1061-1st Chem Exam- 1061025(A)

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

1) The content of a container filled with sand and water would best be described as:
   A) a heterogeneous mixture
   B) elements
   C) a solution
   D) a homogeneous mixture
   E) a compound

   Answer: A

2) For which of the following can the composition vary?
   1. element
   2. compound
   3. pure substance
   4. heterogeneous mixture
   5. homogeneous mixture

   A) 1, 2   B) 4, 5   C) 1, 2, 3   D) 1, 5   E) 2, 4, 5

   Answer: B

3) Which of the following is an illustration of the law of constant composition?
   A) Water is 11% hydrogen and 89% oxygen by mass.
   B) Water can be separated into other substances by a chemical process.
   C) Water boils at 100 °C at 1 atm pressure.
   D) Water and salt have different boiling points.

   Answer: A

4) Which of the following processes represent a chemical change?
   A) distillation of a ethanol
   B) evaporating water
   C) squeezing the juice from grapes
   D) melting ice
   E) souring of milk

   Answer: E

5) Which one of the following is an extensive property?
   A) boiling point
   B) temperature
   C) melting point
   D) density
   E) mass

   Answer: E

6) Of the following, _____ is the largest mass.
   A) 2.5×10^9 fg
   B) 25 kg
   C) 2.5×10^{15} pg
   D) 2.5×10^{-2} mg
   E) 2.5×10^{10} ng

   Answer: B

7) What is the name of the unit that equals 1×10^{-6} meter?
   A) micrometer   B) megameter   C) millimeter   D) nanometer   E) kilometer

   Answer: A

8) How many liters are there in a cubic centimeter?
   A) 10^{-6} B) 10^9 C) 10^{-3} D) 10^6 E) 10^3
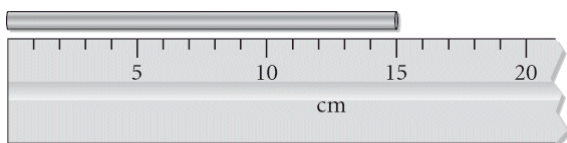
   Answer: C

9) The precision of a data set is considered to be poor, if
   A) the data are a set of closely spaced numbers.   B) the accuracy is high.
   C) the accuracy is low.   D) the data vary widely from the average value.

   Answer: D

10) Which of the following measurements would not be considered exact?
    A) 8 students
    B) 1 cm = 10 mm
    C) 9 chairs
    D) 15 hours
    E) 6 apples

    Answer: D

11) Read the length of the metal bar with the correct number of significant figures.

    A) 15.000 cm   B) 15.00 cm   C) 20 cm   D) 15 cm   E) 15.0 cm

    Answer: E

12) Perform the following calculation and express the result with the appropriate number of significant figures:
    $(1.302 + 953.2)/(2.0) = ?$
    A) 477   B) 477.25   C) 477.3   D) 4.8×10^2 E) 4.80×10^2

    Answer: D

13) A wooden object has a mass of 10.782 g and occupies a volume of 13.72 mL. What is the density of the object determined to an appropriate number of significant figures?
    A) 8×10^{-1} g/mL
    B) 7.9×10^{-1} g/mL
    C) 7.86×10^{-1} g/mL
    D) 7.859×10^{-1} g/mL
    E) 7.8586×10^{-1} g/mL

    Answer: D

14) The gold foil experiment performed in Rutherford's lab _____.
    A) led to the discovery of the atomic nucleus
    B) was the basis for Thomson's model of the atom
    C) utilized the deflection of beta particles by gold foil
    D) proved the law of multiple proportions
    E) confirmed the plum-pudding model of the atom

    Answer: A

15) Which one of the following basic forces is so small that it has no chemical significance?
   A) weak nuclear force   B) strong nuclear force
   C) gravitational force   D) electromagnetic force

   Answer: C

16) Of the following, the smallest and lightest subatomic particle is the _____.
   A) nucleus
   B) neutron
   C) alpha particle
   D) proton
   E) electron

   Answer: E

17) Given atomic weight: P = 30.973761 and O = 15.9994. Calculate the molecular mass of one P_2O_5 molecule
   with the appropriate number of significant figures:
   A) 141.94 amu
   B) 46.3732 μg
   C) 141.9446 amu
   D) 141.945 g
   E) 46.373 g

   Answer: No Correct Answer Was Provided.

18) A sample of CH_4O with a mass of 32.0 g contains _____ molecules of CH_4O.

   A) 5.32×10^{-23} B) 32.0   C) 6.02×10^{23} D) 1.00   E) 1.88×10^{22}

   Answer: C

19) The element X has two naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are
   in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance (%)	Mass (amu)
^{31}X	35.16	31.16
^{34}X	64.84	34.30

   A) 33.20   B) 30.20   C) 32.73   D) 35.22   E) 34.02
   Answer: A

20) Which of the following is an incorrect representation for a neutral atom:

   A) $^{6}_{3}Li$ B) $^{13}_{6}C$ C) $^{63}_{30}Cu$ D) $^{30}_{15}P$ E) $^{108}_{47}Ag$

   Answer: C

21) Which species has 48 electrons?

   A) $^{48}_{22}Ti$ B) $^{118}_{50}Sn^{+2}$ C) $^{68}_{31}Ga$ D) $^{116}_{50}Sn^{+4}$ E) $^{112}_{48}Cd^{+2}$

   Answer: B

22) Which pair of substances could be used to illustrate the law of multiple proportions?
   A) CH_4, $C_6H_{12}O_6$
   B) NaCl, KCl
   C) H_2O, O_2
   D) CO, CO_2
   E) SO_2, H_2SO_4

   Answer: D

23) Which pair of elements would you expect to exhibit the greatest similarity in their physical and chemical properties?

    A) O, S   B) K, Ca   C) C, N   D) Si, P   E) H, He

Answer: A

24) Which pair of elements is most appropriate to form an ionic compound with each other?

    A) nitrogen, hydrogen
    B) barium, bromine
    C) sulfur, fluorine
    D) oxygen, fluorine
    E) calcium, sodium

Answer: B

25) The correct name for MgF_2 is _____.

    A) manganese bifluoride
    B) magnesium difluoride
    C) monomagnesium difluoride
    D) manganese difluoride
    E) magnesium fluoride

Answer: E

26) Write a balanced equation to show the reaction of sulfurous acid with lithium hydroxide to form water and lithium sulfite.

    A) $HSO_4(aq) + LiOH(aq) \rightarrow H_2O(l) + LiSO_4(aq)$
    B) $H_2SO_3(aq) + 2\ LiOH(aq) \rightarrow 2\ H_2O(l) + Li_2SO_3(aq)$
    C) $H_2S(aq) + 2\ LiOH(aq) \rightarrow 2\ H_2O(l) + Li_2S(aq)$
    D) $HSO_3(aq) + LiOH(aq) \rightarrow H_2O(l) + LiSO_3(aq)$
    E) $H_2SO_4(aq) + LiOH(aq) \rightarrow H_2O(l) + Li_2SO_4(aq)$

Answer: B

27) Which type of formula provides the most information about a compound?

    A) empirical   B) structural   C) molecular

Answer: B

28) Which of the following are decomposition reactions?

    1) $CH_4\ (g) + O_2\ (g) \rightarrow CO_2\ (g) + H_2O\ (l)$
    2) $CaO\ (s) + CO_2\ (g) \rightarrow CaCO_3\ (s)$
    3) $Mg\ (s) + O_2(g) \rightarrow MgO\ (s)$
    4) $PbCO_3\ (s) \rightarrow PbO\ (s) + CO_2\ (g)$

    A) 2 and 3   B) 2, 3, and 4   C) 1, 2, and 3   D) 1, 2, 3, and 4   E) 4 only
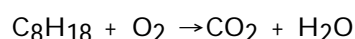
Answer: E

29) When a hydrocarbon burns in air, a possible produced component is _____ .

    A) nitrogen   B) water   C) oxygen   D) argon   E) carbon

Answer: B

30) When the following equation is balanced, the coefficients are _____.

$$C_8H_{18} + O_2 \rightarrow CO_2 + H_2O$$

    A) 4, 4, 32, 36   B) 2, 3, 4, 4   C) 2, 25, 16, 18   D) 1, 4, 8, 9   E) 2, 12, 8, 9

Answer: C

31) If 4.00 moles of C_8H_{18} is burned with 4.00 moles of O_2, which will be the limiting reactant?
    A) H_2O
    B) C_8H_{18}
    C) O_2
    D) CO_2
    E) There is no limiting reactant in this reaction.
    Answer: C

32) When 4.000 moles C_8H_{18} is burned with 4.000 moles of O_2 oxygen, theoretically how many moles of carbon dioxide are formed?
    A) 2.56   B) 5.12   C) 6.25   D) 16.0   E) 8.00
    Answer: A

33) Give the percent yield when 28.16 g of CO_2 are formed from the reaction of 4.00 moles of C_8H_{18} with 4.00 moles of O_2.
    A) 50.0%   B) 20.0%   C) 25.0%   D) 37.5%   E) 12.5%
    Answer: C

34) Combustion analysis of 63.8 mg of a C, H and O containing compound produced 145.0 mg of CO_2 and 59.38 mg of H_2O. What is the empirical formula for the compound?
    A) C_6HO_3 B) C_3H_6O C) CHO   D) C_5H_2O E) C_3H_7O
    Answer: B

35) Determine the molecular formula of a compound that is 62.07% carbon, 10.34% hydrogen, and 27.59% oxygen. The molecular weight is 116.16 g/mol.
    A) C_3H_6O B) $C_3H_6O_2$ C) $C_5H_{12}N_2O$ D) $C_6H_{12}O_2$ E) $C_5H_8O_3$
    Answer: D

36) Which of the following compounds is ethanol?
    A) C_2H_6
    B) C_2H_5OH
    C) $CH_3CO_2CH_3$
    D) CH_3OCH_3
    E) CH_3CO_2H
    Answer: B

37) Which of the following oxyanions is incorrectly named?
    A) ClO_2^-, chlorate
    B) IO_4^-, periodate
    C) SO_3^{2-}, sulfite
    D) BrO_3^-, bromate
    E) MnO_4^-, permanganate
    Answer: A

38) Which one of the following compounds is insoluble in water?
    A) Na_2CO_3 B) $AgNO_3$ C) ZnS   D) K_2SO4 E) $Fe(NO_3)_3$
    Answer: C

39) Which combination will produce a precipitate?
    A) NaOH (aq) and $Sr(NO_3)_2$ (aq)
    B) $Cu(NO_3)_2$ (aq) and $KC_2H_3O_2$ (aq)
    C) $AgC_2H_3O_2$ (aq) and $HC_2H_3O_2$ (aq)
    D) $Pb(NO_3)_2$ (aq) and HCl (aq)
    E) KOH (aq) and HNO_3 (aq)

    Answer: D

40) Which of the following is correctly labeled?
    A) $HCOOH_{(aq)}$ - strong electrolyte
    B) $HNO_{2(aq)}$ - weak electrolyte
    C) $HCl_{(aq)}$ - nonelectrolyte
    D) $CH_3CH_2OH_{(aq)}$ - strong electrolyte
    E) $KCl_{(aq)}$ - weak electrolyte

    Answer: B

41) Which one of the following is a weak acid?
    A) HF   B) HNO_3 C) $HClO_4$ D) HCl   E) HI

    Answer: A

42) The balanced molecular equation for complete neutralization of H_2SO_4 by KOH in aqueous solution is

    _____.
    A) H_2SO_4 (aq) + 2KOH (aq) $\rightarrow$ $2H_2O$ (l) + K_2SO_4 (s)
    B) H_2SO_4 (aq) + 2KOH (aq) $\rightarrow$ $2H_2O$ (l) + K_2SO_4 (aq)
    C) $2H^+$ (aq) + $2OH^-$ (aq) $\rightarrow$ $2H_2O$ (l)
    D) H_2SO_4 (aq) + $2OH^-$ (aq) $\rightarrow$ $2H_2O$ (l) + SO_4^{2-} (aq)
    E) $2H^+$ (aq) + 2KOH (aq) $\rightarrow$ $2H_2O$ (l) + $2K^+$ (aq)

    Answer: B

43) What mass (g) of potassium chloride is contained in 430.0 mL of a potassium chloride solution that has a chloride ion concentration of 0.193 M?
    A) 12.37   B) 0.0643   C) 6.19   D) 0.0830   E) 0.386
    Answer: C

44) The point in a titration at which the indicator changes is called the _____.
    A) end point
    B) setpoint
    C) volumetric point
    D) indicator point
    E) standard point
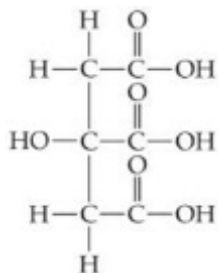
    Answer: A

45) What volume (mL) of 7.48×10^{-2} M hydrochloric acid can be neutralized with 115 mL of 0.244 M sodium hydroxide?
    A) 750   B) 8.60   C) 375   D) 125   E) 188
    Answer: C

46) The structural formula of citric acid is

How many $H^+(aq)$ can be generated by each citric acid molecule dissolved in water?

    A) 1   B) 3   C) 4   D) 6   E) 8

Answer: B

47) In which compound is the oxidation state of oxygen –1?

    A) O_2 B) H_2O C) H_2SO_4 D) H_2O_2 E) KCH_3COO

Answer: D

48) Refer to the selected activity of metals in aqueous solution:

Metal	Oxidation Reaction	
Magnesium	$Mg \longrightarrow Mg^{2+} +$	$2e^-$
Aluminum	$Al \longrightarrow Al^{3+} +$	$3e^-$
Manganese	$Mn \longrightarrow Mn^{2+} +$	$2e^-$
Zinc	$Zn \longrightarrow Zn^{2+} +$	$2e^-$
Chromium	$Cr \longrightarrow Cr^{3+} +$	$3e^-$
Iron	$Fe \longrightarrow Fe^{2+} +$	$2e^-$
Cobalt	$Co \longrightarrow Co^{2+} +$	$2e^-$
Nickel	$Ni \longrightarrow Ni^{2+} +$	$2e^-$
Tin	$Sn \longrightarrow Sn^{2+} +$	$2e^-$
Lead	$Pb \longrightarrow Pb^{2+} +$	$2e^-$
Hydrogen	$H_2 \longrightarrow 2H^+ +$	$2e^-$
Copper	$Cu \longrightarrow Cu^{2+} +$	$2e^-$
Silver	$Ag \longrightarrow Ag^+ +$	e^-
Mercury	$Hg \longrightarrow Hg^{2+} +$	$2e^-$
Gold	$Au \longrightarrow Au^{3+} +$	$3e^-$

Ease of oxidation increases ↑

Which of these metals will be oxidized by the ions of cobalt?

    A) iron   B) copper   C) silver   D) tin   E) nickel

Answer: A

49) What volume (mL) of a concentrated solution of magnesium chloride (9.00 M) must be diluted to 350. mL to make a 2.75 M solution of magnesium chloride?

    A) 45.0   B) 50.0   C) 350   D) 107   E) 2.75

Answer: D

50) Which of the following pairs of atoms represent isotopes?

    A) ^{79}Br, ^{35}Cl B) ^{12}C, ^{14}C C) ^1H, ^{18}O D) ^{77}Se, ^{19}F E) ^{14}N, ^{14}C

Answer: B