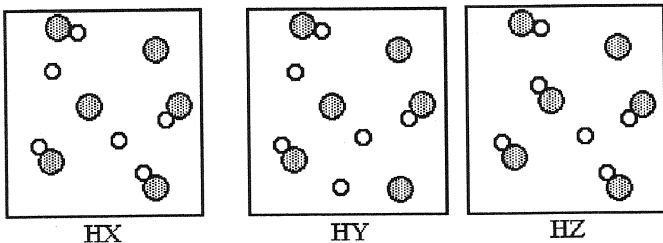


MULTIPLE CHOICE. Answer each of the following questions by filling in the bubble of the corresponding answer on the scantron sheet. There is only one correct answer for each question. Answers on the scantron sheet are considered final. Use pencil only. (2 marks each)

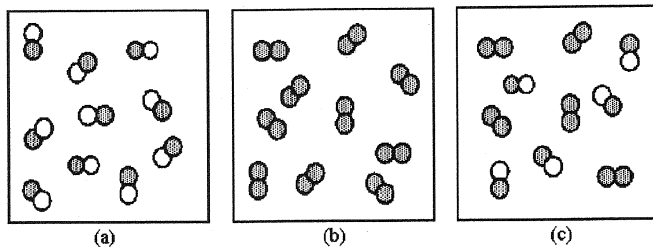
1) How many sodium ions are contained in 99.6 mg of Na_2SO_3 ? The molar mass of Na_2SO_3 is 126.05 g/mol.

- A) 9.52×10^{20} sodium ions
- B) 2.10×10^{21} sodium ions
- C) 1.05×10^{21} sodium ions
- D) 1.52×10^{27} sodium ions
- E) 4.76×10^{20} sodium ions

2) The following pictures represent aqueous solutions of three acids HA (A = X, Y, or Z), with water molecules omitted for clarity. Unshaded spheres represent hydrogen atoms or ions and gray spheres represent A atoms or ions. Which of the three is the strongest acid, and which is the weakest?



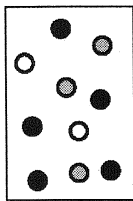
- A) HZ is the strongest acid and HY is the weakest acid.
- B) HY is the strongest acid and HZ is the weakest acid.
- C) HX is the strongest acid and HY is the weakest acid.
- D) HY is the strongest acid and HX is the weakest acid.



3) Which of the above drawings represents a pure compound?

- A) drawing (a) only
- B) drawing (b) only
- C) drawing (c) only
- D) drawings (a) and (b)

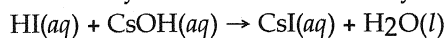
In the diagram below, helium atoms are represented by unshaded spheres, neon atoms by gray spheres, and argon atoms by black spheres.



4) If the total pressure in the container is 900 mm Hg, what is the partial pressure of argon?

- A) 450 mm Hg
- B) 180 mm Hg
- C) 90 mm Hg
- D) 270 mm Hg

5) How many milliliters of 0.550 M hydriodic acid are needed to react with 20.00 mL of 0.217 M CsOH?



- A) 0.127 mL
- B) 7.89 mL
- C) 0.0197 mL
- D) 50.7 mL

6) Which of the following represent isotopes?

- A: $\begin{smallmatrix} 25 \\ 21 \end{smallmatrix} []$ B: $\begin{smallmatrix} 21 \\ 25 \end{smallmatrix} []$ C: $\begin{smallmatrix} 27 \\ 21 \end{smallmatrix} []$ D: $\begin{smallmatrix} 25 \\ 23 \end{smallmatrix} []$

- A) A and B
- B) C and D
- C) A and D
- D) A and C

7) The volume of 350. mL of gas at 25°C is decreased to 145 mL at constant pressure. What is the final temperature of the gas?

- A) 446°C
- B) 10°C
- C) -150°C
- D) 60°C

8) The true volume of a particular real gas is larger than that calculated from the ideal gas equation. This occurs because the ideal gas equation does NOT correct for:

- A) The mass of the molecules or atoms.
- B) The attraction between the molecules or atoms.
- C) The velocity of the molecules or atoms.
- D) The volume of the molecules or atoms.
- E) The shape of the molecules or atoms.

- 9) Which one of the following statements is **not consistent** with the kinetic-molecular theory of gases?
- A) There is no net gain or loss of the total kinetic (translational) energy in collisions between gas molecules.
 - B) The theory explains most of the observed behavior of gases at ordinary temperatures and pressures.
 - C) The average kinetic energies of different gases are different at the same temperature.
 - D) The actual volume of the gas molecules themselves is very small compared to the volume occupied by the gas at ordinary temperatures and pressures.
 - E) Individual gas molecules are relatively far apart.

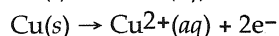
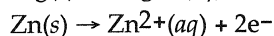
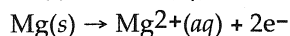
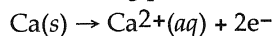
10) When $\text{K}_2\text{SO}_4(aq)$ and $\text{Pb}(\text{NO}_3)_2(aq)$ are mixed, a white colored precipitate forms which is

- A) PbSO_4 .
- B) KNO_3 .
- C) Pb .
- D) K_2SO_3 .

11) Li_2S is named

- A) lithium disulfide.
- B) lithium(II) sulfide.
- C) lithium sulfur.
- D) lithium sulfide.

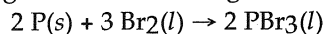
12) Using the following portion of the activity series for oxidation half reactions



determine which reaction will **not** occur.

- A) $\text{Zn}(s)$ with $\text{Cu}^{2+}(aq)$
- B) $\text{Ca}(s)$ with $\text{Cu}^{2+}(aq)$
- C) $\text{Zn}(s)$ with $\text{Mg}^{2+}(aq)$
- D) $\text{Ca}(s)$ with $\text{Zn}^{2+}(aq)$

13) Which species functions as the reducing agent in the following reduction-oxidation reaction?



- A) $\text{Br}_2(l)$
- B) $\text{Br}^-(aq)$
- C) $\text{P}^{3+}(aq)$
- D) $\text{P}(s)$

14) The reaction $\text{Pb}(\text{NO}_3)_2(aq) + \text{K}_2\text{SO}_4(aq) \rightarrow \text{PbSO}_4(s) + 2 \text{KNO}_3(aq)$ is best classified as a(n)

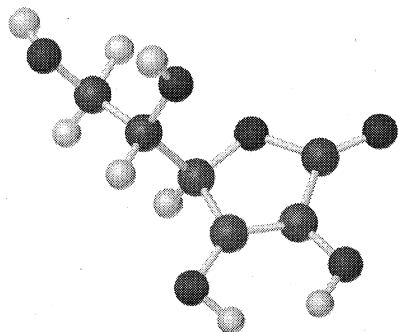
- A) oxidation-reduction reaction.
- B) acid-base neutralization reaction.
- C) precipitation reaction.
- D) single displacement reaction.

15) How many significant figures are there in the answer for the following problem?

$$\frac{[(176.7 - 154) \times 5.09]}{0.900} = ?$$

- A) one
- B) two
- C) three
- D) four

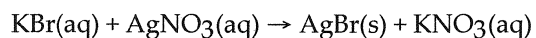
16) Ascorbic acid, $C_6H_8O_6$, can be represented by the molecular model shown below. If 1.00 mol of ascorbic acid is submitted to combustion analysis, how many moles of CO_2 and how many moles of H_2O would be formed? In the diagram, carbon atoms are grey, hydrogen atoms are white, and oxygen atoms are black.



Ascorbic acid

- A) 6.00 mol CO_2 and 4.00 mol H_2O
- B) 12.0 mol CO_2 and 10.0 mol H_2O
- C) 3.00 mol CO_2 and 2.00 mol H_2O
- D) 6.00 mol CO_2 and 8.00 mol H_2O

17) Identify the spectator ions in the following molecular equation.

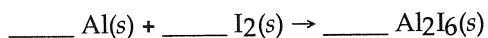


- A) K^+ and NO_3^-
- B) Ag^+ and NO_3^-
- C) Ag^+ and Br^-
- D) K^+ and Br^-
- E) There are no spectator ions in this reaction.

18) How many mL of a 0.175 M $FeCl_3$ solution are needed to make 250. mL of a solution that is 0.300 M in Cl^- ion?

- A) 429 mL
- B) 0.429 mL
- C) 143 mL
- D) It is not possible to make a more concentrated solution from a less concentrated solution.

19) Balance the chemical equation given below, and determine the number of moles of iodine that reacts with 20.0 g of aluminum.



- A) 1.48 mol
- B) 2.22 mol
- C) 0.494 mol
- D) 1.11 mol

20) If CO_2 and NH_3 are allowed to effuse through a porous membrane under identical conditions, the rate of effusion for NH_3 will be _____ times that of CO_2 .

- A) 0.39
- B) 2.6
- C) 1.6
- D) 0.62

21) What group of elements does the shaded area in the following periodic table indicate?

The diagram shows a periodic table with a shaded region. The shaded area covers the elements from Boron (B) to Argon (Ar), specifically the groups 13, 14, 15, 16, 17, and 18 in periods 2 and 3.

- A) gases
- B) metals
- C) nonmetals
- D) semimetals

22) A 45.0-L steel tank at 20.0°C contains acetylene gas, C_2H_2 , at a pressure of 1.39 atm. Assuming ideal behavior, how many grams of acetylene are in the tank?

- A) 67.7 g
- B) 10.0 g
- C) 990 g
- D) 2.60 g

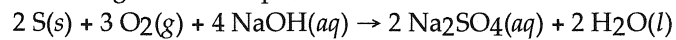
23) Water is an example of

- A) a homogeneous mixture.
- B) an element.
- C) a compound.
- D) a heterogeneous mixture.

24) KH_2PO_4 is

- A) potassium diphosphate.
- B) hypopotassium phosphate.
- C) potassium hydrogen(II) phosphate.
- D) potassium dihydrogen phosphate.

25) Which substance is the limiting reactant when 2.0 g of sulfur reacts with 3.0 g of oxygen and 4.0 g of sodium hydroxide according to the following chemical equation:



- A) $\text{S}(s)$
- B) $\text{NaOH}(aq)$
- C) $\text{O}_2(g)$
- D) None of these substances is the limiting reactant.

Answer Key

Testname: CHY-103 MID 1 F2013

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