# Quiz #0 (Review)

## Summary:

The purpose of this quiz is to get you reacquainted with previous chemistry material you should have been exposed to previously. You may not remember it and/or it may have never been covered in your previous chemistry classes. That is okay but we will be building on these topics so use this an opportunity to catch up. Use any resources you want (search engine, YouTube, tutor, etc.) and even work together using the Discord or other means but make sure you understand it because it will help during the semester. Keep the notes and links that you used to complete this for future use. For time reference, this is mostly an old Introductory Chemistry final that students completed in-class in 2.5-3 hours.

## Instructions:

1. Quiz consists of two parts.
    1. Part 1: 2 write-out/draw questions
    2. Part 2 : 65 multiple choice questions that you will answer on Canvas. (you need to show work or write an explanation (see below)
2. Complete Quiz #0 questions on a printed version of this quiz or your own sheets of paper. You must show your work neatly in pen and the answers must be boxed in a different colored pen or highlighted. If you don't think the problem needs any work, you must write 1-3 sentences of why you think it is the correct answer.
3. After you have completed the Quiz #0 you will input your multiple choice answers on a Canvas quiz and upload all of your work on Canvas as one document.
4. This will be due ~1 week after class starts. You can earn 20% extra credit on the quiz if you submit this by the first day of class.

1) Complete the information below for $H_2S$.

   Draw the Lewis Structure:

   _____

   Electron group geometry:                    Molecular geometry:

   Is the molecule polar or nonpolar? (circle one)      polar            nonpolar

2) Complete the information below for $CO_3^{2-}$.

Draw the Lewis Structure:

   Electron group geometry:                    Molecular geometry:

   Is the molecule polar or nonpolar? (circle one)      polar            nonpolar

MULTIPLE CHOICE.  Choose the one alternative that best completes the statement or answers the question. Remember, you must show your work and if you think it doesn't require work, you must write 1-3 sentences explaining why you chose that answer.

1) Which of the following represents the electron configuration of a *selenium ion* in its common oxidation state?

   A) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^2\,3d^{10}$

   B) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^2\,3d^{10}\,4p^4$

   C) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^2\,3d^{10}\,4p^2$

   D) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^2\,3d^{10}\,4p^6$

   E) $1s^2\,2s^2\,2p^6\,3s^2\,3p^6\,4s^2\,3d^{10}\,4p^5$

2) The correct prefix for the multiplier 1,000,000,000 is:
   A) tera.
   B) mega.
   C) giga.
   D) milli.
   E) none of the above

3) Which element has the *largest* atomic radius?

   A)  B               B) Cs               C) I               D) S               E)  Ba

4) How many unpaired electrons are in a Ru atom?
   A) 3               B) 6               C) 2               D) 4               E) 8

5) If a 128 mg sample undergoes 6 successive half-lives, how much sample will be left?

   A) 4.0 mg          B) 2.0 mg          C) 16.0 mg          D) 1.0 mg          E) 32.0 mg

6) The pH of a solution is 5.46. Determine the $[H_3O^+]$ for the solution.

   A)  $1.9 \times 10^{-5}$          B) $1.1 \times 10^{-6}$          C) $3.5 \times 10^{-6}$          D) $5.6 \times 10^{-4}$

7) What volume of 8.25 M HCl solution must be diluted to prepare 2.40 L of 0.500 M HCl solution?

   A) 438 mL          B) 0.256 L          C) 39.6 L          D) 145 mL

8) In which pair does the symbol *not* match the name of the element?
   A)  Iron - Fe          B) Arsenic - Ar          C) Lead - Pb          D) Strontium - Sr          E) Nitrogen - N
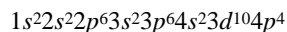
9) What is the formula for triiodine pentoxide?
   A) $I_3O_4$          B) $I_5O_3$          C) $I_3O_5$          D) $I_2O_5$          E) $I_2O_4$
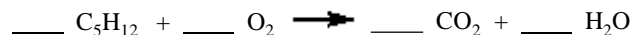
10) What is the formula for chlorous acid?

    A) $HCl(aq)$      B) $HClO(aq)$      C) $HClO_2(aq)$      D) $HClO_3(aq)$      E) $HClO_4(aq)$

11) The electron configuration shown below is for the element _____.
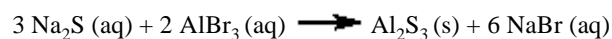
$$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$$

    A) Ga      B) Se      C) Te      D) As      E) Br

12) When the following reaction is balanced the coefficient in front of carbon dioxide is:

$$\underline{\quad}\ C_5H_{12}\ +\ \underline{\quad}\ O_2\ \longrightarrow\ \underline{\quad}\ CO_2\ +\ \underline{\quad}\ H_2O$$

    A) 10      B) 5      C) 8      D) 6      E) 7

13) Calculate the volume in mL of a 1.22 M $Na_2S$ solution needed to react with 2.75 g of $AlBr_3$ in the following equation:

$$3\ Na_2S\ (aq) + 2\ AlBr_3\ (aq)\ \longrightarrow\ Al_2S_3\ (s) + 6\ NaBr\ (aq)$$

    A) 8.45 mL      B) 0.0127 mL      C) 12.7 mL      D) 0.0254 mL

14) When $KNO_3$ is dissolved in water, what type of solution results?

    A) basic      B) acidic      C) depends      D) neutral

15) Which element has the electron configuration $[Kr]\ 4d^{10}5s^2 5p^2$?

    A) Ge      B) Pb      C) Sn      D) Sb      E) Zr

16) What is the name for $H_2C_2O_4(aq)$?

    A) hydrogen carbonic acid
    B) oxalous acid
    C) hydrogen oxalic acid
    D) carbonic acid
    E) oxalic acid

17) A theory is _____.

    A) a hypothesis which is yet to be tested and validated

    B) a law that is yet to be tested and validated

    C) a hypothesis that has been tested and validated over a long period of time

    D) a law that has been "approved" by at least 3 international scientific organizations

18) What is the name for FrIO?

    A) francium iodate
    B) francium hypoiodite C)
    francium hypoiodate D)
    francium(II) iodite
    E) francium(I) hypoiodite

19) Atoms are neutral because _____.

    A) the atomic number equals the number of electrons

    B) equal numbers of protons and neutrons are present

    C) neutrons neutralize the (+) and (−) charges in the atom

    D) all atoms contain neutrons

20) Which of the following kinds of intermolecular forces is found in all molecules?

    A) hydrogen bonding                                B) dipole-dipole interactions

    C) London forces                                    D) Chicago forces

21) Which of the following subtances cannot form hydrogen bonds?

    A) $NH_3$                      B) HF                        C) $CH_3NH_2$                 D) HCl

22) Which of the following ions would not possess an "octet of electrons?"

    A) $Ti^{4+}$                B) $Be^{2+}$               C) $P^{2-}$               D) $S^{2-}$               E) $K^+$

23) How many microliters are in 41.0 mL?

    A) $4.1 \times 10^{10}$

    B) $4.10 \times 10^4$

    C) 0.041

    D) $4.1 \times 10^3$

    E) none of the above

24) Isotopes of a given element _____.

    A) have the same mass number but different numbers of protons

    B) have the same mass number but different chemical properties

    C) have the same atomic number but different chemical properties

    D) have the same number of protons, but different mass numbers

25) What mass of water is needed to prepare 148 grams of 12.0% (m/m) $KHCO_3$ solution?

    A) 130 g                    B) 17.8 g                   C) 9.65 g                   D) 125 g

26) The elements in groups IA, VIIA and VIIIA are called, respectively:

    A) alkaline earth metals, halogens, chalcogens            B) alkaline earth metals, transition metals, halogens

    C) alkali metals, chalcogens, halogens                     D) alkali metals, halogens, noble gases

27) A sample is determined to contain 70.00% C, 3.36% H, and 26.64% O with a molar mass around 240 g/mol. Determine the molecular formula of this compound.

    A) $C_{14}H_{10}O_4$            B) $C_{16}H_{20}O_2$           C) $C_{14}H_8O_4$           D) $C_7H_4O_2$           E) $C_5H_3O_2$

28) The number of electrons and neutrons in an atom of the type given below is _____.

$$^{25}Mg$$

   A) 25 e, 12 n          B) 12 e, 25 n          C) 12 e, 12 n          D) 12 e, 13 n          E) 13 e, 25 n

29) Determine the answer to the following equation with correct number of significant figures: (4.123 x 0.12) + 24.2 = _____

   A) 24.695
   B) 25
   C) 24.70
   D) 24.7
   E) none of the above

30) Which molecule is *not* a polar molecule?

   A) HCN                B) $NH_3$                C) $CHCl_3$            D) $BCl_3$

31) What is the atomic mass of X if 19.9% of all X atoms have a mass of 10.01 amu and 80.1% have a mass of 11.01 amu?

   A) 10.50 amu          B) 10.81 amu          C) 10.21 amu          D) 10.63 amu

32) If a solution contains 6.8 ppm (m/v) of a solute, how many grams of that solute would be present in a 25 mL sample of the solution?

   A) 0.0017 g          B) $1.7 \times 10^{-5}$ g          C) 170 g          D) $1.7 \times 10^{-4}$ g

33) What is the formula for iron(III) thiosulfate?

   A) $Fe_3S_2O_2$       B) $FeS_2O_3$       C) $Fe_2(S_2O_3)_3$       D) $Fe(S_3O_2)_2$       E) $FeS_3O_2$

34) How many atoms of H are present in 27.6 g of $NH_3$?

   A) $2.93 \times 10^{24}$        B) $3.55 \times 10^{26}$        C) $9.79 \times 10^{24}$        D) $3.67 \times 10^{23}$

35) Calculate the percentage composition of oxygen in $Ca(C_2H_3O_2)_2$.

   A) 46.39%          B) 40.46%          C) 29.74%          D) 18.51%

36) How many moles of $CO_2$ will be produced from the complete combustion of 0.956 moles of $C_7H_{16}$ in the reaction below?

$$C_7H_{16} + 11\ O_2 \longrightarrow 7\ CO_2 + 8\ H_2O$$
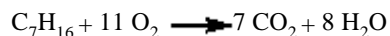
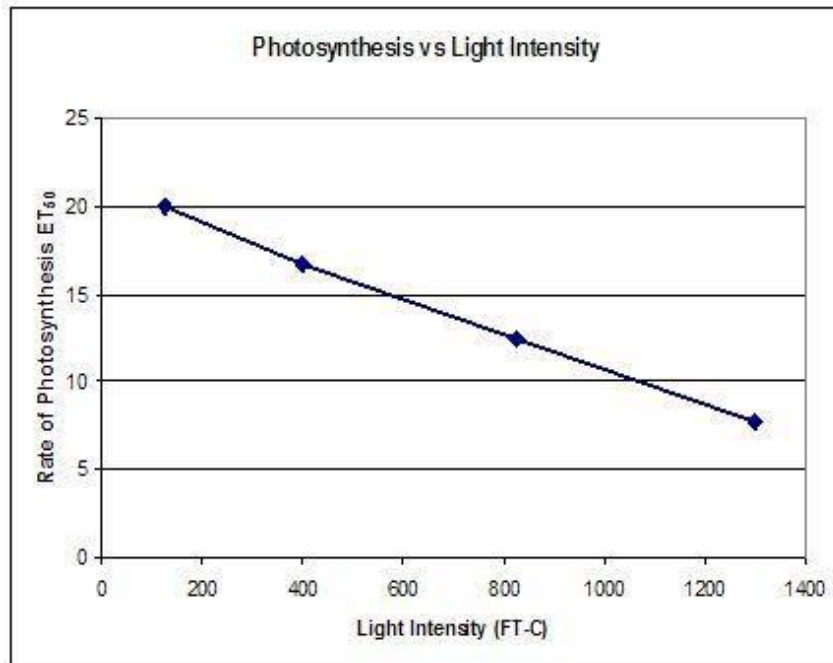   A) 3.50 moles     B) 0.667 mole     C) 1.85 moles     D) 0.956 mole     E) 6.69 moles

37) What is the name for $P_4O_9$?

   A) tetraphosphorous nonoxide
   B) pentaphosphorous nonoxide
   C) triphosphorous heptoxide
   D) tetraphosphorous heptoxide
   E) pentaphosphorous decoxide

38) When $Mg(ClO_4)_2$ is dissolved in water, what type of solution results?

    A) neutral                 B) depends                 C) basic                 D) acidic

39) What is the molarity of KCl in sea water if sea water is 12.5% (m/m) and the density of sea water is 1.06 g/mL?

    A) 17.1 M                 B) 2.69 M                 C) 0.854 M                 D) 1.78 M

40) 10.0 g of nitrogen reacts with 10.0 g of hydrogen to form ammonia. How many grams of ammonia are produced?

    A) 24.3 g          B) 68.4 g          C) 6.08 g          D) 56.2 g          E) 12.2 g

41) In a solution with a pH of 9.64 the molar concentration of the hydrogen ion would be _____.

    A) $2.3 \times 10^{-10}$          B) $2.3 \times 10^{-11}$          C) $5.6 \times 10^{-10}$          D) $1.4 \times 10^{-9}$

42) Which of the following is not a chemical change?

    A) burning a candle          B) frying an egg          C) slicing a ham          D) rusting of iron

43) The wavelength of blue light is 0.00000045 m. Express this wavelength in scientific notation.

    A) $4.5 \times 10^{-7}$          B) $4.5 \times 10^{7}$          C) $4.5 \times 10^{-6}$          D) $4.5 \times 10^{6}$          E) $0.45 \times 10^{-7}$

44) The Bronsted-Lowry acid and base for the reaction $NH_4^+ + CN^- \rightarrow NH_3 + HCN$ are, respectively, _____.

    A) $NH_3$ and $CN^-$          B) $CN^-$ and HCN          C) $NH4^+$ and $CN^-$          D) $NH4^+$ and HCN

45) An object weighing 1.840 kg has a volume of 0.0015 $m^3$. What is the density of the object in g/$cm^3$?

    A) 0.82
    B) 0.0028
    C) 0.0012
    D) 1.2
    E) none of the above

_____46. The following graph illustrates what type of relationship?

      a. Direct       b. Exponential       c. Asymptotic       d. Inverse

**Photosynthesis vs Light Intensity**

y-axis: Rate of Photosynthesis $ET_{60}$ (0, 5, 10, 15, 20, 25)

x-axis: Light Intensity (FT-C) (0, 200, 400, 600, 800, 1000, 1200, 1400)

_____47. Calculate the approximate slope of the line in the same
graph above. a. -0.01       b. 0.01       c. -100
d. 100

_____48. Using PV = mRT/W, rearrange the formula to solve for W:

      a. W = PV/RT       b. W = mRTPV       c. W = mRT/PV       d. none of these is correct

_____49. If x + y = 5 and 3x + 2y = 12, then what are the values of x and y?

      a. x=3, y=2       b. x=1, y=4       c. x=4, y=1       d. x=2, y=3

_____50. If a 207.0 gram solution of salt water is 15.0%-weight salt, how many grams of salt are in the solution?

      a. 13.8 g       b. 15.0 g       c. 31.1 g       d. 192 g

_____51. Express 0.00098760 meters in scientific (exponential) notation with the correct number of significant
figures in the answer:

      a. $9.8760 \times 10^4$    b. $9.876 \times 10^{-4}$    c. $9.876 \times 10^4$    d. $9.8760 \times 10^{-4}$

_____52. Using the conversion factors 1 kg = $10^3$ g and 1 g = $10^3$ mg, convert a mass of 1.15 kg to mg.

      a. $1.15 \times 10^{-6}$ mg       b. $1.15 \times 10^6$ mg       c. 1.15 mg       d. not enough information

_____53. If the human body's normal temperature is 98.6°F, what is it in °Celsius? (°F = 1.8°C + 32.0)

      a. 209       b. 37.0       c. 22.8       d. 98.6

_____54. A sample of aluminum has a density of 2.70 g/mL and a volume of 12.6 mL. What is the mass of this sample?

      a. 4.67       b. 0.214       c. 2.70       d. 34.0 g

_____55. Give the proper chemical name for $Na_2CO_3$:

      a. sodium carbon trioxide    b. sodium carbonic acid    c. sodium carbonate    d. disodium monocarbon
trioxide

_____56. Give the proper chemical formula for lead (IV) oxide:
a. $Ld_4O$      b. $LdO_2$      c. $Pb_4O$      d. $PbO_2$

_____57. Which of the following is equal to a microliter?
a. $10^{-3}$ liter      b. $10^3$ liter      c. $10^{-9}$ liter      d. $10^{-6}$ liter

_____58. What is the proper metric unit for length?
a. meter      b. mile      c. liter      d. light-year

_____59. Give the proper chemical name for $PCl_5$.
a. phosphorus(V) chloride      b. potassium chloride      c. phosphorus pentachloride      d. potassium heptachloride

_____60. What is the complete ground state electron configuration (spdf) of an atom of carbon?
a. $1s^2 2s^2 2p^2$      b $[He]2s^2 2p^2$      c. $1s^2 2p^4$      d. not enough information

_____61. Calculate the molar mass of $Mg_3N_2$.
a. 101.1 g/mol      b. 157.2 g/mol      c. 192 g/mol      d. 38.3 g/mol

_____62. What is the value of Avogadro's Number?
a. $2.06 \times 10^{22}$      b. $6.02 \times 10^{22}$      c. $6.02 \times 10^{23}$      d. $2.30 \times 10^{26}$

_____63. According to the balanced chemical equation given below, how many grams of oxygen are needed to react with 4.00 grams of sulfur dioxide?

$$2\ SO_{2(g)} + O_{2(g)} \rightarrow 2\ SO_{3(g)}$$

a. 2.00 g      b. 1.00 g      c. 4.00 g      d. not enough information

_____64. To make 1.0 L of a 4.00 M solution of NaOH, how many grams of sodium hydroxide are needed?
a. 4.0 g      b. 20. g      c. 160 g      d. not enough information

_____65. Which one of the following pieces of lab equipment is a crucible?

a      b.      c.      d.