

Houston Community College System HCCS  
CHEM 1305 Final Exam, Chapters 1-12  
Spring Semester 2017

Time: 2

Student Name: \_\_\_\_\_ Student ID # \_\_\_\_\_

Instructor: Dr. Emad Akeer

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

**3 Points each**

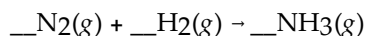
- 1) Which of the following is a branch of chemistry? 1) \_\_\_\_\_  
A) physical chemistry  
B) environmental chemistry  
C) analytical chemistry  
D) all of the above  
E) none of the above
- 2) According to the metric system, 1 L = \_\_\_\_\_ mL. 2) \_\_\_\_\_  
A)  $1 \times 10^6$   
B)  $1 \times 10^3$   
C)  $1 \times 10^2$   
D)  $1 \times 10^1$   
E) none of the above
- 3) If a 250 mL beaker weighs 95.4 g, what is the mass in kilograms? 3) \_\_\_\_\_  
A) 95,400 kg  
B) 0.954 kg  
C) 95.4 kg  
D) 0.0954 kg  
E) none of the above
- 4) Stainless steel is an alloy of iron, chromium, nickel, and manganese metals. If a 5.00g sample is 18.0% chromium, what is the mass of chromium in the sample? 4) \_\_\_\_\_  
A) 0.900 g      B) 0.0450 g      C) 0.450 g      D) 1.80 g      E) 0.0900 g
- 5) Which of the following can be separated into two or more pure substances using a physical method? 5) \_\_\_\_\_  
A) mixture  
B) compound  
C) element  
D) all of the above  
E) none of the above
- 6) Which of the following chemical elements corresponds to the symbol Au? 6) \_\_\_\_\_  
A) gold  
B) lead  
C) copper  
D) silver  
E) none of the above

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- 7) How many neutrons are in the nucleus of an atom of silver-107? 7) \_\_\_\_\_  
A) 47  
B) 107  
C) 154  
D) 60  
E) none of the above
- 8) Which element has the following electron configuration:  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10}$ ? 8) \_\_\_\_\_  
A) Kr  
B) Zn  
C) Ca  
D) Cd  
E) none of the above
- 9) Which of the following is a noble gas? 9) \_\_\_\_\_  
A) Au  
B) No  
C) Kr  
D) N  
E) none of the above
- 10) Given the chemical formulas  $CH_4$ ,  $NH_3$ , and  $H_2O$ , predict the formula for arsine,  $As?H?$ . 10) \_\_\_\_\_  
A)  $AsH_2$                   B)  $AsH_3$                   C)  $H_2As$                   D)  $AsH_4$                   E)  $AsH$
- 11) Which of the following groups has a predictable ionic charge of one positive? 11) \_\_\_\_\_  
A) Group IB/11  
B) Group VIIIA/18  
C) Group VIIA/17  
D) Group IA/1  
E) Group IIIA/13
- 12) What is the Stock system name for  $Cu^+$ ? 12) \_\_\_\_\_  
A) copper(I) ion  
B) copper(II) ion  
C) cuprous ion  
D) cupric ion  
E) none of the above
- 13) What is the ionic charge for the cobalt ion in  $Co_3N_2$ ? 13) \_\_\_\_\_  
A) 3+  
B) zero  
C) 2+  
D) 1+  
E) none of the above

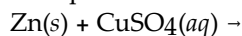
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14) What is the coefficient of ammonia gas after balancing the following equation? 14) \_\_\_\_\_



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

15) What are the products from the following single-replacement reaction? 15) \_\_\_\_\_



- A) Cu and ZnSO<sub>4</sub>
- B) CuO and ZnSO<sub>3</sub>
- C) no reaction
- D) CuO and ZnSO<sub>4</sub>
- E) Cu and ZnSO<sub>3</sub>

16) What is the molar mass of caffeine, C<sub>4</sub>H<sub>5</sub>N<sub>2</sub>O? 16) \_\_\_\_\_

- A) 97.11 g/mol
- B) 43.03 g/mol
- C) 113.11 g/mol
- D) 116.17 g/mol
- E) 102.16 g/mol

17) Which of the following decreases the pressure of a gas? 17) \_\_\_\_\_

- A) increasing the temperature
- B) increasing the volume
- C) increasing the number of gas molecules
- D) all of the above
- E) none of the above

18) Consider the following liquids with similar molar masses. Predict which liquid has the weakest intermolecular attraction based on surface tension data. 18) \_\_\_\_\_

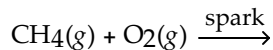
- A) ethyl formate (surface tension @ 20 °C = 24 dynes/cm)
- B) butyl alcohol (surface tension @ 20 °C = 25 dynes/cm)
- C) propyl chloride (surface tension @ 20 °C = 18 dynes/cm)
- D) ethyl ether (surface tension @ 20 °C = 17 dynes/cm)
- E) propionic acid (surface tension @ 20 °C = 27 dynes/cm)

19) Which of the following explains why ice floats on water? 19) \_\_\_\_\_

- A) Ice has a greater molar mass than water.
- B) Ice has a greater density than water.
- C) Ice has a greater specific heat than water.
- D) Ice has a greater volume than an equal mass of water.
- E) Ice has a greater heat of fusion than water.

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20) Complete the following chemical reaction and indicate the products. 20) \_\_\_\_\_



- A) CO + H<sub>2</sub>
- B) CO<sub>2</sub> + H<sub>2</sub>O
- C) C + H<sub>2</sub>O
- D) CO<sub>2</sub> + H<sub>2</sub>
- E) CO + H<sub>2</sub>O

21) Predict which of the following has an ionic bond. 21) \_\_\_\_\_

- A) SnO
- B) CaO
- C) FeO
- D) all of the above
- E) none of the above

22) What is the total number of valence electrons in one molecule of H<sub>2</sub>O<sub>2</sub>? 22) \_\_\_\_\_

- A) 14
- B) 2
- C) 18
- D) 8
- E) none of the above

23) Draw the electron dot formula for hydrogen chloride, HCl. How many nonbonding electron pairs are in a hydrogen chloride molecule? 23) \_\_\_\_\_

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

24) Given the electronegativity values of C (2.5) and O (3.5), illustrate the bond polarity in a carbon monoxide molecule, CO, using delta notation. 24) \_\_\_\_\_

- A) (δ+) C–O (δ-)
- B) (δ-) C–O (δ-)
- C) (δ+) C–O (δ+)
- D) (δ-) C–O (δ+)
- E) none of the above

25) What is the molecular shape of a water molecule, H<sub>2</sub>O? 25) \_\_\_\_\_

- A) trigonal pyramidal
- B) bent
- C) linear
- D) tetrahedral
- E) none of the above

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**You must show your calculations and units clearly for credit or partial credit.**

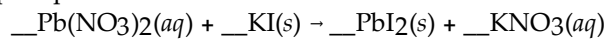
**5 Points Each**

- 26) If 0.587 g of nickel metal reacts with 1.065 g of chlorine gas, what is the empirical formula of the nickel chloride product? 26) \_\_\_\_\_
- A)  $\text{NiCl}_2$       B)  $\text{NiCl}$       C)  $\text{Ni}_3\text{Cl}_2$       D)  $\text{Ni}_2\text{Cl}_3$       E)  $\text{NiCl}_3$

- 27) 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? 27) \_\_\_\_\_
- A)  $\text{CHO}$       B)  $\text{C}_6\text{HO}_8$       C)  $\text{C}_3\text{H}_6\text{O}_3$       D)  $\text{CHO}_2$       E)  $\text{CH}_2\text{O}$

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28) What is the mass of potassium iodide (166.00 g/mol) that yields 0.500 g of lead(II) iodide (461.0 g/mol) precipitate? 28) \_\_\_\_\_



- A) 0.180 g      B) 0.0900 g      C) 0.694 g      D) 2.78 g      E) 0.360 g

29) A sample of ammonia gas occupies 20.0 mL at 585 torr and 20.0 °C. If the volume of the gas is 50.0 mL at 50.0 °C, what is the pressure? 29) \_\_\_\_\_

- A) 258 torr      B) 1330 torr      C) 212 torr      D) 585 torr      E) 1610 torr

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- 30) How many moles of methane occupy a volume of 2.00 L at 50.0 °C and 0.500 atm? ( $R = 0.0821 \text{ atm} \cdot \text{L/mol} \cdot \text{K}$ ) 30) \_\_\_\_\_
- A) 4.11 mol
  - B) 0.244 mol
  - C) 26.5 mol
  - D) 0.0377 mol
  - E) 0.151 mol

## Answer Key

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