}_3$
- 26) Which of the following solid compounds is *insoluble* in water? 26) \_\_\_\_\_
- A)  $\text{BaSO}_4$   
B)  $(\text{NH}_4)_2\text{CO}_3$   
C)  $\text{K}_2\text{CrO}_4$   
D)  $\text{Sr(OH)}_2$   
E)  $\text{Na}_2\text{S}$
- 27) How many atoms of cobalt equal a mass of 58.93 g? (Refer to the Periodic Table.) 27) \_\_\_\_\_
- A) 58.93  
B)  $6.02 \times 10^{23}$   
C) 1  
D) 59  
E) 27

- 28) Which of the following is equal to 1.00 mole of substance? 28) \_\_\_\_\_
- A)  $6.02 \times 10^{23}$  sodium iodide formula units, NaI
  - B)  $6.02 \times 10^{23}$  sodium atoms, Na
  - C)  $6.02 \times 10^{23}$  iodine molecules, I<sub>2</sub>
  - D) all of the above
  - E) none of the above
- 29) What is the molar mass of aspirin, C<sub>9</sub>H<sub>8</sub>O<sub>4</sub>? 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<sub>2</sub>
  - B) 1 mol nitrogen, N<sub>2</sub>
  - C) 1 mol hydrogen, H<sub>2</sub>
  - D) all of the above
  - E) none of the above
- 31) How many propane molecules are in 22.4 liters of C<sub>3</sub>H<sub>8</sub> gas at STP? 31) \_\_\_\_\_
- A)  $1.35 \times 10^{25}$
  - B)  $2.69 \times 10^{22}$
  - C)  $1.81 \times 10^{24}$
  - D)  $6.02 \times 10^{23}$
  - E)  $1.20 \times 10^{24}$
- 32) How many moles of carbon monoxide react with 1 mol of oxygen gas according to the balanced chemical equation? 32) \_\_\_\_\_
- $$2 \text{CO(g)} + \text{O}_2\text{(g)} \xrightarrow{\Delta} 2 \text{CO}_2\text{(g)}$$
- 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) \_\_\_\_\_
- $$\text{H}_2\text{O}_2\text{(l)} \xrightarrow{\Delta} \text{H}_2\text{O(l)} + \text{O}_2\text{(g)}$$
- 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<sub>2</sub>?

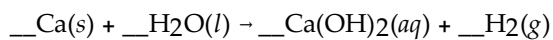
34) \_\_\_\_\_



- 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) \_\_\_\_\_



- 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<sub>2</sub> gas at STP?

36) \_\_\_\_\_

37) The formula for the illegal drug cocaine is C<sub>17</sub>H<sub>21</sub>NO<sub>4</sub> (303.39 g/mol). What is the percentage of carbon in the compound?

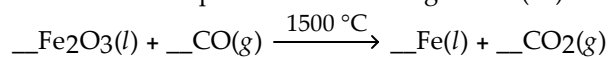
37) \_\_\_\_\_

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) \_\_\_\_\_

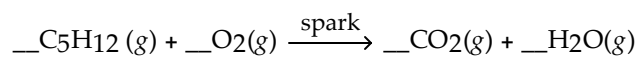
39) What is the mass of iron produced from 225 g of iron(III) oxide (159.70 g/mol)?

39) \_\_\_\_\_



40) How many moles of water are produced from 0.100 mol pentane, C<sub>5</sub>H<sub>12</sub>?

40) \_\_\_\_\_



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)