1091 1st Midterm Exam _11/04/20_(A)
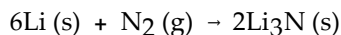
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Calculate the percentage by mass of lead in $Pb(NO_3)_2$.

    A) 44.5   B) 71.2   C) 62.6   D) 38.6   E) 65.3

Answer: C

2) Lithium and nitrogen react in a combination reaction to produce lithium nitride:

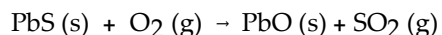 $6Li\ (s)\ +\ N_2\ (g)\ \rightarrow\ 2Li_3N\ (s)$

In a particular experiment, 2.50–g samples of each reagent are reacted. The theoretical yield of lithium nitride is _____ g.

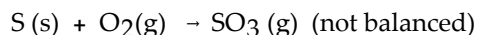   A) 2.09   B) 2.51   C) 6.2   D) 12.5   E) 4.18

Answer: E

3) When the following equation is balanced, the coefficient of sulfur dioxide is _____.

        $PbS\ (s)\ +\ O_2\ (g)\ \rightarrow\ PbO\ (s) + SO_2\ (g)$

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

Answer: A

4) What is the maximum amount in grams of SO_3 that can be produced by the reaction of 1.0 g of S with 1.0 g of O_2 via the equation below?

        $S\ (s)\ +\ O_2(g)\ \rightarrow\ SO_3\ (g)$ (not balanced)

    A) 1.7   B) 2.5   C) 3.8   D) 0.27   E) 2.0

Answer: A

5) Combustion of a 1.031–g sample of a compound containing only carbon, hydrogen, and oxygen produced 2.265 g of CO_2 and 1.236 g of H_2O. What is the empirical formula of the compound?

    A) $C_3H_9O_3$ B) C_3H_5O C) $C_6H_{16}O_2$ D) $C_3H_6O_3$ E) C_3H_8O

Answer: E

6) There are _____ sulfur atoms in 25 molecules of $C_4H_4S_2$.

    A) 6.02×10^{23} B) 1.5×10^{25} C) 3.0×10^{25} D) 4.8×10^{25} E) 50

Answer: E

7) How many carbon atoms are there in 52.06 g of carbon dioxide?

    A) 5.206×10^{24}
    B) 7.122×10^{23}
    C) 1.424×10^{24}
    D) 3.134×10^{25}
    E) 8.648×10^{-23}

Answer: B

8) What is the empirical formula of a compound that contains 49.4% K, 20.3% S, and 30.3% O by mass?

   A) KSO_4 B) KSO_2 C) K_2SO_3 D) K_2SO_4 E) KSO_3

Answer: C

9) One mole of _____ contains the smallest number of atoms.

   A) Na_3PO_4 B) $Al_2(SO_4)_3$ C) S_8 D) $C_{10}H_8$ E) NaCl

Answer: E

10) An element cannot _____.

   A) be part of a heterogeneous mixture
   B) interact with other elements to form compounds
   C) be separated into other substances by chemical means
   D) be part of a homogeneous mixture
   E) be a pure substance

Answer: C

11) A 4.369 g sample of metal is placed in a flask. Water is added to the flask and the total volume in the flask is read to be 126.4 ml. The mass of the water, flask, and metal is 268.5 g. If the mass of the flask is 139.3 g and the density of water is 1.000 g/mL, the density of the solid is _____ g/cm^3.

   A) 2.78   B) 0.641   C) 3.21   D) 1.56   E) 0.366

Answer: A

12) The quantity 1.0 mg/cm^2 is the same as 1.0 × _____ kg/m^2.

   A) 10^{-4} B) 10^{-6} C) 10^4 D) 10^2 E) 10^{-2}

Answer: E

13) The number 1.00430 has _____ significant figures.

   A) 4   B) 2   C) 6   D) 3   E) 5

Answer: C

14) Convert –41.0°F to degrees Celsius.

   A) –40.6°C   B) –73.0°C   C) –117°C   D) –9.0°C   E) –57.6°C

Answer: A

15) Which of the following is a physical property?

   A) the density of lead
   B) platinum metal does not react with hydrochloric acid
   C) ozone reacts with silver to give silver oxide
   D) sulfur burns in oxygen to form sulfur trioxide

Answer: A

16) The correct result (indicating the proper number of significant figures) of the following calculation of the molecular mass for H_2SO_4 is _____.

$$4 \times 15.9994 + 32.066 + 2 \times 1.0079$$

   A) 98.074   B) 98.079   C) 98.84   D) 98.838   E) 98.08

Answer: B

17) Which one of the following is often easily separated into its components by simple techniques such as filtering or decanting?
    A) compounds
    B) homogeneous mixture
    C) heterogeneous mixture
    D) elements
    E) solutions

Answer: C

18) Different isotopes of a particular element contain different numbers of _____.
    A) protons
    B) neutrons
    C) protons, neutrons, and electrons
    D) protons and neutrons
    E) None of the above is correct.

Answer: B

19) Which species is an isotope of ^{39}Cl?
    A) ^{39}Ar B) $^{40}Ar^+$ C) $^{36}Cl^-$ D) $^{34}S^{2-}$ E) ^{80}Br

Answer: C

20) Which isotope has 36 electrons in an atom?
    A) $^{78}_{34}Se$ B) $^{36}_{80}Hg$ C) $^{80}_{35}Br$ D) $^{34}_{17}Cl$ E) $^{80}_{36}Kr$

Answer: E

21) The correct formula for molybdenum (IV) hypochlorite is _____.
    A) $Mo(ClO_3)_4$ B) $Mo(ClO_4)_4$ C) $Mo(ClO_2)_4$ D) $Mo(ClO)_4$ E) $MoCl_4$

Answer: D

22) The charge on the silver ion in the salt AgCl is _____.
    A) +3   B) +2   C) +1   D) +5   E) +4

Answer: C

23) Which atom has the smallest number of neutrons?
    A) oxygen–16   B) carbon–14   C) neon–20   D) nitrogen–14   E) fluorine–19

Answer: D

24) _____ typically form ions with a 2+ charge.
    A) Alkaline earth metals
    B) Chalcogens
    C) Halogens
    D) Transition metals
    E) Alkali metals

Answer: A

25) The empirical formula of a compound with molecules containing 12 carbon atoms, 14 hydrogen atoms, and 6 oxygen atoms is _____.
   A) $C_6H_7O_3$ B) C_2H_4O C) CHO   D) $C_{12}H_{14}O_6$ E) CH_2O

   Answer: A

26) The average atomic weight of copper, which has two naturally occurring isotopes, is 63.5. One of the isotopes has an atomic weight of 62.9 amu and constitutes 69.1% of the copper isotopes. The other isotope has an abundance of 30.9%. The atomic weight (amu) of the second isotope is _____ amu.
   A) 64.8   B) 28.1   C) 63.8   D) 63.2   E) 64.1

   Answer: A

27) The correct name for N_2O_5 is _____.
   A) nitrogen oxide
   B) nitrogen pentoxide
   C) nitrous oxide
   D) nitric oxide
   E) dinitrogen pentoxide

   Answer: E

28) The ions Ca^{2+} and PO_4^{3-} form a salt with the formula _____.
   A) $Ca_3(PO_4)_2$ B) $CaPO_4$ C) $Ca_2(PO_4)_3$ D) Ca_2PO_4 E) $Ca(PO_4)_2$

   Answer: A

29) What is the molarity of a NaOH solution if 15.5 mL of a 0.220 M H_2SO_4 solution is required to neutralize a 25.0–mL sample of the NaOH solution?
   A) 0.355   B) 0.136   C) 0.273   D) 42.6   E) 0.710

   Answer: C

30) What is the concentration (M) of CH_3OH in a solution prepared by dissolving 34.4 g of CH_3OH in sufficient water to give exactly 230 mL of solution?
   A) 11.9   B) 1.59   C) 4.67   D) 0.00159   E) 5.31

   Answer: C

31) What mass (g) of barium iodide is contained in 188 mL of a barium iodide solution that has an iodide ion concentration of 0.532 M?
   A) 39,100   B) 39.1   C) 276   D) 19.6   E) 19,600

   Answer: D

32) Calculate the concentration (M) of sodium ions in a solution made by diluting 50.0 mL of a 0.874 M solution of sodium sulfide to a total volume of 250.0 mL.
   A) 0.350   B) 4.37   C) 0.525   D) 0.175   E) 0.874

   Answer: A

33) In which species does nitrogen have the highest oxidation number?
   A) NO_2^- B) NH_3 C) N_2 D) $NaNO_3$ E) HNO_2

   Answer: D

34) When aqueous solutions of Pb(NO3)2 and NaCl are mixed, PbCl2 precipitates. The balanced net ionic equation is _____.

   A) Pb^{2+} (aq) + $2NO_3^-$ (aq) → $Pb(NO_3)_2$ (s)

   B) Pb^{2+} (aq) + $2Cl^-$ (aq) → $PbCl_2$ (s)

   C) Pb^{2+} (aq) + $2NO_3^-$ (aq) → $Pb(NO_3)_2$ (aq)

   D) $Pb(NO_3)_2$ (aq) + 2NaCl (aq) → $PbCl_2$ (aq) + $2NaNO_3$ (s)

   E) $Pb(NO_3)_2$ (aq) + 2NaCl (aq) → $PbCl_2$ (s) + $2NaNO_3$ (aq)

Answer: B

35) Which one of the following is a diprotic acid?
   A) phosphoric acid
   B) sulfuric acid
   C) hydrofluoric acid
   D) nitric acid
   E) chloric acid

Answer: B

36) Which one of the following compounds is insoluble in water?
   A) Na_2CO_3 B) ZnS   C) $AgNO_3$ D) K_2SO_4 E) $Fe(NO_3)_3$

Answer: B

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

Answer: B

38) Which of the following is an oxidation–reduction reaction?
   A) $Ba(C_2H_3O_2)_2$ (aq) + Na_2SO_4 (aq) → $BaSO_4$ (s) + $2NaC_2H_3O_2$(aq)
   B) $AgNO_3$ (aq) + HCl (aq) → AgCl (s) + HNO_3 (aq)
   C) Cu (s) + $2AgNO_3$ (aq) → 2Ag (s) + $Cu(NO_3)_2$ (aq)
   D) HCl (aq) + NaOH (aq) → H_2O (l) + NaCl (aq)
   E) H_2CO_3 (aq) + $Ca(NO_3)_2$ (aq) → $2HNO_3$ (aq) + $CaCO_3$ (s)

Answer: C

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

Answer: B

40) How many moles of Na$^+$ are present in 343 mL of a 1.27 M solution of Na$_2$SO$_4$?

A) 0.436   B) 3.70   C) 1.31   D) 0.871   E) 11.1

Answer: D